

# Financing the digitalisation of small and medium-sized enterprises

The enabling role  
of digital innovation hubs



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digital innovation hubs

**Prepared for:**

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## **Financing the digitalisation of small and medium-sized enterprises: The enabling role of digital innovation hubs**

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## Foreword



The effect of the coronavirus pandemic on the European and global economies is significant. While the Digital Revolution was well under way globally, the pandemic has led to the wide recognition of the importance of digital transformation for our immediate economic recovery and future resilience. Internet of things, 5G, big data, blockchain technologies and artificial intelligence can help us achieve greater supply-chain transparency and flexibility, increase data security, strengthen remote workforces and automate manual processes. Digital technologies can also help us in our fight to reduce greenhouse gas emissions and enable Europe to be the first climate-neutral continent by 2050, as encapsulated in the objectives of the European Green Deal.

In this context, it is unfortunate that European industry currently operates below its digital potential. This is particularly true for our small and medium-sized enterprises, which, because of their high vulnerability to supply and demand shocks, have been disproportionately affected by the coronavirus pandemic. In fact, the opportunity for economic recovery and future growth through digitalisation in Europe's largest industrial segment is significant. This is why I am particularly pleased with the timely publication of this study, which discloses the ongoing policy discussions under the InvestEU and Digital Europe programmes. These are discussed with reference to the European Union's response to the pandemic.

The study proposes a clear path forward. Europe's digitalisation journey can accelerate if we strengthen our current innovation and digitalisation ecosystem and empower the role of digital innovation hubs. Specifically, these digital innovation hubs should coordinate support to companies within local industrial ecosystems. They should develop central knowledge-sharing platforms and provide technical and financial advice, enhancing their cooperation with the financial community to guide European entrepreneurs throughout their financing journey.

For its part, the EIB Group, in close collaboration with the European Commission, recently launched two new pilot initiatives for financing digitalisation. The first is a guarantee facility under Competitiveness of Enterprises and Small and Medium-sized Enterprises (COSME) for the financing of digitalisation projects; the second focuses on early-stage equity investments in artificial intelligence and blockchain technologies. These two pilot initiatives are important steps forward in better matching supply with demand for the financing of digital projects. They address some of the key issues currently limiting the market supply of funding.

I would like to thank my colleagues at the European Commission for the excellent collaboration with our Advisory Services team and senior sponsorship throughout the study. The EIB is committed to mobilising our advisory and financial firepower in order to help reap the full benefit of digitalisation for European industry.

Lilyana Pavlova

Vice-President of the European Investment Bank

# Foreword



## **Digitalisation and small and medium-sized enterprises – The role of financing in the time of a pandemic**

The coronavirus pandemic has shown how essential digitisation is for a resilient economy. Highly digitised companies have found it much easier to cope with the crisis than digital laggards. Building on this lesson, it is now essential to accelerate the digital transformation and build a stronger, greener, and more resilient economy. Full digitisation requires combining established digital solutions with new and emerging technologies across all sectors, and that, in turn, depends on ensuring sufficient access to finance.

That is why I welcome the timely publication of this study with its focus on financing the digitisation of small and medium-sized enterprises. In particular, the identification of the role that digital innovation hubs can play as key enablers in emerging digital ecosystems is a valuable contribution.

The study reminds us that there are great differences in the ways in which new and emerging technologies are implemented in European companies depending on the company size or region. The European Commission is determined not to leave any European company behind. It has built a coherent package of measures to fight the economic crisis of European economies, including the liquidity problems. The most notable measure in this respect is the Next Generation EU recovery instrument.

However, beyond the immediate support to help businesses stay afloat, it is also critical to continue giving European companies the necessary instruments to invest in their digital transformation. Although this is still risky for companies, there is potentially also a large reward. Indeed, the previous crisis – the financial crisis starting in 2008 – showed that companies able to invest and re-invent themselves through innovation have better growth perspectives in the following years.

To that end, the European Commission has launched initiatives to enable companies to emerge healthier and more prepared for the future from this crisis than from the previous one.

For example, a pilot under the COSME programme together with the EIB Group provides guaranteed loans for small and medium-sized enterprises willing to invest in their digital transformation. Another pilot promotes early and growth-stage equity investments in artificial intelligence and blockchain technologies.

In another example, since 2016, the European Commission has supported digital innovation hubs, which are boosting regional digital ecosystems by helping companies digitise. In the proposed Digital Europe Programme, the Commission plans to co-invest together with Member States to systematically increase the capacity of European digital innovation hubs and strengthen their network.

With these considerations in mind, I believe that the present study will be a valuable input for financial institutions, policymakers and managers in overcoming existing financial barriers to the digitisation of small and medium-sized enterprises.

Roberto Viola

Director General, Communications Networks, Content & Technology

European Commission

# Executive summary

## Context and study approach

The European Investment Bank (EIB) Innovation Finance Advisory, with the support of the European Investment Advisory Hub, and the European Commission, has prepared this study in close cooperation with DG Connect to review access-to-finance conditions for the digitalisation of small and medium-sized enterprises (SMEs) and the role of digital innovation hubs (DIHs) as key enablers in the wider ecosystem.

The recent coronavirus pandemic has clearly shown the importance of accelerating the digital transformation of businesses in almost all sectors, be it health, manufacturing or education. Along with the provision of digital products and online services, automated production processes, internet of things, big data, and artificial intelligence are all technologies which will help to bring about solutions to overcome the current crisis (including, for example, efforts to develop a coronavirus vaccine). Common issues that require substantial attention across many, if not all, sectors are related to supply chain transparency and resilience (such as applying algorithms to detect changes in purchasing patterns), data security and remote workforces and automation.

Digital innovation hubs serve as important, regional multi-partner coordinators. They are situated at the heart of the innovation and digitalisation ecosystem and comprise a wide variety of organisations, including research and technology organisations (RTOs), universities, industry associations, chambers of commerce, incubators and accelerators, regional development agencies and governments. As a first-line, local access point, they play a critical role in facilitating the digitalisation of European companies across industries and regions.

Small and medium-sized enterprises are at the centre of the economic crisis brought on by the coronavirus pandemic and containment measures. This is even truer now than during the 2007-08 financial crisis. The current crisis has disproportionately affected small and medium-sized enterprises and revealed their vulnerability to supply and demand shock (particularly with regard to their liquidity). In this context, the various digital innovation hub networks can play an important role in helping small and medium-sized enterprises deal with the economic effects of the crisis. One example is the Digital Innovation Hub for Cyber-Physical Systems (DIH4CPS) project, which, in agreement with the European Commission, will focus the next open call on helping small and medium-sized enterprises to operate their businesses in a digitalised way, so that they become more resilient and competitive. Technologies which will be supported to this end include artificial intelligence solutions, digital twins, virtual reality and other cyber-physical systems.

**The speed at which small and medium-sized enterprises are able to digitalise along with the level of digitalisation they can achieve will have far-reaching effects on European economic recovery and future competitiveness in global markets.** Digital technologies are disrupting market dynamics at increasing speeds and will create unprecedented opportunities for these companies, as well as for economic expansion in Europe. The technology industry is expanding five times faster than the rest of the European economy by gross value added (GVA), and the rate of growth has accelerated in recent years. The rapid pace of technological development enables small and medium-sized enterprises to scale, compete and disrupt in ways that were unheard of in previous generations.

The key challenge facing European small and medium-sized enterprises, therefore increasing their vulnerability to the impact of the pandemic, is that less than 20% of these companies are highly digitalised,<sup>1</sup> compared to nearly 50% of large corporations. Digitalisation levels are particularly low (below the EU average) among companies in Eastern and Southern Europe and

<sup>1</sup> *Integration of Digital Technology - Digital Economy and Society Index Report 2018*  
[http://ec.europa.eu/information\\_society/newsroom/image/document/2018-20/4\\_desi\\_report\\_integration\\_of\\_digital\\_technology\\_B61BEB6B-F21D-9DD7-72F1FAA836E36515\\_52243.pdf](http://ec.europa.eu/information_society/newsroom/image/document/2018-20/4_desi_report_integration_of_digital_technology_B61BEB6B-F21D-9DD7-72F1FAA836E36515_52243.pdf)

in traditional sectors, such as construction and basic goods manufacturing. Without intervention, there is the risk that the digital gap will increase over time as the companies driving digital change continue to digitalise at a faster rate, while others fall even further behind and risk losing their overall competitiveness. However, there is also a clear opportunity for many businesses to start exploring and investing in digitalisation. If Europe does not address this issue, it will hamper economic recovery, convergence and growth prospects in many sectors of the economy.

## Glossary

**Digital innovation hubs.**<sup>2</sup> As multi-partner coordinators, digital innovation hubs act as one-stop shops that help companies to expand their use of digital technologies to improve business and production processes, products and services and to increase overall competitiveness. Digital innovation hubs share advanced knowledge and expertise with their customers and provide them with access to the latest technologies. They also guide customers in exploring and piloting digital innovations and, when required, they offer business and financing support to customers to allow them to carry out these innovations across the value chain.

**Digitalisation** is not just the act of acquiring information technology (IT) systems and equipment. It involves changes across fundamental business dimensions:

- *Processes:* Digitalisation involves increasing automation in production and integrating simulation and data analytics into processes and supply chains. As a result, substantial and continuous gains in productivity and resource efficiency can be realised over full product lifecycles from product design to lifecycle management.
- *Products:* With the emergence of the internet of things, digitalisation has entered the realm of products, with information and communications technology (ICT) being embedded in all types of products. Examples are self-driving cars, wearables and smart home appliances.
- *Business models:* Digitalisation re-shuffles value chains and blurs the boundaries between products and services. Smart and connected products both drive and adapt to changes in customers' behaviour, resulting in co-created, highly personalised products and services.

## Study approach

The study framework is based on key dimensions of a small and medium-sized enterprise's digitalisation journey: 1) the demand for digitalisation, 2) the supply of financing from financial intermediaries and 3) ecosystem development. At the heart of the ecosystem, we find the digital innovation hubs.

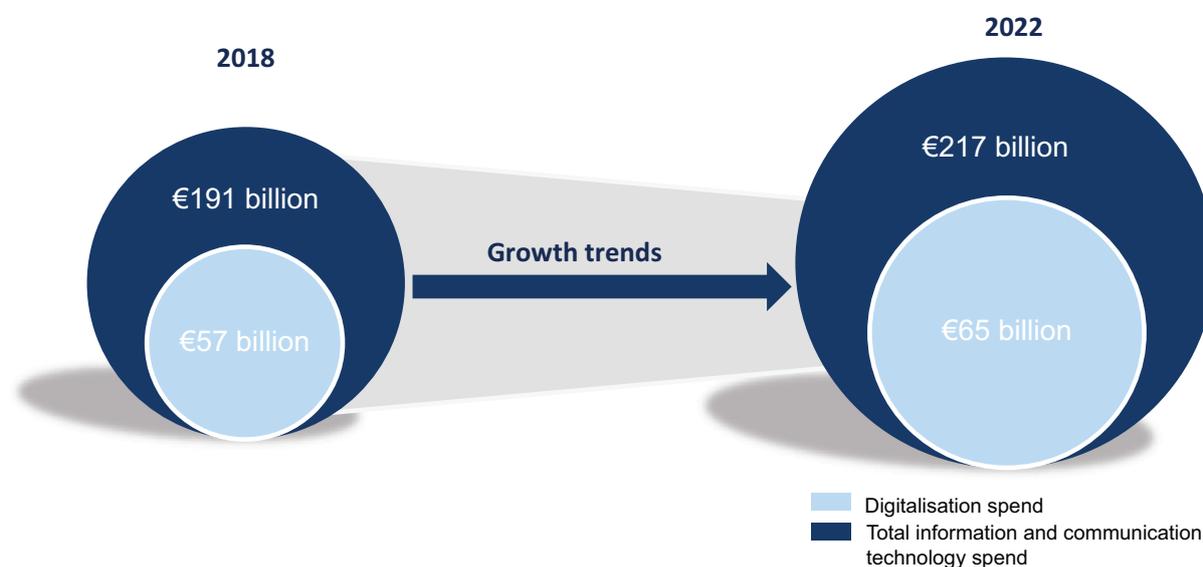
Primary data were collected via surveys of 102 small and medium-sized enterprises and through a series of in-depth interviews with small and medium-sized enterprises and financial intermediaries. Six digital innovation hub (global and EU) case studies were conducted, and six national digitalisation funding programmes were analysed. The sampling was balanced as much as possible in terms of geography, industry verticals, digital profiles of small and medium-sized enterprises and financing products (debt, equity and grants) offered by financial intermediaries. Secondary data<sup>3</sup> were analysed for insight into the market demand for digitalisation and the technologies involved in small and medium-sized enterprise digitalisation. Despite the wealth of data collected and analysed, the results cannot be considered statistically representative. Finally, it is noteworthy that the data collection process was completed prior to the start of the coronavirus pandemic.

<sup>2</sup> Report from DG CONNECT: digital innovation hubs - October 2018

<sup>3</sup> Gartner in-house research and desk research (2019)

## Snapshot of the status of digitalisation in Europe

In Europe, small and medium-sized enterprise spending on digitalisation (part of the total spending on information and communication technology) was estimated to be €57 billion in 2018 and is expected to reach €65 billion by 2022.<sup>4</sup>



**Figure 1. Estimated small and medium-sized enterprise demand for digitalisation in Europe<sup>5</sup>**

However, the growth is uneven among industries and countries. The study shows that small and medium-size enterprises' spending on information and communication technology and digitalisation depends on two external variables:

1. the geographical location of the enterprise; and
2. the industry vertical in which it is active.

### *Regional digitalisation gap*

**Geographically speaking, Northern European countries such as Denmark and Sweden are leading the global rankings for digital transformation, while new Member States are lagging behind.** In 2018, about 95% of small and medium-sized enterprises' total spending on digitalisation and information and communication technology was concentrated in Western Europe in the High Enabling Region<sup>6</sup> (NL, FI, SE, BE, LU, IE, DK, UK, FR) and in the Mid Enabling Region (DE, AT, MT, ES, CZ, EE, PT, CY, LT, IT). Meanwhile, only 5% of spending was in Eastern and South-Eastern Europe, which is reflected in the Modest Enabling Region (SL, HU, EL, SK, BG, PL, HR, LT, RO).

The average spending on information and communication technology and digitalisation within the High Enabling Region is approximately 2.5 times higher than spending in the Mid Enabling Region (mainly Southern and Central European countries). The gap is even larger when the High Enabling Region is compared to the Modest Enabling Region (mainly Eastern and South-

<sup>4</sup> Based on Gartner's research data on small and medium-sized enterprise information and communication technology spending in 2018, 2020 and 2022 forecasts, and feedback collected in executive surveys on digitalisation strategies across the European Union.

<sup>5</sup> Source: Gartner Research

<sup>6</sup> The regions are defined based on the Digital Transformation Enablers Index, which is one of the indices used by the European Commission in the *Digital Transformation Scoreboard (2018)* report.

Eastern European countries), where spending on information and communication technology and digitalisation is ten times smaller than in the region at the forefront of digitalisation. The forecast for information and communication technology and digitalisation spending predicts improvements in the Mid and Modest Enabling Regions. However, the regional gap is not expected to shrink: By 2022, spending in the High Enabling Region is likely to be 12 times greater than in the Modest Enabling Region.

These findings are confirmed by the EIB Economics Department's study<sup>7</sup> on the performance of innovation and digitalisation in Central, Eastern and South-Eastern Europe (CESEE). Most CESEE countries are viewed as modest and moderate innovators, with digital readiness levels below the EU average (though some remarkable exceptions to this are Estonia and Lithuania). The reasons for this are as follows: 1) low levels of investment in intangible assets, such as Research and Development, especially in the private sector, 2) insufficient numbers of highly skilled workers and 3) the overall low quality of scientific and technological infrastructure.

### *Industrial digitalisation gap*

At the industry level, the study shows clear sectoral gaps in small and medium-sized enterprises' estimated demand for digitalisation. Nearly 60% of the total spend on information and communication technology (and digitalisation demand) comes from the financial services sector, the information and communication technology sector itself and advanced manufacturing sectors (such as automotive, electronics, life sciences, drug manufacturers and mechatronics). Meanwhile, **traditional sectors, such as education, healthcare, construction and transportation, account for less than 12% of demand.** Multiple factors contribute to this variance, and the main drivers differ by industry. For example, construction has a high concentration of very small companies, which tend to be less digitalised.

