Up2Circ – Boosting the Uptake of Circular Business Model, Product and Process Innovation

Horizon Europe 2021-2027

GRANT AGREEMENT NUMBER — 101091367

SECTORIAL CATALOGUE
DIGITAL

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Short introduction to the industrial ecosystem / content focus

A digital ecosystem consists of internal solutions, applications, and systems, along with external trading partners, suppliers, customers, third-party data service providers, and all their respective technologies.

The digital ecosystem is a dynamic, interconnected network that necessitates reliable communication among customers and trading partners. In that sense, the world is changing drastically through the ever-evolving era of digitalization and the integration of Information Technology (IT) and Artificial Intelligence (AI).

Developments in the information and communication technology (ICT) sector have led to significant changes in the methods of production and patterns of employment across the European Union (EU).

The total value added of the EU's ICT sector was over €631 billion in 2020, and will get close to $1.4 trillion by 2026, growing at a 5% five-year 2021–2026.

To give some context to this figure, the ICT sector was equivalent to 5.2 % of the EU's gross domestic product (GDP) in 2020.

The EU's ICT sector employed more than 6.4 million people in 2020.

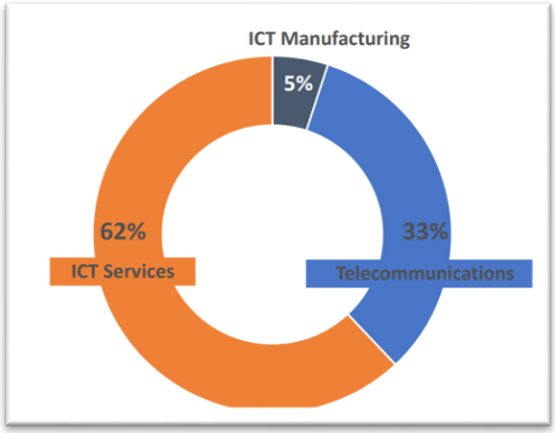

Image 1: Eurostat, based on the definition of the Digital ecosystem.

The digital ecosystem covers ICT Manufacturing, Services (excluding telecommunications), Telecommunications. ICT Services account for the 95% of the total ICT value added. Within the ICT Services subsector, telecommunications play an important role: they make up around 33% of the value added of the services sub-sector and 16% of its employment.

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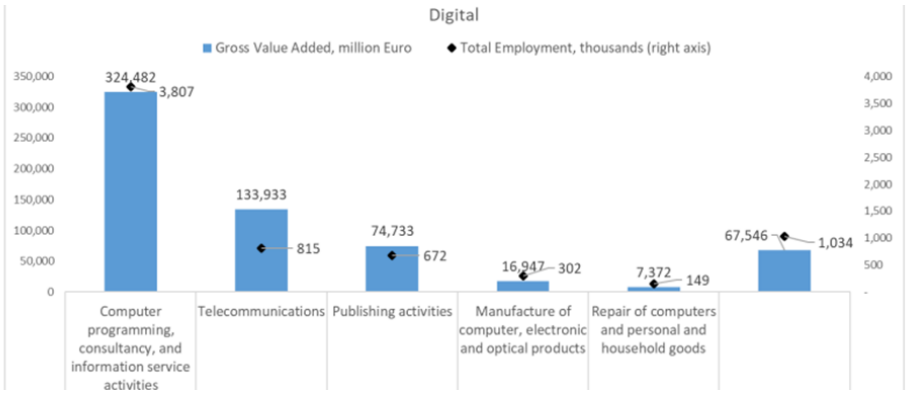
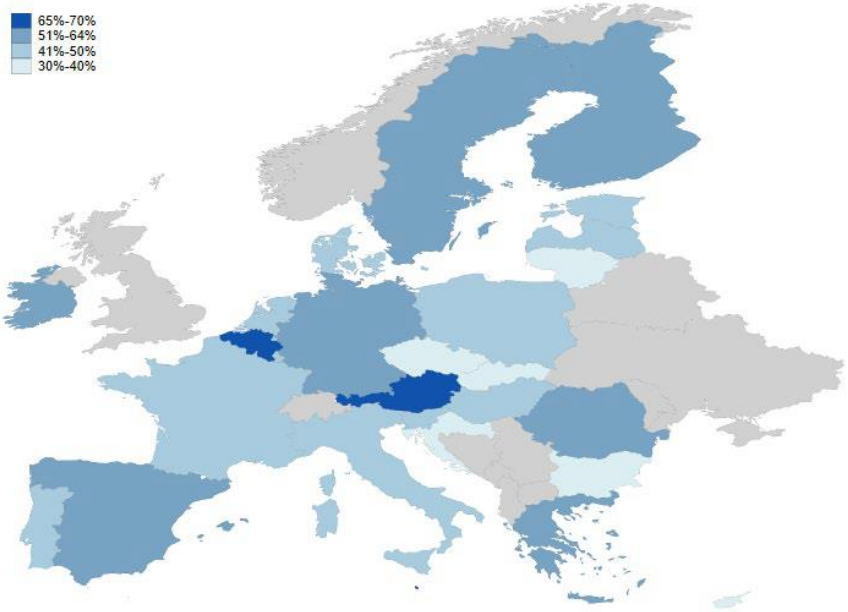


Image 2: Source: Eurostat, National Accounts.