**European small and medium-sized enterprises are underinvesting in disruptive and high potential digital technologies, compared to global leaders in this area.** A striking example is in investments in artificial intelligence.<sup>8</sup> Since 2011, two-thirds of artificial intelligence investments' total global value was located in the US. In comparison, **in 2017, the European Union's share of global artificial intelligence equity investments was only 8%, while China's share was 36%, putting it in second place after the US.** The Organisation for Economic Co-operation and Development (OECD) report explains this disparity, highlighting the fact that the US is responsible for 70-80% of global venture capital (VC) investments across all technologies, including artificial intelligence. Europe's strength, on the other hand, is in core artificial intelligence systems, that is, fundamental research in artificial intelligence that does not target a specific sector or activity. These research efforts generate broad, long-term benefits, so their impact is currently underrepresented in studies on artificial intelligence investment.<sup>9</sup> Thus, Europe is expected to reap the business value from its artificial intelligence investments later than both China and the US.<sup>10</sup>

### *Skew towards certain technologies*

**The data suggest that European small and medium-sized enterprises mainly invest in technologies for business optimisation.** Approximately one-third of the enterprises

<sup>7</sup> *Innovation Investment in Central, Eastern and South-Eastern Europe*, European Investment Bank [https://www.eib.org/attachments/efs/innovation\\_investment\\_in\\_cesee\\_en.pdf](https://www.eib.org/attachments/efs/innovation_investment_in_cesee_en.pdf)

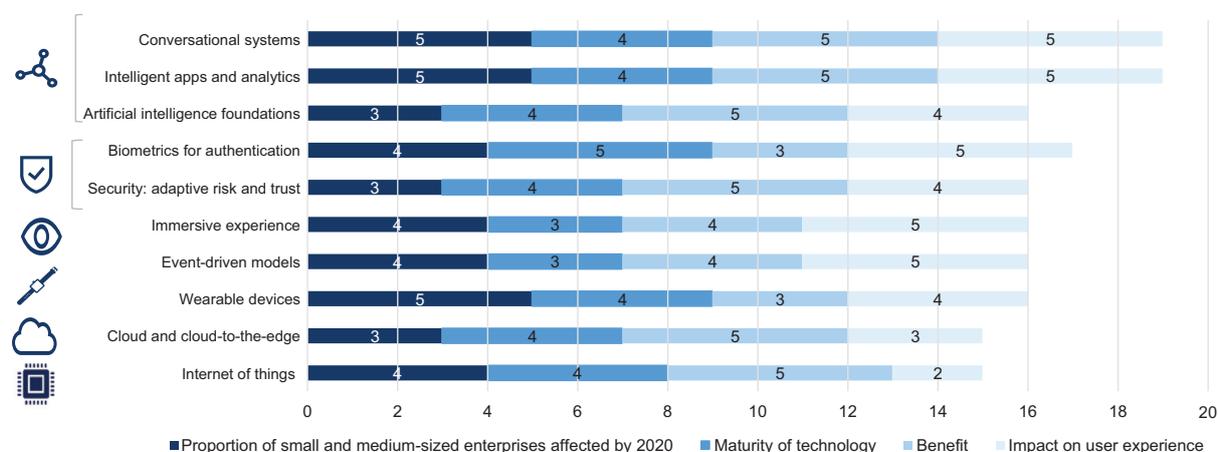
<sup>8</sup> *Private Equity Investment in Artificial Intelligence – OECD report* <https://www.oecd.org/sti/ieconomy/private-equity-investment-in-artificial-intelligence.pdf>

<sup>9</sup> *European Artificial Intelligence (AI) leadership, the path for an integrated vision* [http://www.europarl.europa.eu/RegData/etudes/STUD/2018/626074/IPOL\\_STU\(2018\)626074\\_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2018/626074/IPOL_STU(2018)626074_EN.pdf)

<sup>10</sup> Gartner Research. Business value from artificial intelligence investments is calculated as potential impact on businesses for cost reductions and additional revenues.

surveyed for this study have adopted technologies to support the digitalisation of operations, such as Customer Relationship Management (CRM) or Enterprise Resource Planning (ERP) technology. These are well-established technologies that can help companies remain competitive through improvements in operational efficiencies. In this sense, European small and medium-sized enterprises have focused on optimising existing models and processes, rather than on carrying out transformative digital projects.

Gartner Research has identified the ten most promising and transformative technologies for the digitalisation of small and medium-sized enterprises (see Figure 2), based on the number of enterprises that these technologies are expected to impact in 2020 and a number of characteristics of the technology. These characteristics included: 1) the technology maturity in terms of availability and use across global markets; 2) the benefits it provides for an enterprise, for example, cost reduction or new revenue generation; and 3) its impact on user experience (a strong driver for adopting a technology).



**Figure 2. The top ten enabling technologies for small and medium-sized enterprise digitalisation<sup>11</sup>**

The survey of European small and medium-sized enterprises suggested that they are underinvesting in these promising technologies and potentially missing out on the benefits of deeper transformations. According to the survey, only one-third of European small and medium-sized enterprises use artificial intelligence and cloud computing; a few small and medium-sized enterprises use several of the other technologies.

Even artificial intelligence – viewed as the most important enabling technology and as a key technology in the digitalisation process of small and medium-sized enterprises – appears to be underrepresented. By 2020, it is expected that over 70% of small and medium-sized enterprises in Europe will be impacted by artificial intelligence in conversational systems, intelligent apps and analytics, but only 33% of the enterprises in this study currently have projects in this area.

### *Two broad segments of digital small and medium-sized enterprises*

**This study recognises that small and medium-sized enterprises typically fall into one of two categories. They can be digital adopters or digital natives.** An enterprise's digital profile consists of the following aspects: its attitude towards digitalisation, its drivers for digital projects, its digital journey (according to five typical stages of desire/ambition, design, delivery, scale and harvesting/refining) and its funding strategy for digital projects.

The following summary in Figure 3 highlights the key characteristics of digital natives compared to adopters in their approaches to digitalisation.

<sup>11</sup> Source: Gartner Research

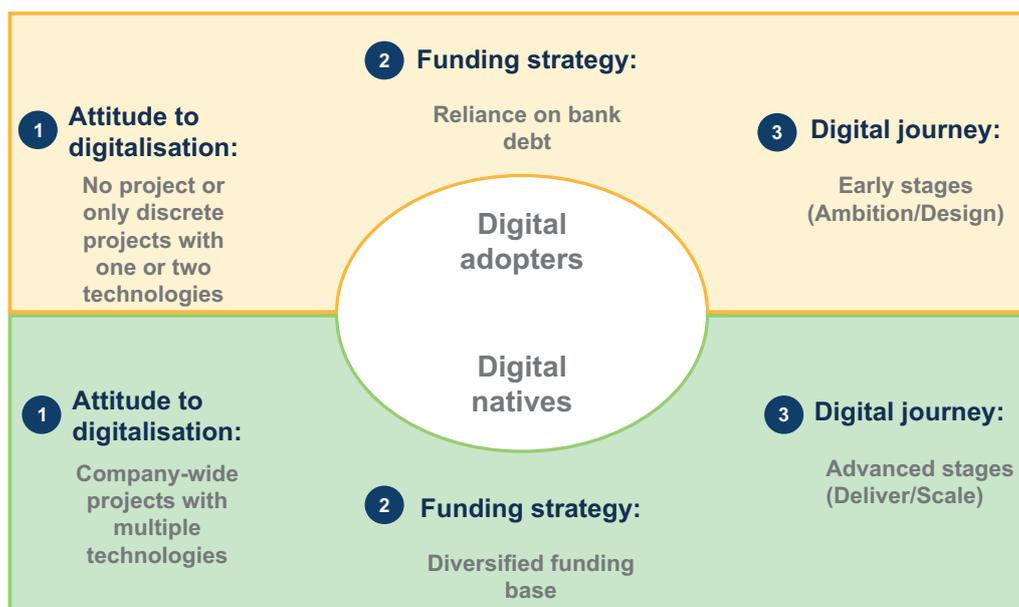


Figure 3. Overview of digital adopters versus digital natives

**Digital adopters are usually older companies (which means they were established well before the digital age) that do not leverage strong technology platforms to conduct business.** Many adopters are in the early phases of their digital journeys, still contemplating their desire and ambition for digital projects. Digital adopters may focus on one or two technologies, or they may not have any digital projects at all. They display a more conservative approach to digitalisation by deploying discrete technologies in a targeted way, engaging in incremental improvements and favouring projects that increase existing revenue streams or optimise operations (digital optimisation). They tend to rely on existing relationships with banks to finance their digital projects, using the same funding channels as for any other project.

**Digital natives, on the other hand, are companies that emerged in the digital economy.** They were established on strong technology platforms, and they exhibit digital maturity across a broad array of processes and functions. They can be start-ups and/or young firms and may revolve around a single digital initiative, but they tend to use multiple technologies to conduct business. This is because they exhibit a more experimental approach towards digitalisation, recognising the value of combining different technologies.

Natives may already be in the ‘deliver’ or ‘scale’ stages of their digital journeys. In other words, their projects tend to be more advanced than those of their adopter counterparts. Natives typically seek financing to scale up operations (digital transformation), rather than to fund a specific digital project. Digital natives are generally younger companies; unlike adopters, they may not have established track records or long-term relationships with banks. Thus, they tend to have a more diversified capital base and use more innovative and alternative funding instruments, such as hybrid financing and crowdfunding.

#### *The enabling role of digital innovation hubs*

Digital innovation hubs are already key enablers in the digital ecosystem and its development. **In broad terms, the services available through digital innovation hubs may be categorised under three pillars:** 1) **innovation activities:** concerned with identifying opportunities for digitalisation and developing and validating innovative solutions based on cutting-edge technologies, 2) **business development:** concerned with helping companies apply their solutions, assess the business implications/impact and manage changes to business models and 3) **skills development:** concerned with building innovation capacity through upskilling.

Currently, there are 386 digital innovation hubs included in the Digital Innovation Hubs catalogue (at the time of this study) in the 28 EU Member States. Of these, 128 hubs are within the High Enabling Region, 164 are within the Mid Enabling Region, and 50 are within the Modest Enabling Region. Big differences exist in the penetration of digital innovation hubs across Europe, with the Modest Enabling Region being underserved (approximately 10 000 small and medium-sized businesses per digital innovation hub) compared to the other two regional clusters (approximately 3 500 enterprises per digital innovation hub).

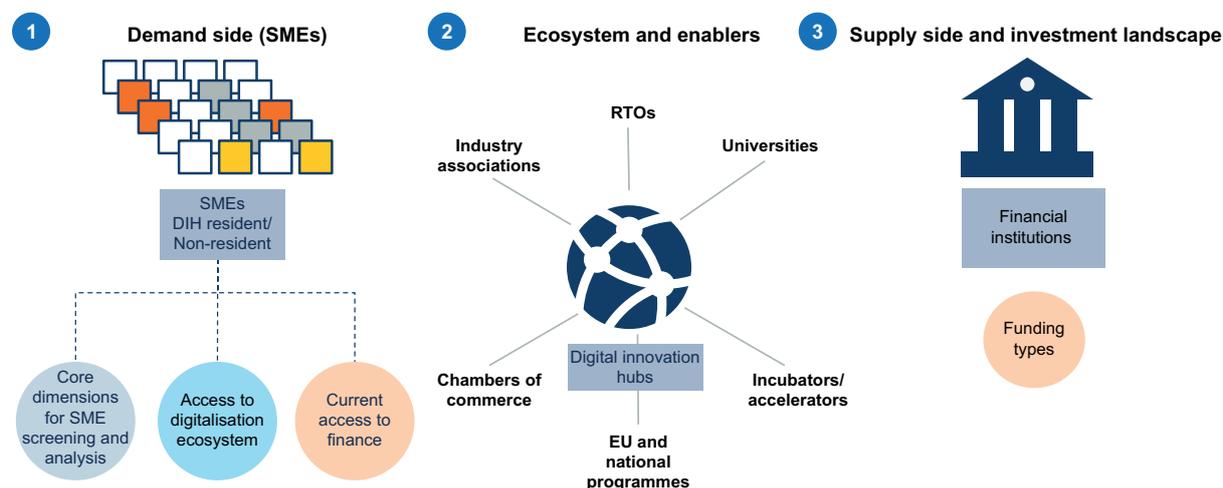


Figure 4. Digital innovation hubs as key enablers

The key findings are presented in the following section.

## Key findings

Table 1. Summary of key findings

Dimension	Finding	Description
Findings focused on ecosystem development	1 <b>Crucial role for digital innovation hubs, but there is room to strengthen their offerings</b>	<ul style="list-style-type: none"> <li>Digital innovation hubs are at the core of the innovation and digitalisation ecosystem for businesses.</li> <li>They play a critical role in supporting small and medium-sized enterprises in Europe during their digital journeys.</li> <li>However, the analysis suggests that there are opportunities to further strengthen the contribution of digital innovation hubs to digitalisation in industries across Europe and even more so now to help companies recover from the impact of the coronavirus pandemic.</li> </ul>
	2 <b>Public funding is dominant for digital innovation hubs, but new financing models are emerging</b>	<ul style="list-style-type: none"> <li>Most digital innovation hubs have a mixed funding model, but there is high dependency on public funding from European, national or regional programmes.</li> <li>However, there is a growing (but limited) number of digital innovation hubs focused on developing more commercial services and activities. The expansion of the offering into revenue-generating activities is an important step towards developing sustainable and more commercially-oriented business models, paving the way for a more diversified and reliable funding base, and mobilising extra financial resources to improve and expand services.</li> </ul>

Dimension	Finding	Description
	<b>3 Perceived complexity and low visibility of public funding programmes</b>	<ul style="list-style-type: none"> <li>National and regional programmes that support digitalisation are an important source of financing for digital projects. However, the use of these programmes is limited because of lack of awareness, the perceived complexity of the funding applications and the length of the application process. Digital innovation hubs may help to navigate this complexity.</li> </ul>
<b>Findings focused on barriers to digitalisation for European small and medium-sized enterprises</b>	<b>4 Knowledge gaps in small and medium-sized enterprises are a key barrier to digitalisation</b>	<ul style="list-style-type: none"> <li>The majority of small and medium-sized enterprises in Europe are facing issues and difficulties around digitalisation.</li> <li>A key barrier to digitalisation is the failure to distinguish between projects with only partially embedded digitalisation features and those involving full digitalisation.</li> <li>Digital adopters are at the early stages of their digital journeys and their knowledge gaps are often at the ambition, design and delivery phases of digital projects. The current coronavirus pandemic has nevertheless increased the awareness and urgency for many businesses to accelerate their digitalisation.</li> <li>Digital natives are usually further along in their digital journeys but they are not immune to knowledge gaps.</li> </ul>
	<b>5 Financing of digital projects is limited by knowledge gaps in banks</b>	<ul style="list-style-type: none"> <li>The intrinsic nature of digital projects exacerbates the issue of access to finance that many small and medium-sized enterprises are already facing across Europe.</li> <li>Banks often have insufficient expertise to assess digital projects, though the current crisis may have heightened bankers' appreciation for digital investments as a way to boost business resilience.</li> <li>Credit departments in banks are typically unable to assess the potential values and risks of a digital project, though the current pandemic shock may force them to address this.</li> <li>This lack of knowledge and expertise within banks puts digital projects at a disadvantage compared to other kinds of projects.</li> <li>This is particularly true for digital natives, who often have digital-only projects, but are without collateral or a track record.</li> </ul>

### **Finding 1: Digital innovation hubs are critical enablers with strong potential to strengthen their offerings**

The data collected during our market consultation and survey show that digital innovation hubs play a critical role in supporting European small and medium-sized enterprises during their digital journeys. According to the survey data, about 70% of small and medium-sized enterprises with a digital project have used a digital innovation hub in their region. This finding is independent of the digital profile of the company. Regardless of whether they are digital natives or adopters, small and medium-sized enterprises consider the contribution from digital innovation hubs to be overwhelmingly positive. Over 70% of surveyed enterprises that had used a digital innovation hub believe that the support they received has improved their digital journey.

However, despite this positive impact, the analysis suggests that there are opportunities for digital innovation hubs to further strengthen their contribution to digitalisation in industries throughout Europe, particularly in the context of the response to the coronavirus pandemic.

The main issues are as follows.

- Unbalanced geographical distribution.* There are clear geographical variances across Europe, resulting in an insufficient number of digital innovation hubs, especially in the Modest Enabling Region.

- *Partial mismatch between demand and hub offerings.* Both digital natives and adopters expressed a material demand for services related to ‘access to finance’. However, this demand is not fully met by the digital innovation hubs.
- *Insufficient awareness of digital innovation hubs among companies.* The companies that have not used these hubs lack information about their offerings.

## **Finding 2: Public funding is dominant in digital innovation hubs, but new financing models are emerging**

The digital innovation hub landscape in Europe is diversified and heterogeneous, with significant differences in levels of maturity and sophistication. Some digital innovation hubs are fairly advanced, with well-defined business models and clear links to the digital ecosystem, while many others are still evolving, having been established in the last few years. Most digital innovation hubs employ mixed funding models but are biased towards public funding from European, national, or regional programmes. Private funding for digital innovation hubs is limited and is generally in the form of membership fees and contributions (often in kind) from partners. Repayable capital is very rare and limited.

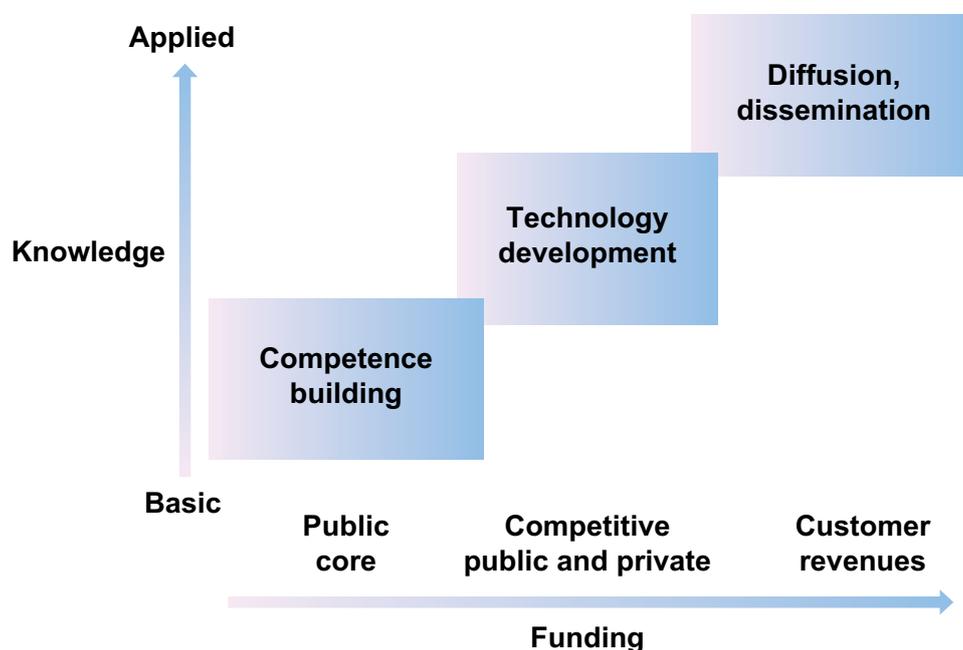
However, a growing number of digital innovation hubs are recognising that the public funding landscape is rapidly changing and that the availability of grants will become increasingly uncertain in the future. This points to a need for the funding paradigm to become more diversified and this requires expanding the role of private funding. This transition is needed not only to secure the future of digital innovation hubs and to reduce their dependence on public grants, but also to mobilise extra financial resources to improve and expand services. However, achieving this shift is often constrained by the digital innovation hubs’ business models, which are not focused on commercial and market-driven activities in the vast majority of cases.

Some activities have always been and will remain non-commercial – a fact that justifies some degree of public funding. Nonetheless, this analysis shows that a growing number of digital innovation hubs are increasing their commercial activities. As they expand their offerings by incorporating more revenue-generating activities, they are taking a step towards more sustainable, commercially-oriented business models, paving the way for a more diversified funding base that would include repayable capital.

The research has identified two emerging business models among digital innovation hubs focused on developing more commercially-oriented approaches:

- **Private–public partnership model.** These digital innovation hubs are pooling resources together from both the private and public sectors. Private partners bring commercially centred approaches to the digital innovation hub’s *modus operandi*. Meanwhile, public sector partners provide access to research centres, scientific infrastructure and basic funding, which are essential for supporting innovation and developing advanced digital solutions.
- **Research and technology organisation model.** These digital innovation hubs are leveraging the financing models used by research and technology organisations across Europe. Some research and technology organisations have broadened their financing mix, combining grants with repayable sources of financing. While basic research is largely publicly funded, research and technology organisations are now leveraging their expertise to take on more project-oriented research, which is often funded by private and public counterparties. Research and technology organisations are also monetising their discoveries via tech-transfer funds, intellectual property management and spin-offs. The financial profile of these organisations indicates that they are generally non-profit organisations and their revenues from dissemination and deployment are re-employed to fund new innovation cycles. They generally operate according to a three-stage innovation dynamic, which broadly correlates with a three-part funding model (see Figure 5):

- public core funding to support exploration of needs and competence-building;
- competitive public and private income for technology development; and
- customer revenues from dissemination and deployment.



**Figure 5. Research and technology organisation three-stage innovation dynamic and funding model<sup>12</sup>**

Advanced digital innovation hubs are adopting similar approaches, expanding beyond basic capacity-building programmes to offer specialised, fee-based services, such as advanced training, memberships and tailor-made solutions.

### Case study: Two Irish examples

#### 1. Private–public partnership model

An example of this approach is a digital innovation hub in Ireland, which is a not-for-profit partnership between a private enterprise, public research institute and the local public authority. The digital innovation hub aims to support Irish and international talent by fostering a design-led, living-lab ecosystem. It helps businesses to digitalise and scale up through training, accelerator programmes for start-ups and innovation services for established companies. The private–public partnership (PPP) structure leverages public and private assets via the following: 1) a private sector donation of a 20 000-square foot building, provided under a 15-year nominal lease, 2) a research institute sharing its third-level sector expertise in education to develop skilled talent to meet industry needs and to stimulate innovation, research and development investments (RDI) and intellectual property and 3) local governments' knowledge and networks to drive economic development. The digital innovation hub generates revenues through rental income, monthly and annual memberships, utilisation fees for testing and research facilities, coaching and other investment-readiness support, milestone success fees, etc. It aims to be self-sustainable within five years.

<sup>12</sup> Source: The European Association of Research and Technology Organisations and EIB, *Access-to-finance conditions for Research and Technology Organisations (RTOs)* <https://www.eib.org/en/publications/access-to-finance-conditions-for-rto>

## 2. Research and technology organisation model

An example of a different approach is provided by another digital innovation hub, also based in Ireland. It was founded in 2003 by the Irish government to support companies in the information and communication technology sector. It was originally fully supported by public funding but today, over two-thirds of its income is from private sources. The main source of income is the fees paid by more than 70 small and large companies being hosted in the campus of the digital innovation hub. In addition to office space, it offers its residents business support (regular seminars, workshops and business clinics) and networking opportunities.

### Finding 3: Perceived complexity and low visibility limit funding through public digitalisation programmes

National and regional programmes for digitalisation are an important source of financing for companies' digital projects. However, the use of these programmes is limited because of companies' lack of awareness of these funding sources and because of the perceived complexity and length of the application process.

**According to the survey, only 43% of small and medium-sized enterprises are aware of national and European digitalisation programmes, and less than one in five have received support from these programmes.** Digital innovation hubs and small and medium-sized enterprises gave similar feedback during the market consultation, confirming that this is a widespread issue among companies.

### Finding 4: A key barrier to the digitalisation of small and medium-sized enterprises (different manifestation for natives versus adopters) is lack of knowledge

Although various initiatives exist at national and regional levels, European companies still face significant hurdles as they try to digitalise, with the lack of knowledge and expertise acting as a persistent, pervasive barrier. Digital adopters are generally at the early stages of their digital journeys, and their lack of knowledge is usually related to the ambition, design and delivery phases of projects.

Based on the survey and market consultations, we can infer that **for digital adopters, the knowledge gap manifests itself in the following ways.**

- **Ambition:** Digital adopters often lack awareness of the true potential of digital technologies. Therefore, they tend not to prioritise these investments, leading to insufficient budgets for digitalisation.
- **Design and delivery:** Digital adopters lack the internal knowledge and technical expertise to design and implement digital projects. The survey shows that over 40% of digital adopters are struggling because they lack this expertise.

While digital natives are usually further along in their digital journeys, often working to deliver or scale up their digital initiatives, they are not immune to lack of knowledge. For these companies, the digital initiatives are at the core of their businesses. They recognise the full potential of these technologies, and they usually have the in-house technical knowledge and expertise to design, develop and implement new ones. However, digital natives often lack the expertise to develop sound business plans for projects, execute well-supported valuations, and plan and carry out fundraising events. They also lack market intelligence, management experience and contacts with relevant investors, making it harder for them to scale up.

## **Finding 5: Financing of digital projects is limited by knowledge gaps in banks**

The intrinsic nature of digital projects exacerbates the access-to-finance issue that many small and medium-sized enterprises across Europe are already facing. The analysis suggests there is a funding gap, with insufficient financing available for the digital projects of digital natives and adopters.

The survey data show that the number of small and medium-sized enterprises capable of raising external financing for their digital projects is significantly lower than that of small and medium-sized enterprises raising financing for general corporate purposes. Even though banks may act as a primary source of funding for digitalisation, they often lack the expertise to properly assess digital projects. Furthermore, their lending products are not always suitable for these projects, especially given the high risk and complex business models of digital natives. Considering the limited capacities of banks, there is an opportunity for financial technology start-ups and alternative funding providers to step in and demonstrate that they can effectively support digitalisation.

**Banks' credit departments are often unable to assess the potential value and risk of a digital project. Therefore, they tend to rely on a company's past performance, collateral, and capital strength.**

The lack of knowledge and expertise within banks means that digital projects are disadvantaged compared to other kinds of projects. Banks tend to perceive digitalisation projects as 'riskier' propositions, given some of the unique characteristics of digital projects.

- Digital projects often lack any tangible collateral.
- Intellectual property and intangible assets are not widely recognised as collateral.
- The novelty of digital projects often means that historical evidence to support the business case for the project is lacking, which may sow doubts about a company's capacity for debt repayment and future cash flow generation.
- The loan ticket size and funding requirements for digital projects are relatively small, resulting in higher transaction costs and administrative burdens. In other words, these projects may be less attractive and less profitable for banks than larger loan tickets. Data from the survey show that small and medium-sized enterprises often require a small loan ticket size to initiate a digital project. Over half the companies in the survey described external funding needs in the range of €25 000-€50 000 to initiate digitalisation.

For digital adopters, banks are able to bundle digital projects with other investments, such as hardware and machinery. This strategy provides collateral and mitigates the risk of the digital or intangible project. However, this option is generally not available for digital natives, as they often only have digital projects. Therefore, banks struggle to provide funding for this category of small and medium-sized enterprises. The current bank offerings (particularly traditional bank loans) are often not suitable for digital natives, especially those less than 10 years old and with high risk profiles (for example, insufficient credit history, a lack of collateral and high dependency on key individuals) and complex business models (unproven, complicated digital products and services).

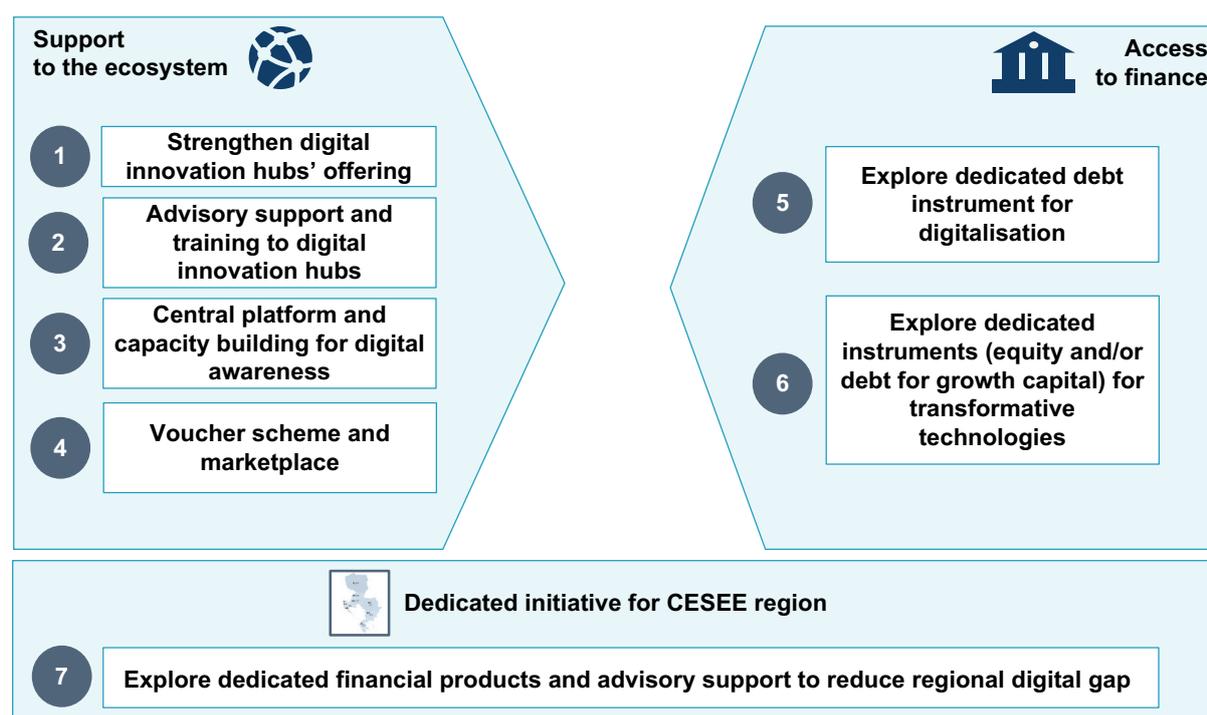
Small and medium-sized enterprises, especially digital natives, have begun using alternative finance and financial technology start-ups as sources of funding for digitalisation projects. These non-traditional entities are leveraging new technologies and creating novel opportunities to improve access to finance. Financial technology start-ups have transformed many aspects of the funding process, developing innovative credit scoring systems, digital account services and online lending platforms.

However, the current coronavirus pandemic may represent an opportunity to promote a change in the approach of banks and credit departments to digital projects. The crisis has proven that digital businesses have been more resilient and able to adjust rapidly to the new reality. This could trigger a response from financial institutions to analyse and assess digital

projects differently, such as by using “digital scores” to quantify a firm’s level of digitalisation, thereby improving risk assessments and strengthening the due diligence process.

## Recommendations

The framework below encompasses recommendations in the following areas: 1) furthering the development of the innovation and digitalisation ecosystem and leveraging the digital innovation hubs’ central coordinating role, 2) improving small and medium-sized enterprises’ access to financing for digital projects by expanding dedicated financial instruments and providing training and support for banks and 3) reducing the digital gap in the CESEE region by exploring possibilities for dedicated instruments and advisory support.



**Figure 6. Recommendation framework**

The proposed set of recommendations is based on key findings from this study’s market consultation and analysis. The recommendations are expected to help the economic recovery following the pandemic and increase the future resilience of European small and medium-sized enterprises. The recommendations also draw from lessons learnt through the direct digitalisation project advisory experience of the Innovation Finance Advisory team, including two previous assignments related to the digitalisation of small and medium-sized enterprises in specific countries: one with the Department of Business, Enterprise and Innovation in Ireland<sup>13</sup> and one with COTEC Portugal.<sup>14</sup>

The key learnings from these assignments are captured below and inform this report’s overall recommendations.

- To address the financing gap for traditional small and medium-sized enterprises (which are typically digital adopters), it is important to **develop a set of dedicated financial instruments for digital projects**.

<sup>13</sup> *The digitalisation of small and medium-sized enterprises in Ireland*, European Investment Bank. The specific recommendations of this study are currently being considered and do not necessarily reflect the final actions of the Irish government. [https://www.eib.org/attachments/thematic/digitalisation\\_of\\_smes\\_in\\_ireland\\_summary\\_en.pdf](https://www.eib.org/attachments/thematic/digitalisation_of_smes_in_ireland_summary_en.pdf)

<sup>14</sup> *The digitalisation of small and medium-sized enterprises in Portugal*, European Investment Bank [https://www.eib.org/attachments/thematic/digitalisation\\_of\\_smes\\_in\\_portugal\\_summary\\_en.pdf](https://www.eib.org/attachments/thematic/digitalisation_of_smes_in_portugal_summary_en.pdf)

- To address the knowledge gap for traditional small and medium-sized enterprises, **financial instruments should be accompanied by dedicated soft measures.**
- **To leverage the supply side** (that is, technology companies selling digital solutions) **to accelerate demand for digitalisation** from traditional small and medium-sized enterprises, a ‘push and pull’ strategy should be applied by creating a technology marketplace for traditional small and medium-sized enterprises.
- **To develop a well-coordinated strategy to ensure a holistic and coherent approach to digitalisation**, it is necessary to consider all socio-economic dimensions (from education and technology to business and regulation) in the digital strategy; highly digitalised countries (such as Denmark and Finland) demonstrate that their success has been contingent on doing this.

Building on the experience of the Digitising European Industry initiative, the InnovFin Programme and the European Fund for Strategic Investments, the recommendations below could also be considered pertinent to the upcoming Digital Europe Programme and the InvestEU Programme (where applicable and relevant), as well as to the economic response and recovery from the coronavirus pandemic. In particular, in response to the unique economic shock caused by the pandemic, the European Commission has proposed a new window under the InvestEU programme: the Strategic Investment Facility. This new facility would provide an EU budgetary guarantee of €31.5 billion for selected projects and could generate investments of up to €150 billion to incentivise European industrial leadership in strategic sectors and key value chains, including those which are crucial for the dual green and digital transitions. The recommendations below will contribute to addressing Europe’s twin challenges of digital and green transformation.

## **Recommendations focused on supporting the ecosystem**

The recommendations below should be implemented in close cooperation with the digital innovation hub network and they should leverage digital innovation hubs’ critical role as coordinators of different players and organisations in the ecosystem.

### **Recommendation 1: Strengthen digital innovation hubs’ reach and role in helping small and medium-sized enterprises access financing support**

**It is recommended to increase the number of digital innovation hubs across underserved regions of Europe, including the Modest Enabling Region (mainly South-Eastern Europe), and to further strengthen key services, such as providing small and medium-sized enterprises with access to financial support. Digital innovation hubs play a key role in accelerating the digitalisation of small and medium-sized enterprises and are already adopting initiatives to better support small and medium-sized enterprises in adjusting to the new reality of the coronavirus pandemic.**

#### **Recommendation 1.1 Increase the number of digital innovation hubs in underserved regions**

Main objective: Address the knowledge gap in regions and sectors with low levels of digitalisation.

Target companies: Small and medium-sized enterprises in regional clusters and industries with low levels of digitalisation.

Brief description: A policy-level initiative to promote the creation of additional digital innovation hubs in the Modest Enabling Region, which is underserved compared to other clusters, and in low-digitalised industries.

**Key design principle:** A combination of dedicated funds and incentives. This initiative could be considered for the upcoming Digital Europe Programme and associated pandemic response. It could also build on the experience from the existing Digitising European Industry initiative, which has supported the creation of new digital innovation hubs in Eastern Europe, an expanded InvestEU programme, not to mention the national and regional economic recovery actions in response to the coronavirus pandemic.

## **Recommendation 1.2 Strengthen the link between digital innovation hubs and banks**

**Main objective:** Address banks' knowledge gaps related to digitalisation.

**Target companies:** Digital natives and digital adopters.

**Brief description:** Promote stronger cooperation between digital innovation hubs and banks or other financial investors. Digital innovation hubs could design and develop an independent 'digital score' for digital projects. This score could be used by banks and investors to improve risk assessments and strengthen the due diligence process.