Digitalisation in the European Union

More than half of firms invested in digitalisation in response to the COVID-19 crisis. In the European Union, 53% of firms report taking action to become more digital — for example by providing services online — according to the results of the EIB Investment Survey (EIBIS) conducted from April to July 2022 (EIB, 2023). However, significant differences exist between countries and firm sizes (Jaumotte et al., 2023).

Investment in digitalisation as a response to COVID-19 (% of firms), by country



Source: EIBIS 2022.

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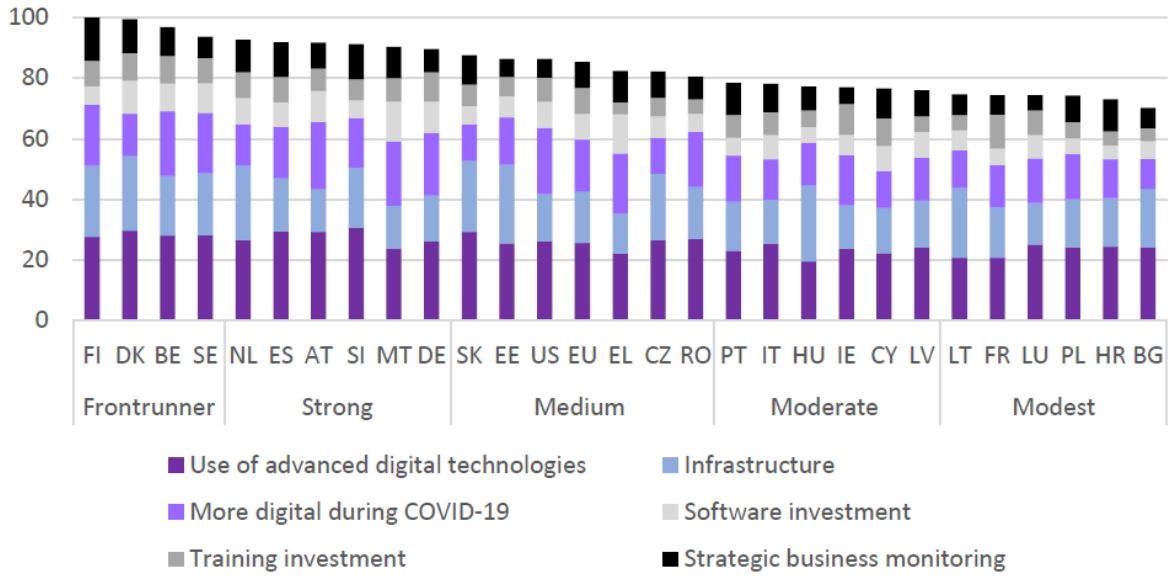
The share of firms that invested in digitalisation as a response to COVID-19 is higher in the United States than in the European Union, and this gap increased from 2021 to 2022. Micro and small firms are lagging behind medium-sized and large firms. In the European Union, only 30% of microenterprises stated that they took steps to improve digitalisation in 2022, compared with 62% of large firms. European micro and small firms are also less likely than their US peers to report having invested in becoming more digital.

In addition to moving ahead with basic digitalisation, European firms are accelerating the adoption of new, advanced digital technologies after putting these processes on hold in the first year of the pandemic. The European Union has been closing its digital adoption gap with the United States over the past four years. The share of EU firms implementing advanced digital technologies increased from 2021 to 2022, reaching 69% compared with 71% in the United States.

EIBIS Corporate Digitalisation Index, by country.



The crisis emphasised the need for digital connectivity, skills and digital tools for businesses and citizens.

Compared to international competitors, the EU is currently underinvesting in digital technologies, e.g. AI, robotics, blockchain, quantum, high performance computing, cybersecurity.

In the other hand, SMEs are not fully exploiting potential of digitalisation. Enterprises are increasingly digitised, with large companies taking the lead, but there are room for improvement. Only 38.5% of large companies rely already on advanced cloud services and 32.7% are using big data analytics. However, the vast majority of SMEs are not yet taking advantage of these technologies.

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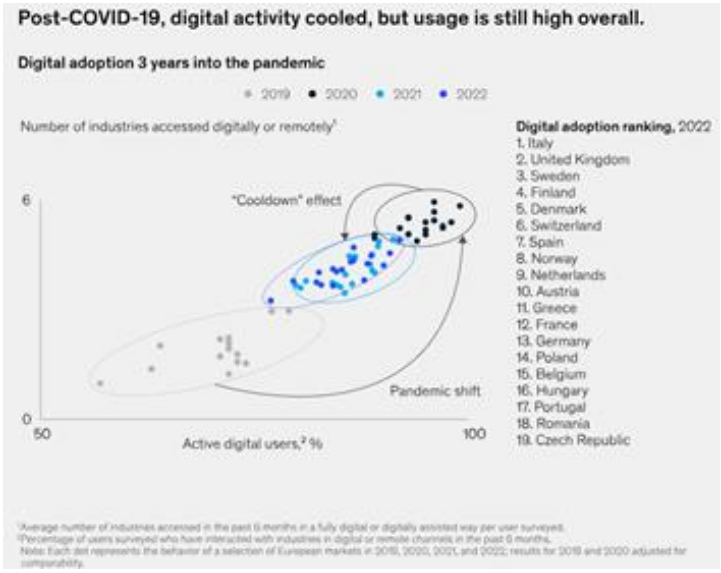

Source: McKinsey & Company[1]

To ensure a Europe at the cutting edge of technology, the European Commission has established a Digital Compass, with concrete targets to be achieved by 2030 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021DC0118. This Compass includes the means to realise the digital principles by establishing checkpoints along the four cardinal points. The first two will focus on infrastructure and education, and the other two on the digital transformation of businesses and public services.

The future of the digital ecosystem looks promising, with endless possibilities for innovation and growth.

Challenges for the sector with regard to sustainability demands, including a brief overview of relevant regulations

Although the digital ecosystem has not been among the most hardly hit, the current crisis and the negative impact on investments still risk undermining the development and deployment of strategic digital capabilities, such as 5G, cybersecurity, HPC, AI. At the same time, the COVID-19 pandemic has highlighted the crucial role played by digital technologies in all sectors, and triggered an unprecedented

1 https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/opportunity-knocks-for-europes-digital-consumer-digital-trends-show-big-gains-and-new-opportunities

demand for digital technologies and infrastructures. Connectivity in the EU is steadily improving, businesses are increasingly taking up digital solutions, and citizens are using more digital tools . However, significant variations still exist across sectors, Member States and regions, large businesses and SMEs. Significant gaps also remain when it comes to digital skills, which are a key enabler of digitalisation. Digital transformation of sectors like construction and transportation is crucial to achieve more circularity and further energy efficiency, and meet the EU target of carbon neutrality by 2050.

Digital sustainability is the responsible adoption and use of digital technology to impact society and the environment in the long term positively. This includes considering energy efficiency, sustainability in producing and disposing of electronic devices, and minimizing digital waste, among other factors. It also encompasses the ethical and responsible use of data and technology to protect the privacy and promote a fair digital economy.

Digitalization faces more challenges than just respecting the environment. It also faces the challenge of addressing inequalities and improving access to education.

Main **challenges** of Digital sustainability:

- Energy efficiency
- E-waste
- Ethical data protection
- Fair economy and accessibility
- Green IT

Energy efficiency

The information and communication technology (ICT) sector, including data centres, devices and communication networks, has a significant energy and climate footprint, estimated at between 2.1%-3.9% of global greenhouse gas emissions in 2020, putting it on a par with aviation industry emissions. If nothing changes, this share could increase to over 14% by 2040.

In the EU, data centres are significant users of energy. In 2018, EU data centres accounted for 2.7% of electricity demand in the EU. This is projected to increase by over 200% between 2020 and 2030 as more cloud services and high-performance computing (HPC) are used for computing and storage.

To address this challenge, efficiency must be promoted at every digital technology life cycle stage, from production to disposal. This includes using more efficient and sustainable technologies, materials, and infrastructure.

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Shifting to renewable energy sources and using energy more efficiently are central to making data centres more sustainable. More efforts are needed to reduce emissions associated with the production and operation of data centres, water consumption and the demand for rare metals.

Additionally, the lifecycle emissions of user devices account for about 50% of the total ICT footprint. While the International Energy Agency (IEA) estimates that by 2040 the global energy consumption of control devices in buildings is expected to be lower than the expected energy savings, the challenge should not be overlooked. Connected devices consume energy even when they are not in use, to maintain connectivity

Consequently, digitalisation can be a truly sustainable solution for the clean energy transition only if the energy performance of ICT technology is improved and its climate footprint is reduced.

E-waste

Rapid obsolescence and short life cycle of some tech devices lead to large amounts of electronic waste. Many contain toxic materials and are not correctly dispatched, posing severe threats to the environment and human health.

The composition of computers includes a wide range of different metals and other materials that are expensive to mine and cause a variety of disposal issues. This includes aluminium, magnesium, copper, cobalt, nickel, and iron.

To face it, sustainability in the life cycle of electronic devices must be promoted, including using more sustainable and recyclable materials, extending device life, and promoting recycling and reuse.

For example, extending the lifetime of all smartphones by just 1 year would save 2.1 Mt CO2 per year by 2030, equivalent to removing 1 million cars from our roads. Switching from 4G to 5G networks can reduce energy consumption by up to 90%.

In 2019, 12Mt of e-waste were generated in the EU, contributing to around 53.6Mt worldwide. The trend points to rising numbers, with global e-waste predicted to reach 74.7Mt by 2030. Multiple device ownership, the growth of cloud computing services, short product lifespans and replacement cycles are contributing to a growing e-waste phenomenon, meaning a loss of resources and significant costs for the economy. In addition, if not handled well in its end-of-life phase, the hazardous substances in e-waste pose a pollution threat to public health and the environment.

Companies and consumers must be sensitized about responsible disposal and adopting sustainable practices in the industry. This means preserving the value of products and materials for as long as

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possible and reducing resource consumption and waste by increasing repair, reuse, remanufacturing and recycling of materials and products.