**Key design principle:** Develop policy incentives to promote stronger collaboration between digital innovation hubs and banks. This initiative could be considered in the upcoming Digital Europe Programme and an expanded InvestEU programme, as well as in national and regional economic recovery actions in response to the coronavirus pandemic.

**Example:** This recommendation could leverage the experience of an existing pilot involving a digital innovation hub partnership with a national bank (see box below).

### **Case Study: Digital Innovation Hub Lombardia – A partnership model with a national bank**

The Italian industry association has established a digital project cooperation agreement with a major national bank using its network of digital innovation hubs. The purpose of this agreement is to enable the digital innovation hub to forge a link between hub customers and the bank.

At the inception of this cooperation, there is a digital and financial assessment in the form of a four-hour joint interview with digital experts from the digital innovation hub and financial experts from the bank. The outcome would be a set of recommendations, focused on innovation gaps as well as on a detailed analysis of the digital projects.

The partnership has key benefits for both sides.

#### **For the bank:**

- Expanded portfolio of products for customers, with the addition of digital assessment and technical support services via the digital innovation hub; and
- Access to independent quality assessments of digital projects from the hub, for which the bank does not have the designated expertise. Therefore, banks are assured about the technical soundness of projects.

#### **For digital innovation hubs:**

- Early involvement of the bank in the digital projects of small and medium-sized enterprises so that risks can be addressed as quickly as possible; and
- Ability to offer a full package solution from digital assessment to financing.

### **Recommendation 1.3 Strengthen links between digital innovation hubs, large corporations and equity investors**

Main objective: Address digital innovation hubs' limited ability to assess the market potential and business case for highly innovative technologies.

Target companies: Small and medium-sized enterprises developing complex and innovative digital projects, mainly digital natives.

Brief description: By involving larger corporations and equity investors in the early stages of a project, a digital innovation hub can benefit from an early assessment and market validation of a new technology's potential. Then, digital innovation hubs would be better able to prioritise projects and assist companies that are developing digital technologies to envision a clearer path to market.

Key design principle: Develop policy initiatives to promote stronger collaboration among small and medium-sized enterprises, large corporations and equity investors. This initiative could be considered for the upcoming Digital Europe Programme, an expanded InvestEU Programme and the associated coronavirus pandemic response package.

Example: A concrete example of this kind of partnership appears in the case study below. It shows the potential benefits of stronger collaboration between small and medium-sized enterprises and equity investors.

#### **Case Study: North American digital innovation hub**

This North American hub is one of the largest urban innovation hubs in the world. Founded in 2000, it supports over 1 200 science and tech companies from start-up to scale-up.

The hub's business model is based on strong partnerships with large corporations. It has over 50 partners across multiple sectors and includes corporations such as Microsoft and Samsung. The partnerships play a key role in selecting the start-ups that the hub will ultimately support. The selection combines a standard process based on criteria such as technology readiness, management expertise and the state of the organisation, with a market validation that is completed in cooperation with the large corporate partners.

This screening process enables the hub to prioritise the best projects. Companies supported by the hub are 45% more likely to be successful in their fundraising compared to the overall population of start-ups.

### **Recommendation 2: Diversify funding sources where possible and support digital innovation hubs to develop more commercially-oriented business models**

**It is recommended to provide advisory services and training to digital innovation hubs to help them develop more commercially-oriented business models, which could lead to a more diversified funding mix, reducing dependencies on public sources.**

Main objective: Facilitate and promote the development of more commercially viable activities and services among digital innovation hubs. Some hubs are already expanding their offerings to include more fee-based services and products to create more sustainable business models and reduce the dependence on public funding.

Target companies: Digital innovation hubs across Europe.

Brief description: Develop a platform for knowledge exchange and training for digital innovation hubs focused on developing commercially viable business models. European, national, and/or regional policymakers should also support the research and technology organisations by putting the right incentives in place and by creating appropriate framework conditions.

**Key design principle:** The platform should include workshops, networking events, face-to-face training and online support (webinars, e-learning portals, etc.).

**Example:** This initiative could build on the experience from the Digital Innovation Hub Enhanced-Learning Programme (DIHELP).

### **Case Study: Digital Innovation Hub Enhanced-Learning Programme**

DIHELP aims to develop coherent, coordinated and sustainable support for European industries in all EU Member States at the regional level using the concept of digital innovation hubs.

To achieve this objective, it helps 30 hubs to develop and/or scale up their activities through a mentoring and coaching programme that lasts for nine months.

Selected hubs receive training and coaching on business development, financing and innovation management delivered both face-to-face and remotely as part of the Digital Innovation Hub Academy.

For established digital innovation hubs with previously developed business models, there are already appropriate financial instruments, such as the European Fund for Strategic Investments or InnovFin Science (EU Finance for Innovators, a joint European Investment Bank–European Commission programme), which could be used to diversify funding mixes and increase private funding.

### **Recommendation 3: Develop a central platform to drive awareness and ambition**

**It is recommended to establish a central platform with standardised tools that would enable small and medium-sized enterprises to assess their digital maturity and banks to address their knowledge gaps. The online tool would provide small and medium-sized enterprises with access to a central library of training materials and case studies. The tool would also make specific recommendations on enterprises' digital levers, including in relation to actions in response to the coronavirus pandemic. Similarly, the platform could provide training material to improve banks' knowledge and skills in assessing the risks and value of digital projects. This could be further enhanced with capacity-building activities which bring together the financial community and FinTech enterprises.**

**Main objective:** Address the knowledge gap in small and medium-sized enterprises (in the early stages of digital journeys) and banks.

**Target companies:** Small and medium-sized enterprises in the early stages of their digital journeys, mainly digital adopters, and banks with limited knowledge of digitalisation.

**Brief description:** A single online platform (to reduce the fragmentation of the current offering) available to all European small and medium-sized enterprises and banks, offering the following:

- A standardised online assessment of small and medium-sized enterprises' digital maturity. The online tool would enable companies to identify their developmental stages, needs and challenges. The platform would conduct analyses and recommend relevant actions that companies could take to improve selling, production and administrative processes, and to transform their organisation. In addition, the online tool would provide links to an online library for extra information, potential financial instruments, EU and national digitalisation funding programmes and information on which hub to contact for extra support. This offering should include materials specifically regarding the response to the coronavirus pandemic. For example, the DIH4CPS project aims to support European small and

medium-sized enterprises by enabling them to test the technologies that will make them more competitive and efficient following the pandemic.

- An exhaustive online library with training material, case studies, assessment tools and training for the credit risk of digital projects, and typical digitalisation roadmaps prepared and vetted by digital innovation hubs. With the support of digital innovation hubs, this library could also include material specific to countries or industries, as needed.
- A matchmaking tool linking small and medium-sized enterprises with concrete digital projects to banks.

Key design principle: The tool should be simple and user-friendly. It should be designed, developed and implemented in cooperation with digital innovation hubs. This initiative could be considered for the upcoming Digital Europe Programme.

Example: Digitalometer launched by Bpifrance

#### **Case Study: Bpifrance's Digitalometer**

**Bpifrance has launched Digitalometer:** A 15-minute, online, free questionnaire for small and medium-sized enterprises to self-assess their digital maturity and receive customised recommendations to promote digital transformation.

#### **Recommendation 4: Develop a voucher scheme to provide technical assistance to small and medium-sized enterprises and a marketplace to facilitate matchmaking**

**This study recommends creating a pan-European voucher system that would provide small and medium-sized enterprises with access to technical support and developing a central digital repository to act as a market matching system, bringing together small and medium-sized enterprises and technology providers. For this measure, priority could be given to small and medium-sized enterprises that have been heavily affected by the coronavirus pandemic.**

##### **Recommendation 4.1 Pan-European voucher scheme**

Main objective: Address the knowledge gap in the planning and implementation of a digital project.

Target companies: Small and medium-sized enterprises in the planning and implementation phase of digital projects, mainly digital adopters (possibly with priority given to small and medium-sized enterprises that have been heavily affected by the coronavirus pandemic). For example, DIH-HERO (a pan-European network of digital innovation hubs specialising in healthcare robotics) has opened a COVID-19 call aimed at supporting robotic technologies and solutions that can be quickly deployed in the healthcare sector.

Brief description: A pan-European voucher scheme to cover the cost of hiring external consultants to develop business cases and feasibility studies for digital projects.

Key design principle: The application process for the voucher scheme should be simple and straightforward, with a limited amount of paperwork and documentation. It should be designed and developed in cooperation with digital innovation hubs, which can then provide a quality label or accreditation for potential service providers in the ecosystem.

##### **Recommendation 4.2 Central digital repository**

Main objective: Support small and medium-sized enterprises as they navigate through the labyrinths of digital markets to identify the best technology providers for their projects.

**Target companies:** Small and medium-sized enterprises during the planning and implementation phase of digital projects, mainly digital adopters.

**Brief description:** A central digital repository (to avoid fragmentation and multiplication of platforms) with information on technology providers and products to assist companies in identifying the best products to support their business models and to optimise their digitalisation strategies. The focus will be on recovery from the coronavirus pandemic and the development of future resilience. For example, DIHNet, a network of digital innovation hubs, has created an online community to exchange ideas and best practises among digital innovation hubs in response to the current crisis.

**Key design principle:** The platform should be simple and user-friendly. Its search tool should allow searching by industry, country, digital solution, etc. Digital innovation hubs should properly screen and regularly vet all technology providers for quality before including them in the digital repository. This initiative could be considered for the upcoming Digital Europe Programme.

**Example:** A similar initiative was implemented in Singapore through a national digital strategy (further details are available in the Recommendation section).

#### **Case Study: Small and Medium-sized Enterprises Go Digital Programme**

The **Small and Medium-sized Enterprises Go Digital Programme** in Singapore offers a list of pre-approved digital solutions that are proven and robust and that meet small companies' business needs; it facilitates the matchmaking of companies and technology providers.

## **Recommendations focused on access to finance**

### **Recommendation 5: Explore the development of dedicated financial instruments to support digitalisation**

**The study recommends the development of a dedicated risk-sharing financial instrument for digital projects, which could include a First Loss Piece from the European Commission.**

**Main objective:** Address banks' negative bias towards digital projects. Banks often do not have the in-house expertise required to assess digital projects, which have very specific characteristics.

**Target companies:** Digital natives and digital adopters.

**Brief description:** A European initiative to develop a dedicated guarantee scheme for digital projects. In the context of the EIB response to the coronavirus pandemic, the InnovFin Small and Medium-sized Enterprises Guarantee Facility is being expanded to cover the financing of digitalisation. This aims to support the uptake of digital technologies and digital transformation of small and medium-sized enterprises, which could be crucial for the recovery from the pandemic.

**Key design principle:** The dedicated guarantee scheme should include simplified eligibility criteria and could be combined with training and skills development programmes for banks, offered by the digital innovation hubs. This should improve banks' understanding of the business models of digital initiatives and how to assess credit risks associated with digital transformation. It should also familiarise banks with different technologies and applications. This initiative could build on the experience of the European Investment Fund (EIF) digitalisation pilot. The new Competitiveness of Enterprises and Small and Medium-sized Enterprises<sup>15</sup>

<sup>15</sup> This is an EU programme running from 2014 to 2020 with a planned budget of €2.3 billion.

pilot offers a 70% guarantee of coverage (versus the standard 50%) to intermediaries for financing the digital projects of eligible small and medium-sized enterprises, and it provides a new, simplified mechanism to evaluate eligibility. In this scenario, digitalisation transactions would become eligible for support upon the provision of a standardised signed declaration by the small business, without requiring any further checks by a financial intermediary.

### **Recommendation 6: Consider developing dedicated equity instruments and/or higher risk-absorption debt products for growth capital to support disruptive digital technologies**

**This study recommends further exploration of dedicated equity instruments and/or higher risk-absorption debt products for growth capital (which could take the form of an investment platform) to address Europe's underinvestment in transformative and high potential digital technologies such as artificial intelligence. This initiative should be complementary to and incorporate lessons learned from existing programmes, such as the European Innovation Council Pilot, which aims to support high-risk and disruptive European companies, and the artificial intelligence /blockchain pilot.**

Main objective: Address underinvestment and market gaps in highly strategic and transformative digital technologies, such as artificial intelligence. To address this issue, the European Commission's new proposal for the InvestEU Programme includes a new window: the Strategic Investment Facility.

Target companies: Small and medium-sized enterprises with projects in transformative technologies, mainly digital natives.

Brief description: Further investigate the design of a dedicated investment platform with the aim of supporting key strategic digital technologies and high-tech digital start-ups in Europe through equity and/or higher absorption debt products for growth capital. This potential investment platform could benefit from a first-loss piece contribution from the European Commission and leverage public and private investments from different sources, including but not limited to the EIB Group and national promotional banks.

Key design principle: Co-investment approaches bringing together private and public investors. The dedicated equity instrument could be considered for InvestEU and build on the experience with the upcoming artificial intelligence/blockchain pilot under the InnovFin equity window managed by the European Investment Fund. This pilot aims to raise €100 million in investment funds by leveraging €45 million in contributions from the European Commission's Horizon 2020 programme. The investment fund will be accompanied by an EU investment support programme.

## **Dedicated initiative for the CESEE region**

### **Recommendation 7: Further investigate opportunities for dedicated financial instruments and dedicated advisory services for the CESEE region**

**It is recommended to further investigate opportunities for dedicated financial instruments and dedicated advisory services to reduce the digitalisation gap between the CESEE region and the rest of Europe. It should be noted that this gap is expected to widen as a result of the coronavirus pandemic and its economic impact.**

Main objective: Address underinvestment and market gaps in digital technologies and transformation in the CESEE region. In the areas of innovation and digital transformation, CESEE countries lag behind the rest of the world even more significantly than other countries in the EU. This trend applies to private and public investments and is thought to arise from a

combination of factors: 1) lack of access to finance; 2) suboptimal investment allocations; 3) low public research and development investment (1.2% of gross domestic product, compared to the EU average of 2%) and 4) a generally small corporate research and development ecosystem.

Target companies: Small and medium-sized enterprises in the CESEE region, mainly early stage innovative start-ups, those that are scaling up, and deep-tech small and medium-sized enterprises (digital natives).

Brief description: Further investigate the design and development of potential funding structures and support mechanisms (including advisory services) to leverage resources from the EU, international financial institutions, national promotional banks and the private sector. These resources could be used to support highly innovative start-ups and small and medium-sized enterprises with higher risk profiles in the CESEE region.

Key design principle: Co-investment approaches bringing together private and public investors. This could evolve into a series of initiatives to accomplish the following objectives: 1) enhance financing and access to advisory services for the early stage and scale-up of innovative start-ups with high growth potential; 2) provide advisory support to innovators, 3) connect innovators and investors, and 4) enhance the visibility of digital champions. It is also important to offer technical assistance to public agencies to strengthen their capacity to design, develop and implement digital innovation programmes, strengthen strategic investments in the enabling environment for digital innovations and connect digital innovation ecosystems across the region.

# 1. Context and study approach

## 1.1 Context

### This study

The EIB Innovation Finance Advisory division, in collaboration with the European Investment Advisory Hub and DG Connect of the European Commission, has prepared this study to review small and medium-sized enterprises' access to finance for digitalisation projects. Thereby, the role of digital innovation hubs as key enablers is examined.

**Digital Innovation Hubs are regional, multi-partner coordinators at the heart of the ecosystem for innovation and digitalisation.** This ecosystem includes several types of participants, such as research and technology organisations, universities, industry associations, chambers of commerce, incubators/accelerators, regional development agencies and governments. Hubs play a crucial role in supporting digitalisation across industries and regions to improve competitiveness and support economic growth.

Digital innovation hubs<sup>16</sup> are not-for-profit, one-stop-shops supporting companies to develop more competitive business processes, products and services using digital technologies. They support small and medium-sized enterprises in the region, giving them access to expertise and technology. This enables small companies to pilot, test and experiment with digital innovations. The hubs also provide business and financing support to implement these innovations.

### The market opportunity

The global economy is witnessing a wave of digital disruption. Digital technologies, such as artificial intelligence, robotics, the internet of things, cloud computing, high performance computing and 3D printing, are redefining market paradigms. These technologies can provide unprecedented opportunities for economic growth, including for European small and medium-sized enterprises, which represent 99% of companies in the EU. The rapid pace of technological change enables even small companies to scale up, compete and disrupt in a way which was not possible in the past. Innovations in digital technologies are fundamentally changing the way companies design, produce and commercialise goods and services, as well as how they interact with customers.

The coronavirus pandemic has led to an even wider recognition of the value of digital transformation, in addition to creating a sense of urgency and an opportunity to improve the digital capabilities of small and medium-sized enterprises. In the current environment, digitalisation may be critical for the survival of many companies, as well as being a way to improve resilience. Small and medium-sized enterprises are at the centre of the economic crisis brought on by the coronavirus pandemic and containment measures. The impact has been even greater than that of the 2007-08 financial crisis. The current crisis has revealed the vulnerability of small and medium-sized enterprises to supply and demand shocks (particularly with regard to their liquidity). There is a serious risk that over 50% of small and medium-sized enterprises will not survive the coming months.<sup>17</sup>

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<sup>16</sup> Report from DG CONNECT: digital innovation hubs - October 2018

<sup>17</sup> OECD – Coronavirus (Covid-19): SME Policy Responses  
[https://read.oecd-ilibrary.org/view/?ref=119\\_119680-di6h3qgi4x&title=Covid-19\\_SME\\_Policy\\_Responses](https://read.oecd-ilibrary.org/view/?ref=119_119680-di6h3qgi4x&title=Covid-19_SME_Policy_Responses)

## The challenge

At the same time, businesses' exposure to technology risk and the risk of obsolescence is increasing and this is particularly pertinent for small and medium-sized enterprises. The speed at which European enterprises digitalise and the level of maturity of digitalisation that they can achieve directly impact the competitiveness of the European market on the global stage.