Risk of increased cyberattacks

The European Union Agency for Cybersecurity (ENISA) warns against numerous challenges that could threaten cybersecurity, including an increase in digital surveillance and loss of privacy, an increase in targeted attacks due to more connected devices, more advanced hybrid threats, human failures, outdated cyber-systems, a lack of skilled workers, misuse of artificial intelligence (AI) and cross-border ICT service providers as a single point of vulnerability.

As more devices are connected to the energy infrastructure and the energy system is increasingly digitalised throughout buildings, transport, agriculture and industry, cybersecurity risks increase as well. If these risks are not addressed adequately, digitalisation may turn into a source of energy insecurity instead of functioning as a driver of the transition towards renewable and more efficient energy systems. As electricity grids and pipelines are closely interconnected not only across Europe but internationally with other critical infrastructures, a cyberattack could, for example, disrupt electricity supply in numerous countries and cause significant problems in sectors such as transport, banking and financial markets, health, public administration, space, water and food.

Ethical data protection

When more data is collected and shared, concerns arise about privacy and the ownership of this data. Digital technology can significantly impact privacy, security, and human rights. For example, massive use of personal data and AI can create inequalities and result in discrimination and exclusion of certain groups.

Concerns around data protection are often also a barrier to sharing data among relevant stakeholders. Operators are sometimes reluctant to share data that could be used for multimodal and interoperable travel information, ticketing and payment.

Ethics and responsibility in digital technology must be promoted, including adopting ethical standards and practices in technology development and use (such as the GDPR, General Data Protection Regulation, in Europe), and respecting human rights and privacy in data handling.

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Fair economy and accessibility

Despite technological advances, a digital divide still limits access to technology and information for many people worldwide, including those in rural, poor, and marginalized areas.

Digital inclusion and ensuring equal access to technology and information must be promoted to face it right. This includes investing in infrastructure, improving internet access and digital skills, and creating accessible content in different languages and formats.

These challenges require a long-term commitment from all stakeholders, including tech organizations, users, and regulators. The United Nations Sustainable Development Goals, discussed in this post, are a good foundation for building this future.

Green IT

Green IT is the set of good practices, methodologies, or a way of working, let say, a business culture, whose purpose is to minimise the environmental impact of a company.

This focuses on ensuring that technologies, whether hardware or software, do not pollute and are not harmful to the environment. This is because the expenditure and consumption produced by ICTs is increasing and must be regulated, especially in large companies and SMEs.

Reducing energy consumption or efficient resource management are some of these measures that contribute to reducing this impact and reducing the carbon footprint in a context of climate change.

The term green IT or green computing refers both to technology products and services, as well as to strategies for using ICTs that prioritise respect for the environment.

REGULATIONS

The European Union has adopted several sweeping digital regulations, such as the Digital Services Act (DSA) https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/digital-services-act-ensuring-safe-and-accountable-online-environment_en and Digital Markets Act (DMA) https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/digital-markets-act-ensuring-fair-and-open-digital-markets_en, while proposing a number of new measures, including the Data Act, the Artificial Intelligence Act, and the Media Freedom Act. These regulations will shape, likely quite dramatically, the environment for doing digital business in Europe

and beyond. They will have profound implications on the leading U.S. digital service providers designated by the European Union as “gatekeepers”—large digital services providers that are expected to adhere to regulatory requirements—as well as these companies’ hundreds of millions of transatlantic European business and individual customers. By impacting primarily U.S. companies instead of Asian or European ones, Europe’s digital policies will also shape U.S. and European global strategic and national security interests. This study will assess the potential implications of new and proposed EU digital acts on U.S. digital service providers, on their customers in Europe and the United States, and on the EU and U.S. economies and exports.

RULES FOR SAFE AND TRANSPARENT AI

The Proposal for a Regulation on artificial intelligence was announced by the Commission in April 2021. It aims to address risks of specific uses of AI, categorising them into 4 different levels: unacceptable risk, high risk, limited risk, and minimal risk.

In doing so, the AI Regulation will make sure that Europeans can trust the AI they are using. The Regulation is also key to building an ecosytem of excellence in AI and strengthening the EU's ability to compete globally. It goes hand in hand with the Coordinated Plan on AI.

https://www.europarl.europa.eu/news/en/press-room/20230609IPR96212/meps-ready-to-negotiate-first-ever-rules-for-safe-and-transparent-ai

https://digital-strategy.ec.europa.eu/en/library/proposal-regulation-laying-down-harmonised-rules-artificial-intelligence

CYBERSECURITY POLICIES

The European Commission and the High Representative of the Union for Foreign Affairs and Security Policy presented a new EU Cybersecurity Strategy at the end of 2020.

The Strategy covers the security of essential services such as hospitals, energy grids and railways. It also covers the security of the ever-increasing number of connected objects in our homes, offices and factories.

The Strategy focuses on building collective capabilities to respond to major cyberattacks and working with partners around the world to ensure international security and stability in cyberspace. It outlines how a Joint Cyber Unit can ensure the most effective response to cyber threats using the collective resources and expertise available to the EU and Member States.

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https://digital-strategy.ec.europa.eu/en/policies/cybersecurity-policies

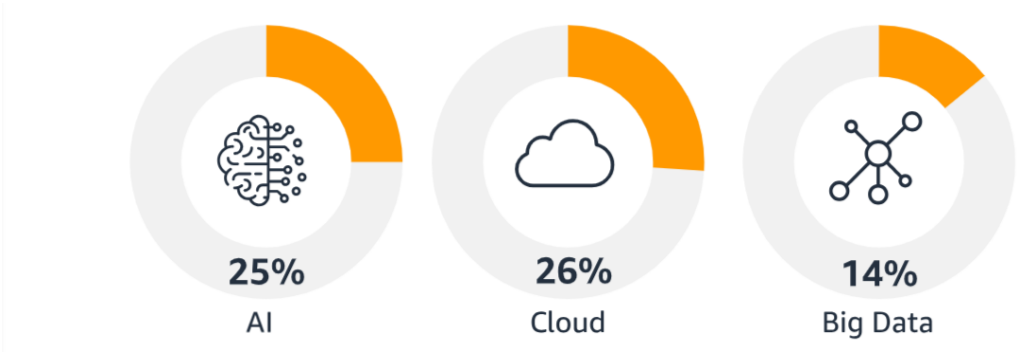
EU TELECOM RULES

Today marks the deadline for Member States to transpose the new EU telecom rules into national law. The European Electronic Communications Code, which entered into force in December 2018, modernises the European regulatory framework for electronic communications, to enhance consumer's choices and rights, ensure higher standards of communication services, as well as boost investment for more connectivity and more digital innovation.

https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1547633333762&uri=CELEX:32018L1972

CE opportunities for the sector, including best practices

The EU's tech sector is growing rapidly, but many companies haven't fully taken the advantage of existing technologies such as the AI



According to the Digital Transformation Policy from DIGITALEUROPE[2], there are several areas covered by digital transformation:

- Artificial intelligence
- Digital manufacturing

[2] https://www.digitaleurope.org/policies/digital-transformation/

- Digital health
- Digital finance
- Autonomous driving

[3]The digital economy extends well beyond digitization and automation.

Instead, this new paradigm harnesses multiple advanced technologies and new technology platforms. Those technologies and platforms include but aren't limited to: hyperconnectivity, the internet of things (IoT), big data, advanced analytics, wireless networks, mobile devices and social media.

[4]Digitalisation is opening up new opportunities for SMEs to innovate and flourish (OECD, 2019, p.7). Therefore, SMEs are adopting different emerging technologies, including 3D printing and blockchain, to support their engagement in CE-related initiatives. The natural environmental orientation of firms leads to higher profitability in the long term (Menguc & Ozanne, 2005). Indeed, digital and environmental orientation has a positive direct effect on product innovation performance. However, pursuing a dual strategy towards digitalisation and environmental sustainability was not found to be significant for product innovation performance (Ardito et al., 2021). Ranta et al. (2018) studied the business models of CE-driven business ventures in terms of their value proposition, value creation and delivery, and value capture; they do not explicitly consider the value such models provide to customers, and nor do they consider the role of digital technologies in enhancing the value of CE initiatives. Therefore, it is unclear how SMEs can generate value for customers from a CE-oriented business model by utilising digital technologies and what kind of capabilities they need to develop to generate such a competitive advantage.

More information:

- The future of industry
- Digital for health

[3] https://www.techtarget.com/searchcio/definition/digital-economy

[4] https://www.sciencedirect.com/science/article/pii/S014829632100953X

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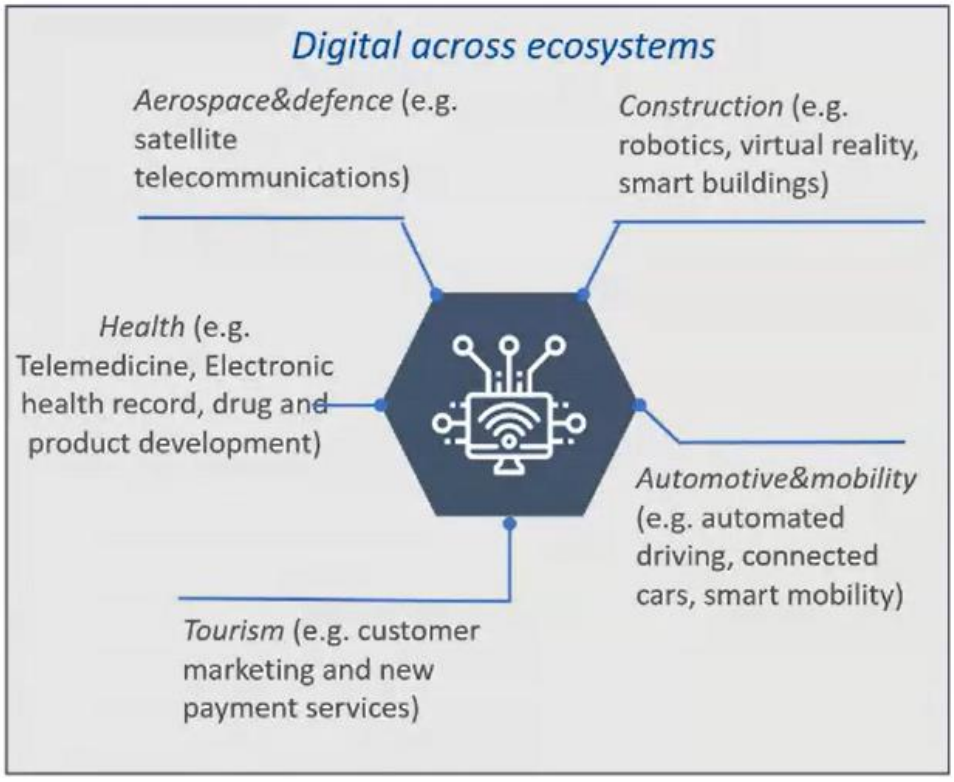