In Europe, less than one in five small and medium-sized enterprises is highly digitalised<sup>18</sup> versus almost half of large corporates. Digitalisation levels are particularly low and below the EU average among companies in Eastern and Southern Europe and in traditional sectors, such as construction and basic goods manufacturing. There is a risk that the digital gap for European enterprises identified here will continue to increase, as those that are driving the digital change continue to do so at a faster rate, while those yet to start will fall even further behind. These companies face the loss of business opportunities and risk becoming uncompetitive.

## Rising to the challenge

Governments all over Europe and the European Commission have adopted initiatives to encourage the uptake of digital technologies, and to strengthen their industries. However, investment gaps remain. This prompted the Commission to launch the InvestEU Programme in 2018 to foster the digitalisation of small and medium-sized enterprises, internationalisation, innovation activities, and upskilling of the workforce, among other things.<sup>19</sup> This programme provides the EU with a single investment support mechanism for the Multiannual Financial Framework 2021-2027.

In the same year, the Commission further responded to the challenge of digital transformation of industry with its Digital Europe Programme.<sup>20</sup> This programme aims to strengthen the network of digital innovation hubs, among other goals. The programme addresses the broad roll-out of digital technologies, including artificial intelligence, high performance computing and innovative cybersecurity techniques.

Digital innovation hubs and the European Commission have been rapidly responding to the new reality of the coronavirus pandemic. Digital innovation hub networks have adopted many measures during the last few weeks to better assist small and medium-sized enterprises in the current circumstances and improve their resilience during the crisis using digital technologies.

For example, DIH-HERO (a pan-European network of digital innovation hubs specialising in healthcare robotics) has opened a COVID-19 call aimed at supporting robotic technologies and solutions that can be quickly deployed in the healthcare sector. Similarly, DIHNet, a dedicated community of digital innovation hubs, has responded to the crisis by looking into the immediate and long-term needs of public sector organisations and small and medium-sized enterprises resulting from the pandemic. Investigations are being conducted regarding how digital tools could help them become more resilient. The DIH4CPS project aims to support European small and medium-sized enterprises in overcoming obstacles posed by innovative technologies through open calls to finance experiments in the area of cyber-physical systems and is an example of a digital tool in this context. The project was quick to adapt to the current situation and, in agreement with the European Commission, decided to focus the next open call on helping small and medium-sized enterprises recover from the economic effects of the pandemic. €1.6 million will be made available for the open call, giving many

<sup>18</sup> *Integration of Digital Technology - Digital Economy and Society Index Report - 2018*  
[http://ec.europa.eu/information\\_society/newsroom/image/document/2018-20/4\\_desi\\_report\\_integration\\_of\\_digital\\_technology\\_B61BEB6B-F21D-9DD7-72F1FAA836E36515\\_52243.pdf](http://ec.europa.eu/information_society/newsroom/image/document/2018-20/4_desi_report_integration_of_digital_technology_B61BEB6B-F21D-9DD7-72F1FAA836E36515_52243.pdf)

<sup>19</sup> InvestEU Programme COM (2018) 439 final  
<https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52018PC0439&from=EN>

<sup>20</sup> Digital Europe Programme COM/2018/434 final – 2018/0227 (COD)  
<https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52018PC0434&from=E2N>

small and medium-sized enterprises the possibility to test the technologies that will make them more competitive and efficient. Small and medium-sized enterprises can also join the DIHNet community and should familiarise themselves with the dedicated space “How can digital innovation hubs help in times of COVID-19?”.

In addition to the immediate impact of lockdowns, factory shutdowns, a dramatic drop in demand, and a slowdown in the economy as a whole, disrupted industrial supply chains have contributed to the adverse impact of the crisis on advanced manufacturing. All parts of the value chain have been affected, across all sectors and geographic locations. What has become evident is that the European industrial supply chain is vulnerable, perhaps more than previously imagined, and this has led to calls for enhanced flexibility and agility. To mitigate the impact and repurpose current manufacturing capacity, the European Commission<sup>21</sup> has mobilised additional resources from Horizon 2020 in a call for urgent research and innovation actions, including the repurposing of manufacturing for vital medical supplies and equipment (€23 million), and medical technologies, digital tools, and artificial intelligence analytics to improve surveillance and care at high technology readiness levels (€56 million). There is an overall need to shift to more flexible and agile manufacturing systems, not only from a technological standpoint but also from the regulatory side, for example, regarding certifications. Digital innovation hubs can play an important role in this regard.

Moving on to the new MFF, Horizon Europe, and the European Union industry policy, the twin challenge and clear direction towards the green and digital transformation remain a key focus for advanced manufacturing. However, given the palpable weaknesses of some parts of European Union industry and its supply chain, proposals include taking a more strategic approach (Strategic Investment Facility, 5th window under InvestEU), also in line with the ‘Made in Europe’ initiative,<sup>22</sup> which has already been launched. Together, these initiatives aim to retain critical manufacturing technology in Europe. This would ultimately allow for a more flexible and agile advanced manufacturing ecosystem in Europe, not only in the current context but also in preparation for future challenges.

## 1.2 Approach

### Framework for analysing digitalisation

The framework adopted for this study is illustrated in Figure 7. The process of digitalisation is analysed based on three dimensions.

- **Demand side:** Represented by the population of European small and medium-sized enterprises (both traditional and innovative companies) which have or are expected to adopt digital technologies to transform their businesses, thereby remaining relevant and competitive globally. The focus of the study is on companies with more than 10 employees. Microenterprises (up to 10 employees) have limited capacity to invest in digitalisation.
- **Supply side and investment landscape:** Represented by private financial intermediaries and public promotional institutions providing financing to support digital transformation.
- **Ecosystem and enablers:** Digital innovation hubs are regional multi-partner coordinators at the heart of the ecosystem for innovation and digitalisation. The ecosystem includes several organisations and players, such as research and technology organisations, universities, industry associations, chambers of commerce, incubators/accelerators,

<sup>21</sup> *Coronavirus: Commission boosts urgently needed research and innovation with additional €122 million*  
[https://ec.europa.eu/commission/presscorner/detail/en/ip\\_20\\_887](https://ec.europa.eu/commission/presscorner/detail/en/ip_20_887)

<sup>22</sup> *‘Made in Europe’* [https://ec.europa.eu/info/publications/made-europe\\_en](https://ec.europa.eu/info/publications/made-europe_en)

regional development agencies, governments and EU and national digitalisation programmes.

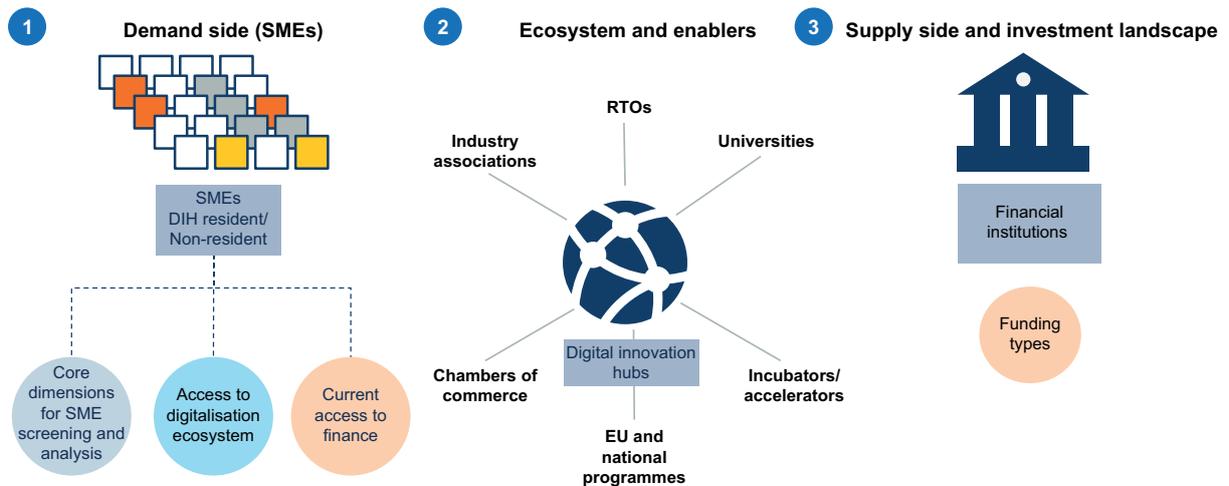


Figure 7. Digital innovation hubs as key enablers

### Demand-side segmentation model

The demand-side segmentation model covers the following dimensions:

- the digital profile of the small business. Which is the core dimension of segmentation;<sup>23</sup> and
- the external variables influencing access to the digitalisation ecosystem for small and medium-sized enterprises – these depend on the industry vertical in which the company is active and the geographical location.

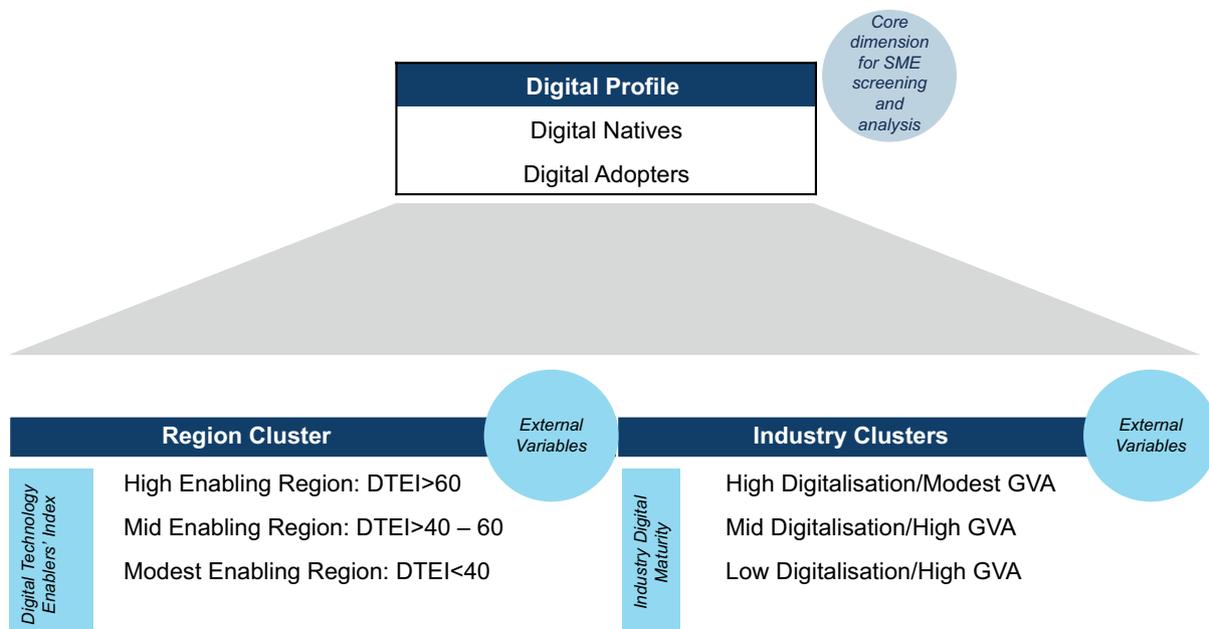


Figure 8. Demand-side segmentation model

<sup>23</sup> Geographical clustering of small and medium-sized enterprises into regions reflects the different levels of the EU countries for the Digital Transformation Enablers' Index (DTEI).

### Digital profile of small and medium-sized enterprises

The digital profile is applied as the core dimension for the segmentation of small and medium-sized enterprises in this study. This variable is a major differentiating factor in the approach to digitalisation in terms of the challenges and issues encountered by companies in their digital journey, as presented later in this report. The proposed model differentiates digital natives from digital adopters as follows.

- **Digital native:** an enterprise which has been established on a strong technology platform and exhibits a high level of digital maturity across its processes and functions. A digital native is usually a start-up or young firm which is focused on a single digital initiative to launch or scale up its business. Hence, digital natives typically look for financing to scale up their operations, rather than funding for a discrete, digital project.
- **Digital adopter:** an enterprise which has been established for longer than a native has, and which does not have a strong technology platform which it can leverage. A digital adopter usually launches digitalisation projects which make incremental improvements and augment their revenue streams or optimise their operations. An example is digitalisation of certain core processes using an Enterprise Resource Planning system.

### Industry vertical clustering

In addition, an industry segmentation model leveraging Eurostat data sources and Gartner’s research is developed in this study to identify a company’s level of digital maturity and its contribution to the European economy at an industry level. These criteria include:

- Gross value added (GVA) to the EU economy; and
- Digital assets under use, digital transaction profile and levels of digitalised business processes (based on enterprise resource planning deployments).

Based on these criteria, the study identifies four distinct clusters within European industry verticals. The industry segmentation model is presented in Figure 9.

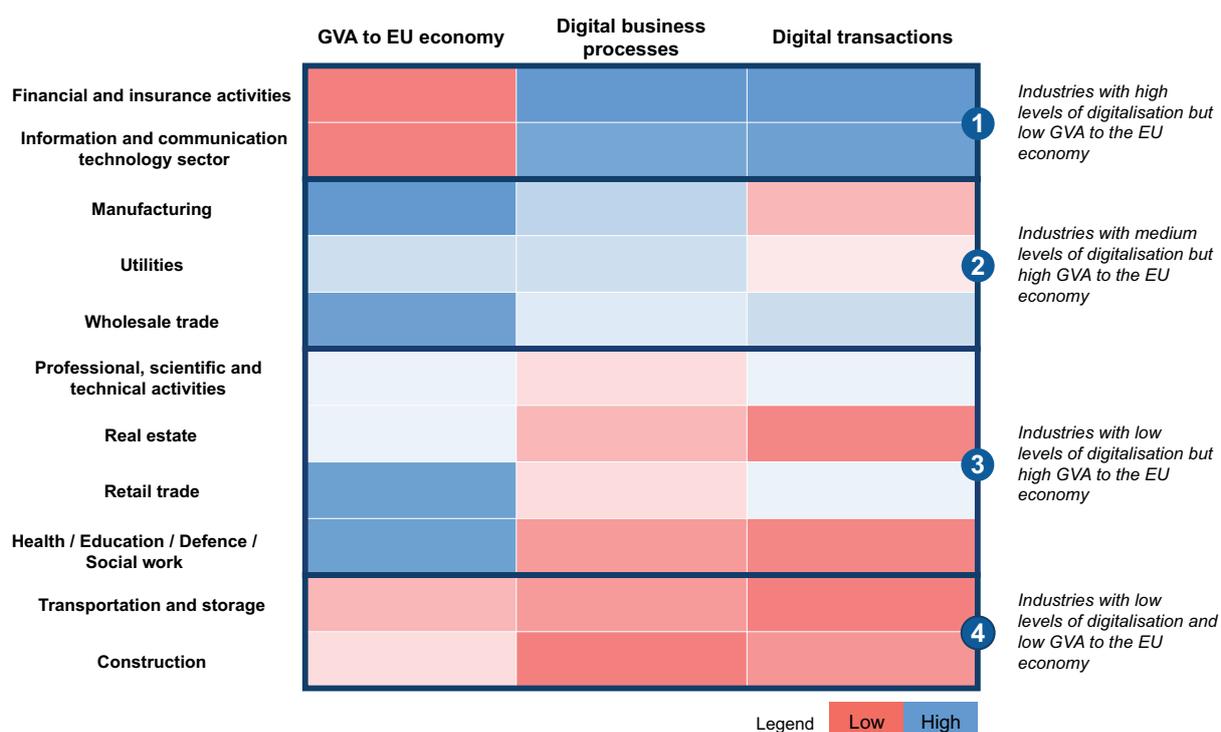


Figure 9. Industry cluster segmentation framework

The segmentation of the industry verticals distinguishes four different clusters:

- **Cluster HighDig/ModGVA:** Industries with high levels of digitalisation but low to medium gross value added to the European economy (including information and communication technology and financial and insurance services)
- **Cluster MidDig/HighGVA:** Industries with medium levels of digitalisation but high gross value added to the European economy (including manufacturing, utilities and wholesale trade)
- **Cluster LowDig/HighGVA:** Industries with low levels of digitalisation but high gross value added to the European economy (including retail trade and health/education/defence/social work)
- **Cluster LowDig/ModGVA:** Industries with low gross value added to the European economy and low levels of digitalisation (including transportation and storage and construction).

### Regional clustering

The **geographical clustering** of small and medium-sized enterprises into regions reflects the different levels of the Digital Transformation Enablers' Index (DTEI) recorded for different EU countries.<sup>24</sup> The index monitors a set of enablers for digital transformation in each country. As a general hypothesis, enabling factors for digital transformation impact the extent to which national industries integrate new digital technologies and foster an environment for the birth and growth of digital start-ups and new businesses. The index measures the factors enabling digital transformation across five main categories (digital infrastructure, investments and access to finance, supply and demand of digital skills, e-leadership, and entrepreneurial culture). The Digital Transformation Enablers' Index provides a ranking for Member States based on the assumption that infrastructure, access to finance and the demand for/supply of skills are the most important factors driving digital transformation. Accordingly, these factors account for weights of 20%, 30% and 30% of the index, respectively. The environmental enabling conditions (e-leadership and entrepreneurial culture) are also considered but are given a lower weighting in the index (10% each).

Figure 10 provides the result of the clustering into three regions:

- **Cluster High Enabling Region for digitalisation (HighEnabl Reg):** refers to countries with a Digital Transformation Enablers' Index score above 60, and mainly includes Northern European countries (Netherlands, Finland, Sweden, Belgium, Luxembourg, Ireland, Denmark, United Kingdom, France)
- **Cluster Mid Enabling Region for digitalisation (MidEnabl Reg):** refers to countries with an index score between 40 and 60 (whereby the EU average is approximately 50) and mainly includes Southern and Central European countries (Germany, Austria, Malta, Spain, Czech Republic, Estonia, Portugal, Cyprus, Lithuania, Italy)
- **Cluster Modest Enabling Region for digitalisation (ModEnabl Reg):** refers to countries with an index score below 40 and mainly includes Eastern and South-Eastern European countries (Slovenia, Hungary, Greece, Slovakia, Bulgaria, Poland, Croatia, Latvia and Romania).

<sup>24</sup> The Digital Transformation Enablers' Index is one of the indices used in the Digital Transformation Scoreboard (2018).

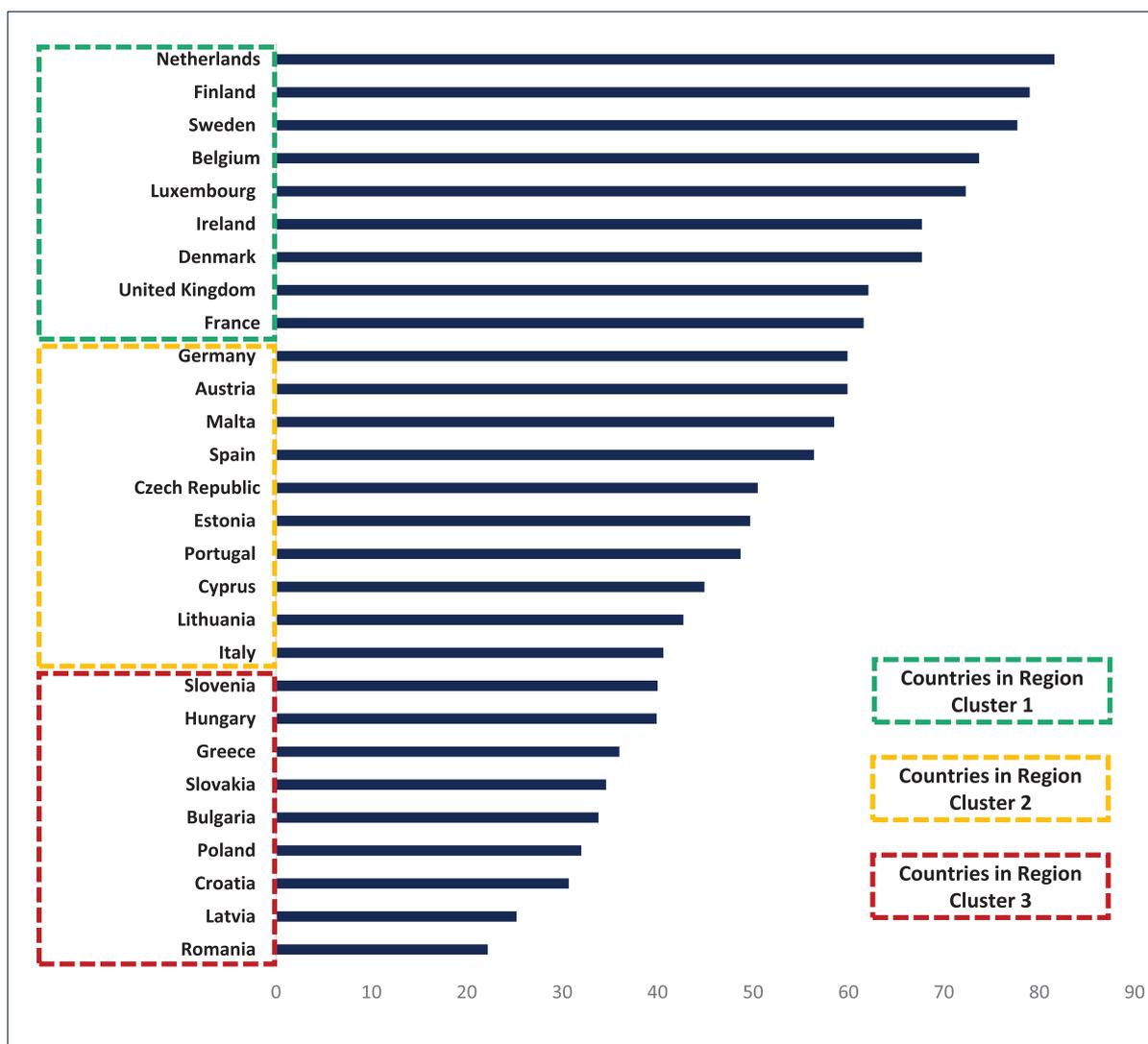


Figure 10. Segmentation of geographies into region clusters by Digital Transformation Enablers' Index

### Supply-side segmentation model

The **supply-side** segmentation model is based on the **type of financing products offered** by financial intermediaries, as illustrated in Figure 11.

<i>Funding types</i>			
Debt	Equity	Hybrid	Grants
Asset lending	Angel funding	Subordinated debt	Conditional/Non-conditional grants
Factoring/Reverse Factoring	Private equity	Private placement	Government loans
Term loans	Venture capital	Profit sharing	Guarantees
Lease financing	SME listing	Revenue sharing with collateralised equity	
Crowdsourcing (Debt)	Crowdsourcing (Equity)	Mezzanine	
	Equity ownership grants	SME bond market	

Figure 11. Segmentation model of the supply side

This segmentation differentiates debt, equity, hybrid instruments and grants.

- **Traditional debt** financing is contingent on the creditworthiness of the firm seeking funding
- **Equity**-based instruments rely on the growth or disruptive potential of a project to generate returns.
- **Hybrid instruments** generally combine equity and debt characteristics and have a higher risk-absorption capacity than traditional debt.
- **Grant financing** is usually provided by government bodies at a federal or county/state level to organisations to support economic or policy targets.

### Ecosystem and enablers segmentation model

The digital innovation hub network is at the heart of the ecosystem for innovation and digitalisation. The segmentation model for the ecosystem is based on two main items: digital innovation hubs and European and national programmes for digitalisation.

### Digital innovation hubs

Hubs play a key role in supporting small and medium-sized enterprises in their digital journey.

As per the European Commission's definition, **digital innovation hubs**<sup>25</sup> are **not-for-profit, one-stop-shops supporting companies** to develop more competitive business/production processes, products, or services using **digital technologies**. They provide access to the latest knowledge, expertise and technology to support their customers' projects which pilot, test and experiment with digital innovations. They also provide business and financing support to implement these innovations, if needed. As proximity is considered crucial, digital innovation hubs act as a first regional point of contact; they strengthen the local innovation ecosystem. A hub is a regional, multi-partner cooperation (including organisations such as research and technology organisations, universities, industry associations, chambers of commerce, incubators/accelerators, regional development agencies and even governments) and can also have strong linkages with service providers outside the region. This means they can support local companies with access to services in other geographical areas.

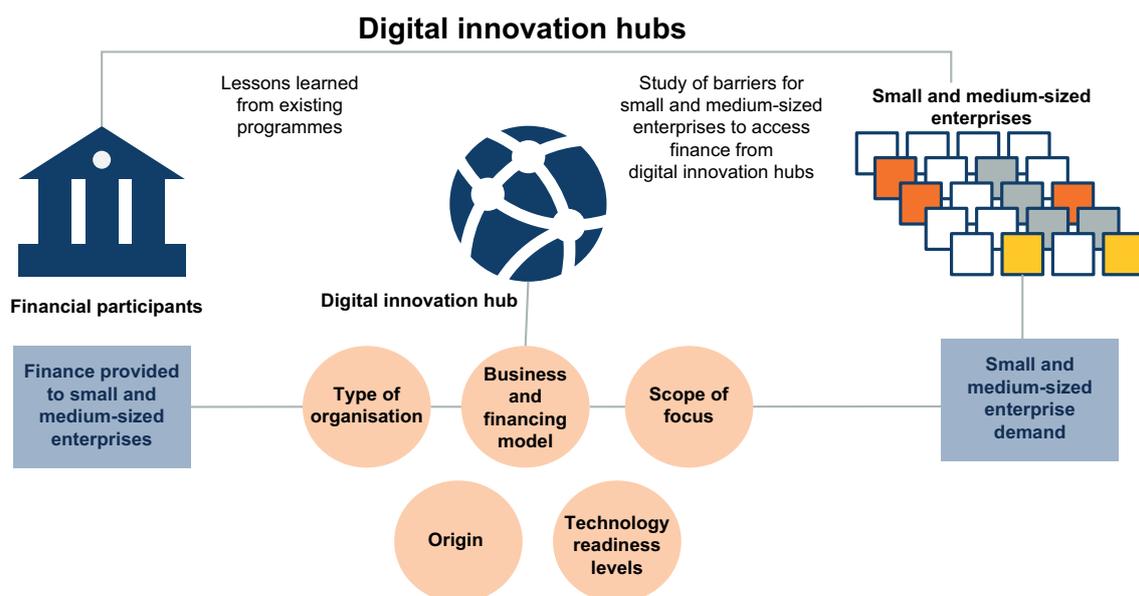


Figure 12. Digital innovation hub analysis model

<sup>25</sup> Report from DG CONNECT: digital innovation hubs - October 2018

However, the hub network in Europe is quite heterogeneous and fragmented. There is no formal classification/segmentation today. In practice, digital innovation hubs can be broadly classified based on the following categories<sup>26</sup>:

**Table 2. Digital innovation hub categories**

<b>Category</b>	<b>Description</b>
<b><i>Origin (founders/sponsors)</i></b>	<ul style="list-style-type: none"> <li>- Universities</li> <li>- Research centres</li> <li>- Industry associations</li> <li>- Private companies, etc.</li> </ul>
<b><i>Scope of focus</i></b>	<ul style="list-style-type: none"> <li>- Specific sectors or technologies (expert hubs)</li> <li>- Digital natives or digital adopters</li> <li>- Specific regions or areas, etc.</li> </ul>
<b><i>Type of organisation</i></b>	<ul style="list-style-type: none"> <li>- Public-private partnership</li> <li>- Public entity</li> <li>- Non-profit private entity</li> <li>- No separate legal entity (informal association of existing institutions), etc.</li> </ul>
<b><i>Business and financing model</i></b>	<ul style="list-style-type: none"> <li>- Free services covered by public funding</li> <li>- Fee-based services (private funding)</li> <li>- Mixed model combining free and fee-based services</li> </ul>
<b><i>Technology readiness level of customers</i></b>	<ul style="list-style-type: none"> <li>- All levels (1-9)</li> <li>- Only certain levels</li> </ul>

### European and national programmes for digitalisation

Digitalisation of industries is a key priority in the digital agenda of many Member States. There are currently 15 national schemes and programmes around digital transformation and Industry 4.0 and four extra initiatives are under preparation. These programmes facilitate capacity-building initiatives, create awareness about the importance of digitalisation, support the development of digital skills and incentivise digital investments through grants, tax breaks and financial instruments.

### 1.3 Methodology

This study is based on primary and secondary research data. The primary research approach was to survey small and medium-sized enterprises, as well as to conduct in-depth interviews with some small and medium-sized enterprises, digital innovation hubs and financial institutions. Two workshops were also conducted.

The selection criteria for the primary research subjects were based on the segmentation framework described above, with the Region and Industry segmentation summarised in the box to the right.

<b>Region</b>	
<b>HighEnabl Reg:</b> NL FI SE BE LU IE DK UK FR	
<b>MidEnabl Reg:</b> DE AT MT ES CZ EE PT CY LT IT	
<b>ModEnabl Reg:</b> SI HU EL SK BG PL HR LV RO	
<b>Industry Cluster</b>	
<b>HighDig/ModGVA:</b> Information and communication technology, financial and insurance services	
<b>MidDig/HighGVA:</b> Manufacturing, utilities, wholesale trade	
<b>LowDig/HighGVA:</b> Retail trade, health/education/defence	
<b>LowDig/ModGVA:</b> Transportation and storage, construction	

<sup>26</sup> Based on an expert interview with DG CONNECT

The main conclusions and findings of this report draw on the qualitative judgement and expertise of the authors. The data collected via the survey and market consultation can act as an indicator of the market but are not designed to form a statistically significant sample.

### Demand side – Small and medium-sized enterprises

The analysis of the demand side is based on a survey, in combination with in-depth interviews.

#### Survey sample

The survey is based on a sample of 102 small and medium-sized enterprises. The survey sample is sufficient to act as an indicator of the market but is not designed to be statistically significant.

The sample was designed to ensure an even distribution of survey participants across the following categories:

- Digital natives and digital adopters
- Companies with an ongoing **digitalisation project** and those without. This dimension ensured that the study gathered information on why some small and medium-sized enterprises could not/did not digitalise
- The **regional** clusters
- The **industry** clusters – although the fourth industry cluster (the Low Dig/ModGVA) was not included due to the low chances of finding enough enterprises with a digitalisation project.

Figures 13-14 show the survey respondents' distribution across these three segmentation categories and illustrate that the sample was balanced across these dimensions.

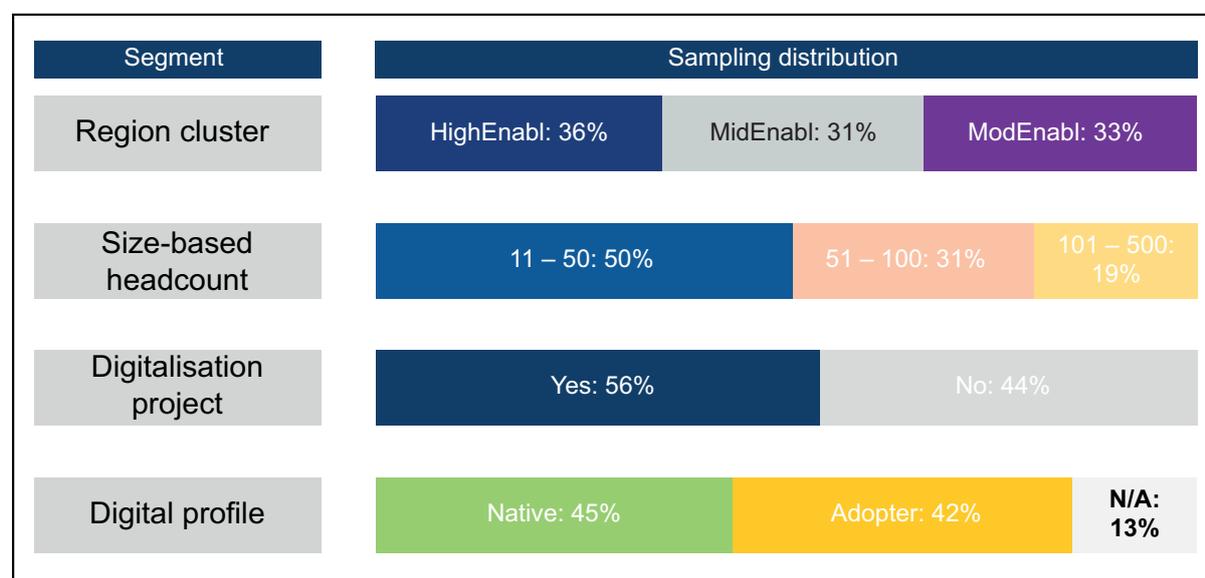


Figure 13. Sampling of the small and medium-sized enterprise survey

#### Interview sample

The ten interviews provided in-depth information to understand the constraints companies are facing, as well as to identify possible solutions or best practices. The interview sampling

focused on ensuring that a **diversity of technologies in use** was reflected in the sample, while maintaining a **spread among regions** and – to the extent possible – industry clusters. The figure below shows the sample distribution of the interviews.

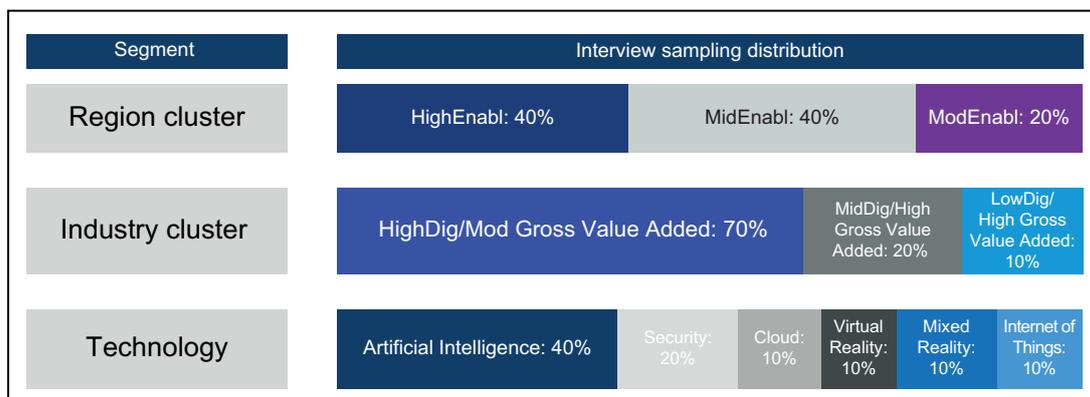


Figure 14. Sampling of the small and medium-sized enterprise interviews

## Supply side – Financial institutions

### Interview with financial institutions

The interviewees from financial institutions were identified through desk research and by leveraging the networks of Gartner and the EIB. In total, expert input from 12 financial institutions or associations of financial intermediaries was gathered, with a near even distribution among the two segments: the region clusters and the funding types. Although not a segmentation criterion, the type of institution is listed in Table 3 as well, to illustrate the variety of institutions that were interviewed.