Main technology providers for a digital green economy

The main technology providers for a digital green economy are a diverse set of companies and organizations that offer a wide range of products and services. Here are some examples of technology providers for a digital green economy:

Renewable energy companies: Renewable energy companies are at the forefront of the digital green economy, providing technologies such as solar panels, wind turbines, and energy storage systems. Companies such as Tesla, SunPower, and First Solar are leaders in the renewable energy space and are developing new technologies to make clean energy more affordable and accessible.

Renewable energy technologies and supporting infrastructures are resource intensive as large amounts of critical raw materials, composites, plastics, metals, and concrete are required in the construction of renewable energy production plants.

Therefore, renewable energy technologies must be manufactured and managed in the most environmental, economic, and socially sustainable way. To this end, circular economy strategies can narrow, slow, and close resource loops in helping to achieve these goals (Bocken et al. 2016). However,

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technology design for the circular economy is challenging and demands a better understanding of resource requirements, material alternatives, use performance and end-of-life solutions to identify the most suitable life cycle management strategies.

For solar, full life cycle assessment studies have demonstrated that most of the impacts are associated with the production and the end-of-life stages (Mukoro et al.,2021). Solar-production countries with predominantly fossil-based energy mix will generate devices with higher embedded greenhouse gasses.

Another sustainability issue arises in the wind turbines (WT) that can house around 25,000 components with more than 2,000 tonnes of material, of which critical raw materials and composites are a challenge for the wind industry

Internet of Things (IoT) companies: One way that IoT can help to create a circular economy is by enabling companies to track their production and consumption data more accurately. This data can be used to identify opportunities for efficiency, such as reducing energy use in manufacturing processes or minimizing the amount of waste generated. In addition, IoT can be used to monitor the quality of products and ensure that they are safe for consumers. Finally, IoT can help to manage inventory more effectively, allowing businesses to maximize the use of resources and reduce the amount of waste generated.

Another way that IoT can help to create a circular economy is by facilitating the sharing and reuse of products and materials. IoT-enabled sensors can be used to track the condition of products so that they can be reused or shared rather than thrown away. This not only reduces waste, but also helps to ensure that products are not wasted due to lack of use.

Artificial intelligence (AI) companies: AI is becoming increasingly important in the digital green economy, with applications such as optimizing energy use, improving agricultural yields, and reducing waste.

Here there are a range of applications across sectors:

Design circular products, components, and materials. AI can enhance and accelerate the development of new products, components, and materials fit for a circular economy through iterative machine-learning-assisted design processes that allow for rapid prototyping and testing.

Operate circular business models. AI can magnify the competitive strength of circular economy business models, such as product-as-a-service and leasing. By combining real-time and historical data from products and users, AI can help increase product circulation and asset utilization through pricing and demand prediction, predictive maintenance, and smart inventory management.

Optimize circular infrastructure. AI can help build and improve the reverse logistics infrastructure required to “close the loop” on products and materials, by improving the processes to sort and disassemble products, remanufacture components, and recycle materials.

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Circular economy platforms: Circular platforms, which combine digital marketplaces with circular models of production and consumption, can play a vital role in increasing the reuse, repair and recycling of valuable resources.

There are several opportunities for the role of platforms in the circular economy. They include:

- Product and material exchanges where businesses exchange surplus or waste materials that can be reused for other use cases.
- Reuse/resale marketplaces and programs for clothing and other items.
- Platforms for sharing assets like cars and real estate spaces to reduce idle capacity.
- Circular supplier networks committed to practices such as take-back programs and waste reduction.
- Sustainable logistics collectives that collaborate on backhauling and asset sharing to reduce carbon emissions and miles traveled.

E-mobility companies: Shifting the automotive sector away from combustion engines and toward green transportation is a key strategy for many governments looking to meet ambitious climate targets. Supported by government incentives and the phasing out of internal combustion vehicles in many countries, the e-mobility sector is one of the automotive sector's fastest-emerging trends and is expected to achieve significant growth over the decade ahead.

E-mobility companies such as Tesla, BYD, and General Motors are developing electric vehicles and charging infrastructure, which are critical for reducing emissions in the transportation sector.

Fintech companies: Through technologies such as advanced data analytics, blockchain or artificial intelligence, fintech can help companies to evaluate and reduce their environmental impact, and investors to channel their operations towards more sustainable assets.

FinTech can enable circular economy by enhancing financial/transaction data with product information such as material composition, emissions along supply chain, instructions for disassembly/recycling, product profile/pics for resale/share economy.

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Best practices

To see how companies adapt to a new digital landscape, it's essential to look more closely at some case studies. From the many success stories out there, the following five companies are incredibly successful examples of large-scale digital transformation in 2022.

IKEA

IKEA dominates the furniture industry. The company has done this by adapting to new working practices. Their digital adoption strategy has recently helped them keep their competitive advantage over other companies.

IKEA's stores used to be very different from an eCommerce platform. But when they started to prioritize the digital side of their business, online sales tripled. Their brick-and-mortar stores now act more like fulfillment centers than retail outlets. Even within stores in selected countries, customers can now pay for their purchases without going through the checkout.

Underneath the customer experience, the company quietly revised its supply chain systems. It was only possible to change one process.

The example of IKEA shows how a full digital transformation process can help a company to stay relevant.

Armstrong World Industries

AWI is one of the USA's leading manufacturers of ceilings and walls, bringing in a revenue of over $1 billion in 2021.

Armstrong's digital transformation started by improving weaknesses in its financial processes. This meant investment in Enterprise Resource Planning (ERP) software, transparent spending, and attention to cybersecurity.

These improvements became the basis of further digital strategies to support customers through their buying journey, with a massively improved website and customer services.

For Armstrong, the digital transformation started with financial systems but ended up providing a fully improved customer experience.

Capital One

Capital One has used new artificial intelligence technologies to provide brilliant customer service. As one of the first banks to manipulate Amazon's Alexa-enabled devices, their customers can now quickly get the information they need when they need it.

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By asking, “what’s my balance?”, “How much is my next car payment?” and “what’s the due date on my next credit card bill?” customers get answers without even logging in to online banking.

Capital one shows how a focused digital adoption strategy can improve customer service. Their digital transformation project reconfigured only part of the business. At the right time, small interventions can produce very effective changes.

Microsoft

Microsoft have been leaders in software innovation since the dawn of home computing in the late 1980s. But faced with the advent of cloud-based software systems in the early 2000s, their long-established distribution model suddenly seemed dated.

Their digital strategy was to completely overhaul their delivery systems, using their proprietary cloud solution. They launched Microsoft Azure in 2008. Azure has now become the 2nd biggest cloud provider in the world, providing a vast range of digital services for individuals and companies of all sizes.

As market leaders, Microsoft could have chosen to behave like Blockbuster video. Instead, they made a shrewd decision to completely update their digital strategy. Without that radical change program, they could already have been forgotten.

NIKE’s Digital Transformation through SNKRS App

NIKE, a leading brand in sports footwear, is now focusing on mobile devices. Using machine learning and recommendation algorithms, it uses advanced technologies.

One of the company’s mobile applications helps choose the best shoe based on a leg scan.

A 13-point map of the feet is created by scanning the feet. In addition, the application provides the company with valuable information for making future footwear projects.

Its NIKE + loyalty program, which rewards its most active members, is one of the company’s most important projects. Sales increased significantly in Japan after the solution was implemented, and the Nike SNKRS application also recorded a 100% increase in sales.

In NIKE’s case, innovation has also led to a modernization of internal company operations. Design teams can work more quickly and efficiently by digitizing 6,000-footwear materials, and this directly affects response time to market demands.

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Overview of tech-savvy SMEs that develop/offer solutions to increase circularity in the sector

The network of European Digital Innovation Hubs, along with the AI-ondemand platform, the AI Testing and Experimentation Facilities and the EUwide Data Spaces create unique synergies that help both less digital savvy SMEs and disruptive innovators capture the real value of the data economy and deploy AI-based tools and services by providing them with innovation services and access to technical expertise. The aim is that by 2030, 75% of European enterprises have taken up cloud computing services, big data and Artificial Intelligence.

Here you can find some of tech-savvy solutions:

Renacens: Expert companies in the development of solutions for the new technologies sector. They specialise in 3D and Virtual Reality technology solutions, as well as state-of-the-art web developments to improve the user experience. They have their own software developments and work, among others, for some of the most important airlines in the world.

ECapture: Leading company in image analysis and processing, which allows you to generate 3D models with any camera.

Cedesa Digital: Company dedicated to software development and ICT project management. Positioned at national level and a benchmark as such in the fields of computer forensics and cybersecurity.

MOBBEEL SOLUTIONS: Global pioneer in biometric recognition technology for mobile devices without the need for specific hardware. Application sectors: banking, travel, insurance, health, telecommunications, online gaming, etc. and in a wide range of use cases.

Metaphase07: Consultancy specialising in software engineering and maintaining software solutions. With proprietary technologies around natural language processing and computer vision, they offer comprehensive solutions for the conversion of AI models into functional and marketable products.

Sngular: Company developer of custom software solutions for some of the leading financial institutions in Europe. Sngular develops technology and innovation projects globally for leading companies in the sectors that drive transformation and innovation, such as Banking, Pharma, Energy, Retail, Health, Industry, Telco and Entertainment.

Dufter GmbH, which has developed a solution based on AI to build circular furniture efficiently.