Table 3. Sampling of financial institution interviews

Region cluster	Debt	Equity	Grants	Type of financial institution
	✓			Bank
	✓	✓		Bank
	✓	✓		Bank
	✓			Bank
	✓	✓		Bank
All	✓	✓		Specialist provider of risk finance to benefit small and medium-sized enterprises
	✓	✓	✓	National promotional bank
All		✓		Business angel trade association
	✓			National promotional bank
	✓			Bank
All	✓	✓		Association of guarantee institutions
	✓	✓		Mutual guarantee provider/Counter-guarantee provider

■ HighEnabl Reg ■ MidEnabl Reg ■ ModEnabl Reg ■ HighDig/ModGVA ■ MidGVA/HighGVA ■ LowGVA/HighGVA

## Ecosystem and enablers

### Digital innovation hubs: case study sample

The case studies were identified through desk research and by leveraging recommendations from DG Connect. In total, six case studies were undertaken, with one example outside Europe.<sup>27</sup> The case studies provide in-depth information to understand the constraints small and medium-sized enterprises are facing and identify possible solutions or best practices to enable access to finance via digital innovation hubs. The sampling focused on **diversifying the types of digital innovation hubs contacted**, based on the different categories of hubs that exist (see the ecosystem and enablers segmentation model section), while maintaining a **spread among region clusters**. There was also a strong focus on artificial intelligence as the technology supported by hubs.

**Table 4. Digital innovation hub case study sample**

	Region cluster	Industry cluster	Technology	Origin	Scope of focus	Organisation	Business model	Technology readiness level of customer
1					Expert digital innovation hub	Public private partnership, linked to academia	Public funding	1-8
2					Regional digital innovation hub	Public private partnership, linked to academia	Private and public funding	1-8
3					Regional digital innovation hub	Public private partnership	Private and public funding	4-9
4					Expert digital innovation hub	Academia	Public funding	3-5 8-9
5					Regional digital innovation hub	Private, linked to academia	Private and research funding	>=6
6	International				Regional digital innovation hub	Public private partnership, linked to academia	Private and public funding Moving to only private	1-9

■ HighEnabl Reg   
 ■ MidEnabl Reg   
 ■ ModEnabl Reg   
 ■ HighDig/ModGVA   
 ■ MidGVA/HighGVA   
 ■ LowGVA/HighGVA

### Digital innovation hub workshops

The study included **two workshops** with external stakeholders. The aim of the workshops was to get participants' views and opinions on the key needs for improving the access-to-finance conditions for digital innovation hubs and small and medium-sized enterprises involved in digitalisation programmes. The workshops were held with experts from digital innovation hubs and European Commission representatives.

The **first stakeholder workshop** focused on identifying good practices and challenges in financing digital innovation hubs and digital projects for small and medium-sized enterprises. During the workshop, experts shared information about their experience with current business models and funding sources for hubs, details about key obstacles for digitalisation of small and medium-sized enterprises and views on how to improve their access to finance for digital projects and to digital innovation hubs.

The aim of the **second stakeholder workshop** was to share the key findings of the study and gather feedback from the digital innovation hubs on the draft recommendations.

<sup>27</sup> The case of the digital innovation hub outside of Europe was chosen because it was linked to the good practice case identified in the national programmes and this hub was becoming financially sustainable. Namely, this hub is able to operate on the basis of private funding only.

## National programmes

The national programme case studies were identified through desk research and by leveraging recommendations made by the European Commission's DG Connect. The focus of the case studies was on programmes related to Industry 4.0, due to the link between Industry 4.0 projects and specific technologies, such as artificial intelligence and the internet of things. This enabled an understanding of the relationship between the development of these technologies and the access to digital innovation hubs. In total, six case studies were conducted, covering two examples outside Europe. The aim of collecting information from international cases is to identify innovative approaches for funding the digitalisation of small and medium-sized enterprises.

**Table 5. Analysis of sampling of the national programmes**

	Region cluster	Industry vertical cluster		Debt	Equity	Grant	Notes
1				✓	✓		<ul style="list-style-type: none"> <li>• Incentives: Tax relief</li> <li>• Access to finance: Guarantee/Loan fund - venture capital start-up</li> </ul>
2				✓	✓		<ul style="list-style-type: none"> <li>• Incentives: Amortisation schemes - tax relief</li> <li>• Access to finance: Guarantee/Loan fund - venture capital start-up</li> <li>• Patents and intellectual property rights incentives</li> </ul>
3				✓	✓	✓	<ul style="list-style-type: none"> <li>• Incentives: Innovation vouchers - tax relief</li> <li>• Access to finance: Guarantee/Loan fund - national innovation fund - venture capital start-up support</li> <li>• Patents and intellectual property rights incentives</li> </ul>
4					✓	✓	<ul style="list-style-type: none"> <li>• Incentives: Amortisation schemes</li> <li>• Access to finance: National innovation fund - venture capital start-up support</li> </ul>
5	International					✓	<ul style="list-style-type: none"> <li>• Incentives: Innovation vouchers</li> </ul>
6	International	Not specified		✓	✓		<ul style="list-style-type: none"> <li>• Access to finance: Guarantee/Loan fund - venture capital start-up support</li> </ul>

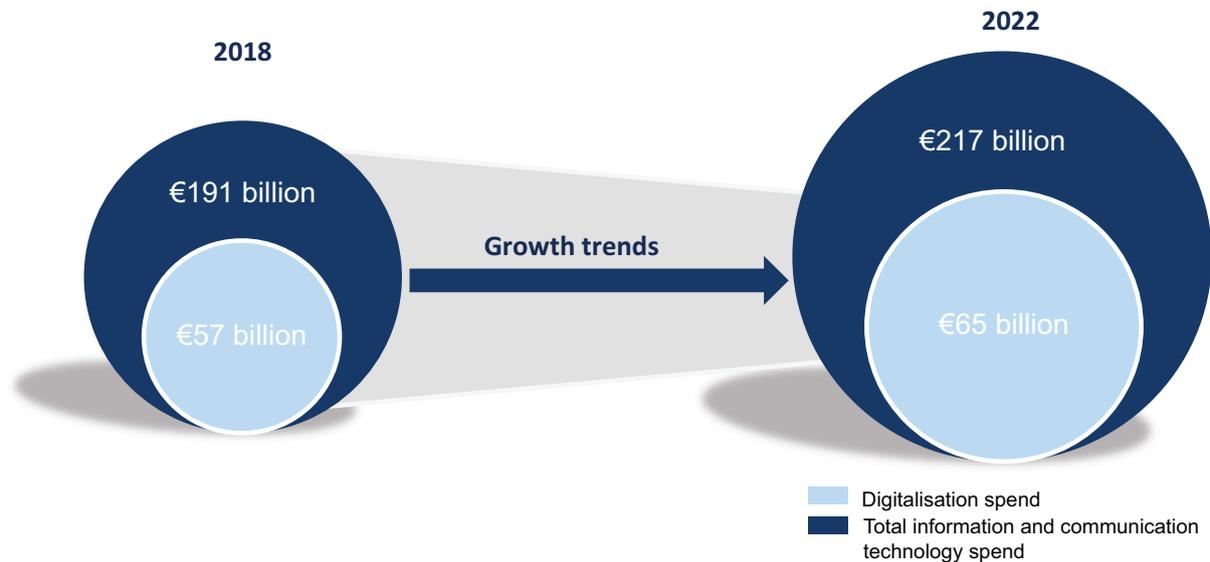
■ HighEnabl Reg  
 ■ MidEnabl Reg  
 ■ ModEnabl Reg  
 ■ HighDig/ModGVA  
 ■ MidGVA/HighGVA  
 ■ LowGVA/HighGVA

## 2. Snapshot of the status of digitalisation in Europe

### 2.1 Trends of digitalisation in Europe and expected growth

**Small and medium-sized enterprises' estimated demand for digitalisation and digital transformation (based on spending) is growing at an accelerated pace in Europe**

Small and medium-sized enterprises' spending on digitalisation in Europe is estimated at €57 billion for 2018, representing about 30% of the total spending on information and communication technologies (€191 billion). Digitalisation spending is expected to grow at a compound annual growth rate of 3.3% from 2018-2022, to reach €65 billion by 2022.



**Figure 15. Estimated small and medium-sized enterprise demand for digitalisation in Europe<sup>28</sup>**

#### **Methodology for estimating the demand for digitalisation**

To estimate the market size of demand for digitalisation across Europe, the study has developed a model for small and medium-sized enterprises' investment in digitalisation. The model leverages Gartner's robust information technology services and digital spend forecasts to calculate an overall figure for small and medium-sized enterprises' information and communication technology expenditure across Europe.

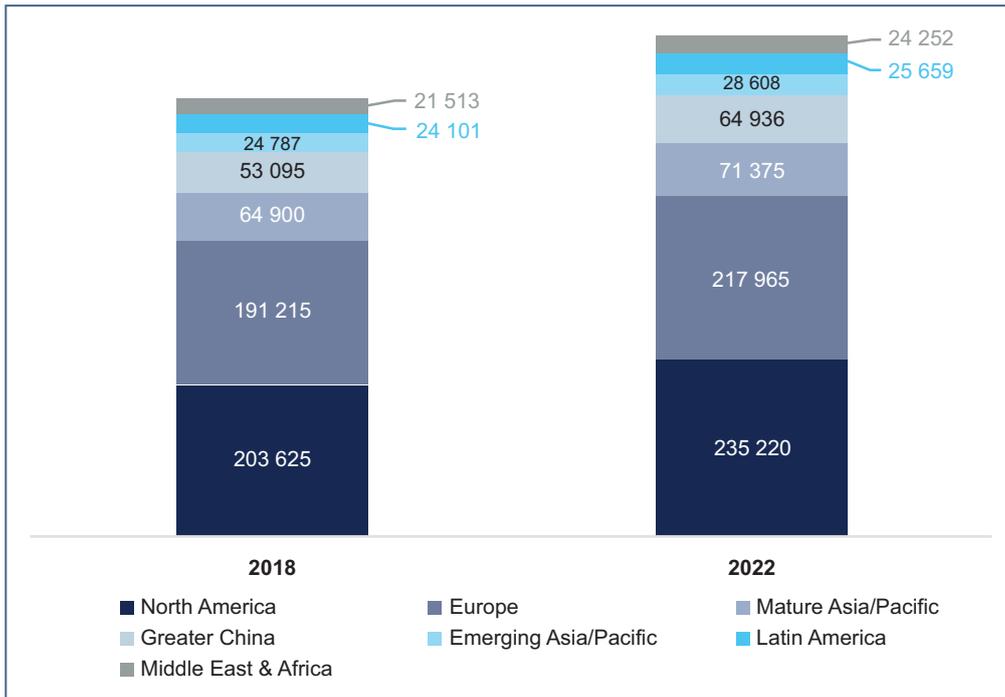
<sup>28</sup> Source: Gartner Research

The estimation of the total demand also reflects the feedback collected in surveys of executives regarding their digitalisation strategy across the EU. Furthermore, the methodology for the estimation of market size applies the following assumptions:

- The Gartner information and communication technology forecast calculates the total investment on behalf of small and medium-sized enterprises. The forecast specifically considers five technology segments: data centre systems, devices, information technology services, software and telecommunications services.
- Information and communication technology expenditure can be of two kinds:
  - **Ongoing spending:** Traditional ‘business as usual’ expenses for servers, connectivity, etc. This category accounts for the majority of small and medium-sized enterprises’ information and communication technology spending (approximately 70%).
  - **Non-recurring spending:** Non-traditional expenses accounting for optimisation and transformation projects. This spending accounts for approximately 30% of total information and communication technology expenditure.
  - Within non-recurring spending, there are largely two kinds of investments that small and medium-sized enterprises undertake — digital optimisations (approximately 20% of spending) and digital transformations (approximately 10% of spending).
- This study uses the figure for **non-recurring spending as an estimate of the total demand for digitalisation** in Europe.
- Due to the lack of sufficiently granular data, the total expenditure is used as a proxy for digitalisation demand in the in-depth analysis of geographical and sectorial trends, as well as the international comparison. Total information and communication technology spending is highly correlated with digitalisation demand.

**Overall expenditure on information and communication technology and digitalisation by European small and medium-sized enterprises is second only to that in the United States. It is significantly higher than that in China and the rest of the world.**

The analysis of digitalisation spending demonstrates that small and medium-sized enterprises in Europe exhibit strong levels of investment in information and communication technology products and services when compared with similar companies in other regions of the world. The only region where small and medium-sized enterprises exhibit higher spending on information and communication technology is North America.



**Figure 16. Total small and medium-sized enterprise spending on information and communication technology (2018 versus 2022) in € million (worldwide)<sup>29</sup>**

Total information and communication technology expenditure by small and medium-sized enterprises in Europe in 2018 was €191 billion. This figure is expected to grow to €218 billion by 2022, representing a compound annual growth rate of 3.3%. In comparison, spending on behalf of similar companies in North America in 2018 was €203 billion, which is expected to grow to €235 billion by 2022, representing a compound annual growth rate of 3.6%.

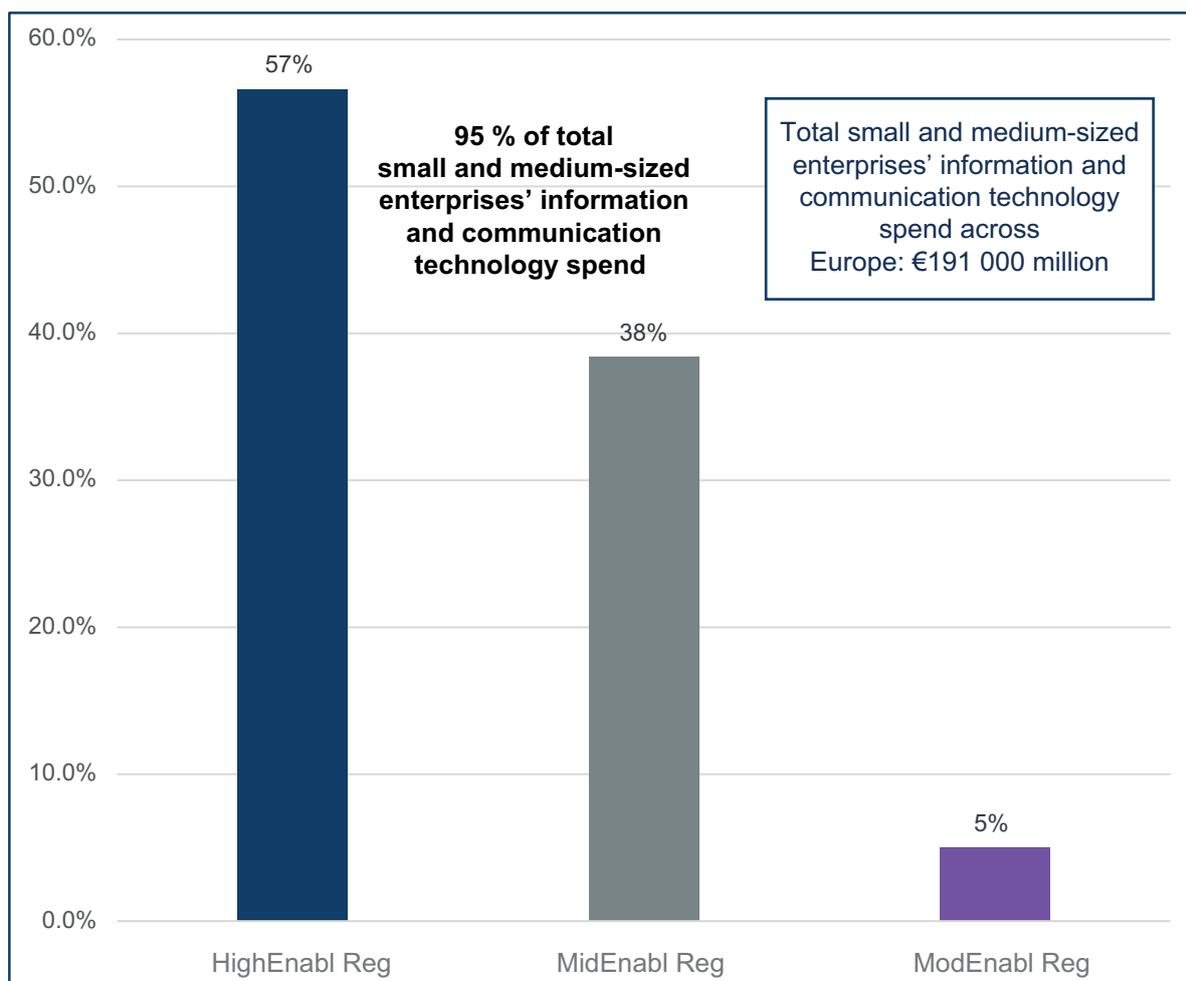
**However, small and medium-sized enterprises’ demand for information and communication technology and digitalisation in Europe is highly fragmented and heterogeneous.**

The study shows that small and medium-sized enterprises’ **demand for information and communication technology and digitalisation depends** on two external variables: **the industry vertical** in which the enterprise is active and **the company’s region**.