Nest is a startup that has created a line of cutting edge, energy-saving thermostats. Nest thermostats can be controlled remotely using a smartphone or tablet, and can learn your heating and cooling preferences over time.

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Cirplus: Hamburg-based cirplus is the global B2B marketplace for recycled plastics. They are digitising and shortening the transaction process for plastic processors and recycling companies. Founded in 2018, the platform consolidates all aspects of the transaction process including finding, negotiating, contracting, shipping, insurance, and paying for recyclates and plastic waste. Its mission is to lower costs for recyclates over virgin plastics, which supports the shift to a circular economy in plastics

Greyparrot: Greyparrot is an analytics platform for the circular economy. Greyparrot leverages computer vision technology to monitor, analyse, and sort tonnes of waste at scale. Poor packaging design and ineffective recycling sorting mean that most of what goes into recycling bins ends up in landfills. Greyparrot is bringing transparency and automation into an inefficient system. Their technology has analysed over 10 billion packaging items in sorting plants to increase recycling rates and introduce accountability to the waste value chain. Providing data on waste can impact government policies on recycling and packaging data

LICO is an Indian startup that recycles end-of-life lithium-ion batteries. Through a mechanical shredding process, the startup shreds spent lithium-ion batteries and crushes them into fine sizing. It then uses magnetic separation, vibration screens, and multiple sieving techniques to separate plastic, steel, aluminum, copper, and black mass. This process ensures zero waste while also maximizing material recovery from the spent batteries.

Octa design a circular marketplace platform for the automotive industry. Its qualification and pricing system allows companies to sell their end-of-life vehicles for the best offer. At the same time, the buyers receive insights into how much CO2 emissions they save as a result of buying end-of-life vehicles instead of new ones. Additionally, Octa offers reverse logistics solutions for repairable automotive parts to expand their lifetime, further contributing to circularity.

Links to sector specific online contents, including sector specific funding opportunities

Online content of interest:

The Digital Europe Programme: https://digital-strategy.ec.europa.eu/en/activities/digital-programme

How technology can enable the circular economy: https://ellenmacarthurfoundation.org/tech-enablers-series/part-1

How digital platforms are enabling circular economy innovation: https://ellenmacarthurfoundation.org/videos/how-digital-platforms-are-enabling-circular-economy-innovation

The role of the Internet of Things in creating a circular economy: https://ellenmacarthurfoundation.org/tech-enablers-series/part-3

Funded by the European Union

The power of digital technologies to enable the circular economy: https://medium.com/circulatenews/the-power-of-digital-technologies-to-enable-the-circular-economy-5471d097ee7f

Funding programmes, dedicated reforms and investments and existing initiatives (e.g. the Pact for Skills, the Digital Skills and Jobs Coalition) play a key role in promoting joint action for training, reskilling and upskilling, to enable workers to meet the needs of a labour market in transition and increase the pool of digital specialists. By 2030 there will be 20 million employed ICT specialists in the EU, with convergence in the relative proportions of women and men.

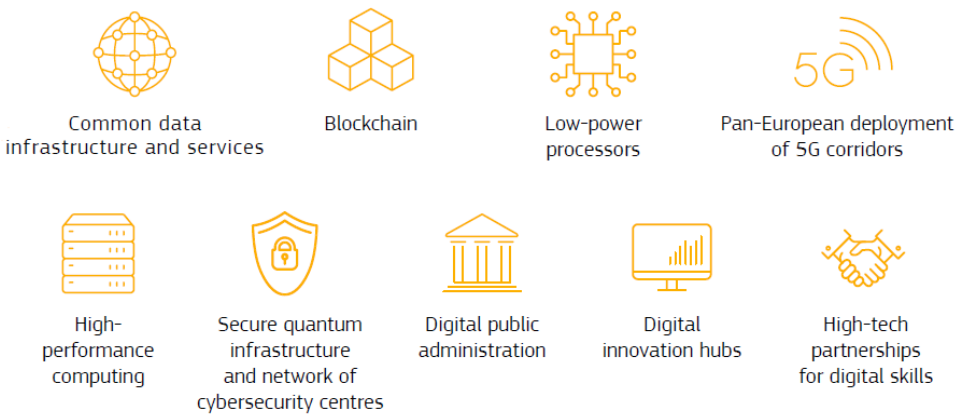
Europe's largest digital innovation ecosystem: https://www.eitdigital.eu/

Digital Innovations Hub: https://www.dih4e.eu/noticias/

Europe's Digital Decade

Multi-country projects are large-scale projects that can contribute to achieving the digital decade targets. They will allow Member States to come together and pool resources to build digital capacities that they would not be able to develop on their own.

The Commission has identified an initial list of areas for multi-country projects and may update the list, if needed, based on the annual progress monitoring.



Multi-country projects should pool investments from EU funding resources, including from the Recovery and Resilience Facility, as well as from the Member States. Other public and private entities may invest in the projects where appropriate.

The Commission will help Member States identify, set-up and implement multi-country projects. To set-up a multi-country project where there is no other legal instrument, the policy programme foresees a new legal structure, the European Digital Infrastructure Consortium (EDIC) which will enable swift and flexible implementation.

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