**Geography is a clear driver of digitalisation. There is a wide gap in demand for information and communication technology and digitalisation between Western, Eastern, and South-Eastern Europe on the one hand and Northern, Southern, and Central Europe on the other hand.**

An analysis of the data by country shows that approximately 95% of small and medium-sized enterprises’ total spending on information and communication technology and digitalisation in 2018 is in the High Enabling Regions (NL, FI, SE, BE, LU, IE, DK, UK, FR) and Mid Enabling Regions (DE, AT, MT, ES, CZ, EE, PT, CY, LT, IT), while only 5% of spending (and therefore, of demand) lies in the Modest Enabling Region (SL, HU, EL, SK, BG, PL, HR, LT, RO), which mainly comprises Eastern and South-Eastern European countries.

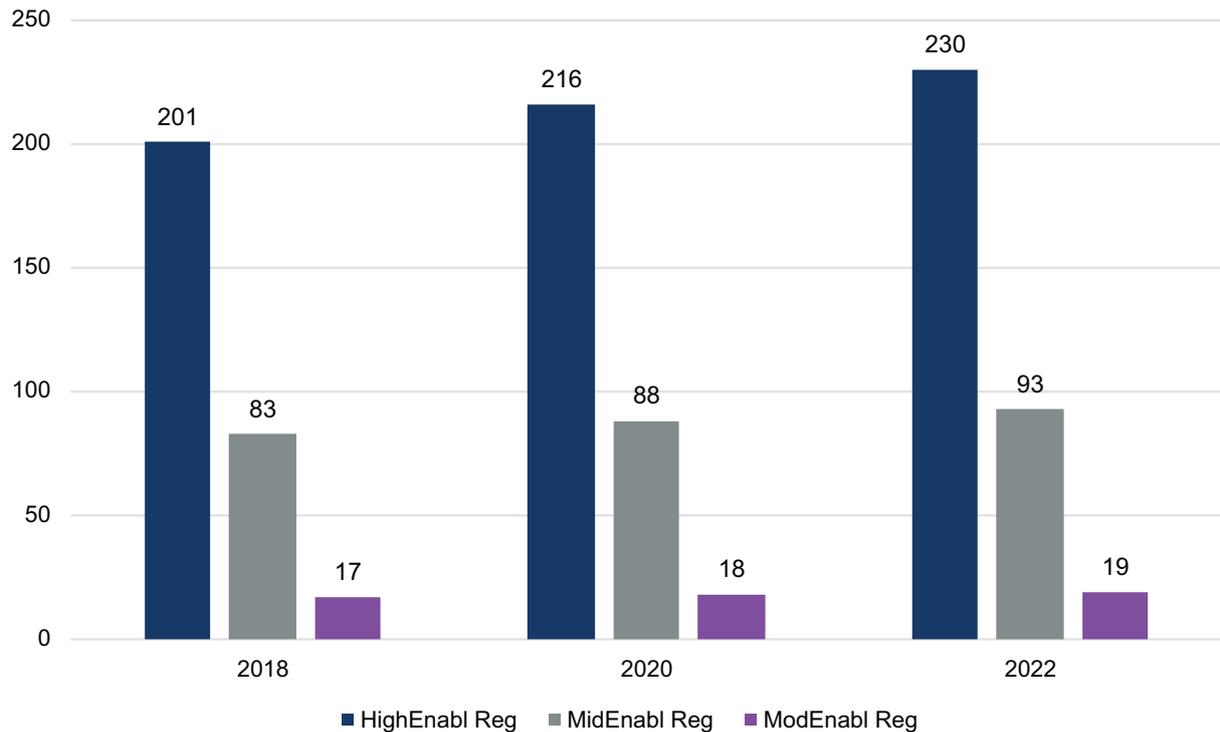
<sup>29</sup> Source: Gartner forecast of small and medium-sized enterprises’ spending on information and communication technology



**Figure 17. Information and communication technology spending by small and medium-sized enterprises in the region clusters<sup>30</sup>**

When the spend is analysed at the 'per firm' level (2018 and 2022 forecast) within the clusters, the pattern of disparity between regional clusters remains. Overall, the data show that small and medium-sized enterprises' spending on information and communication technology within the High Enabling Region (which mainly includes Northern European countries) is approximately 10 times, on average, that in the Modest Enabling Region (mainly Eastern and South-Eastern European countries).

<sup>30</sup> Source: Gartner forecast of small and medium-sized enterprise spending on information and communication technology



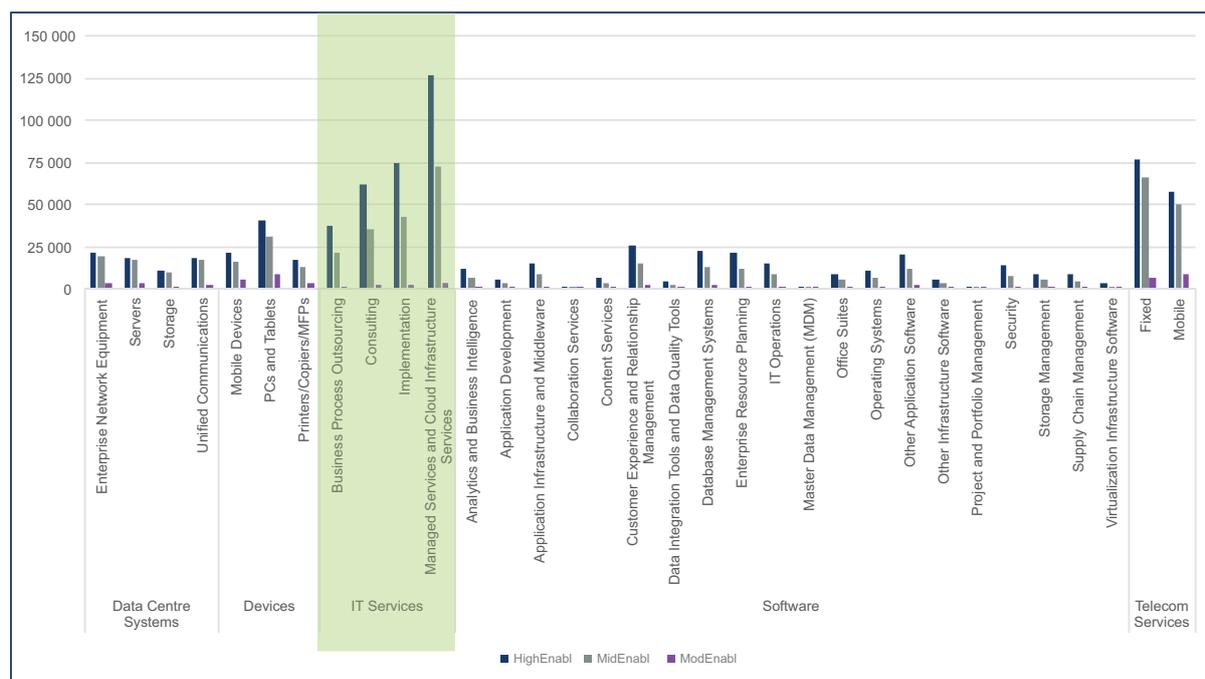
**Figure 18. Average spending (in € thousands per firm) on information and communication technology (real and forecast) within clusters<sup>31</sup>**

Small and medium-sized enterprises in the High Enabling Region exhibit the largest spending per company at €0.2 million, which is 11 times that in the Modest Enabling Region. The forecast shows that there is an expected increase and improvement in spending for small and medium-sized enterprises in the Mid and Modest Enabling Regions. Nonetheless, the gap between the High Enabling Region and Mid and Modest Enabling Regions is expected to increase. Spending in the High Enabling Region is likely to be 12 times that in the Modest Enabling Region by 2022.

As we analyse the regional and industry clusters in greater detail, the study finds that this gap could be explained by the profile of the companies in each cluster. As we move from the High Enabling Region to the Mid Enabling Region, the proportion of digital adopters within the total population of small and medium-sized enterprises increases. A higher proportion of the countries in the High Enabling Region comprises knowledge-driven and service-driven economies, resulting in a higher level of digital natives. This effect is even stronger as we move from the Mid Enabling Region to the Modest Enabling Region.

The study shows that small and medium-sized enterprises in the High Enabling Region cluster show a greater level of digital maturity. This can be inferred by their use of advanced information and communication technology products and services.

<sup>31</sup> Source: Gartner forecast of small and medium-sized enterprise spending on information and communication technology and European small and medium-sized enterprise figures from Eurostat



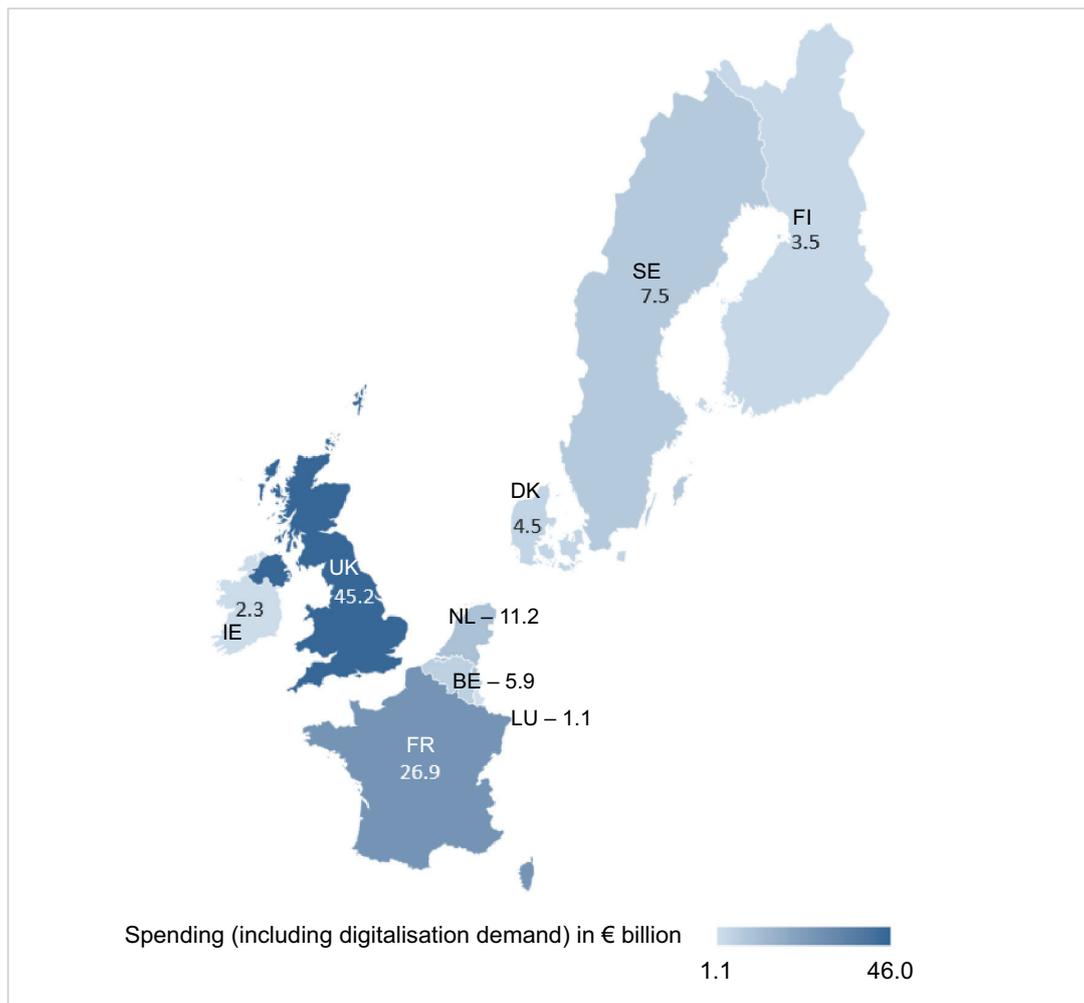
**Figure 19. Small and medium-sized enterprise spending on information and communication technology (in € million) by products and services across industries and region clusters<sup>32</sup>**

As illustrated in Figure 19, the enterprises in the High Enabling Region exhibit higher spending on more advanced types of information and communication technology products (such as consulting and managed services). These types of products and services are only used when organisations require support to manage more complex and advanced implementations of systems and processes.

While companies in the Mid Enabling Region do procure advanced products and services, the overall level of purchasing of advanced products and services is much lower than in the High Enabling cluster. The Modest Enabling Region’s small and medium-sized enterprises exhibit very low spending in the advanced product categories as the implementations of information and communication technology are relatively straightforward.

<sup>32</sup> Source: Gartner forecast of small and medium-sized enterprise spending on information and communication technology

### High enabling region cluster (HighEnabl Reg)



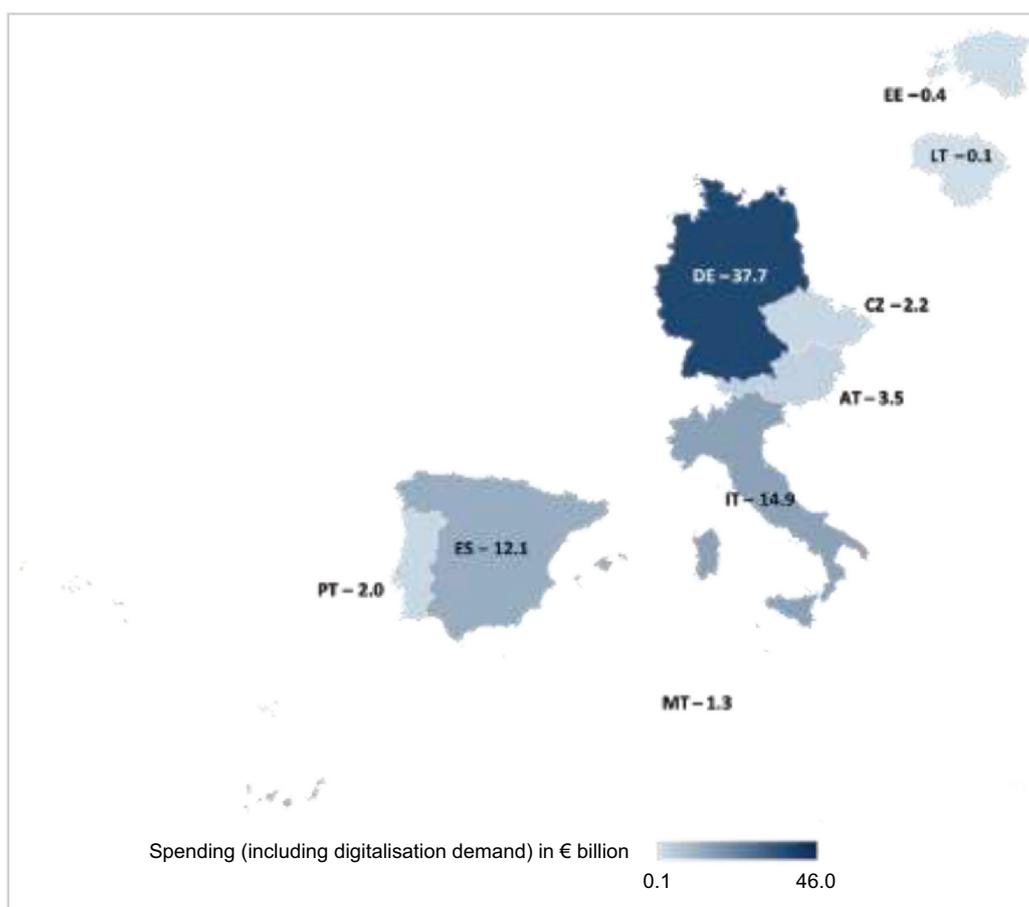
**Figure 20. Detailed country spending on information and communication technology by small and medium-sized enterprises within the High Enabling Region cluster<sup>33</sup>**

At a country level, the largest proportion of information and communication spending (including digitalisation demand) is in the United Kingdom (€45.2 billion), France (€26.9 billion) and the Netherlands (€11.2 billion). The next set of countries in the cluster includes Sweden (€7.5 billion), Belgium (€5.9 billion), Denmark (€4.5 billion) and Finland (€3.4 billion).

Within the High Enabling Region, while there is a generally higher level of spending, there is a material difference in the proportion of the spend in the top five countries. Considering the size of the economy (based on gross domestic product), Finland, Sweden, Luxembourg, Denmark and the United Kingdom spend close to 2% of their national gross domestic product on information and communication technology and digital transformation versus around 1% for the remaining countries in this group. This is partly because the High Enabling Region group comprises largely knowledge-based service economies. Furthermore, a majority of these countries have a high proportion of start-ups and digital natives, which in turn results in greater digital maturity and higher information and communication technology spending.

<sup>33</sup> Source: Gartner forecast of small and medium-sized enterprise spending on information and communication technology

## Mid Enabling Region cluster (MidEnabl Region)



**Figure 21. Detailed country spending on information and communication technology by small and medium-sized enterprises within the Mid Enabling Region cluster<sup>34</sup>**

The total spend in this cluster is €73.3 billion. Of this, the largest proportion of the spending (including digitalisation demand) is in Germany (€37.7 billion), Italy (€14.9 billion) and Spain (€12.1 billion).

The level of spending on information and communication technology per small and medium-sized enterprise is significantly lower when compared with that of the High Enabling Region. A firm in the Mid Enabling Region spends €0.083 million, which is 58% lower than average small and medium-sized enterprise spend in the High Enabling Region.

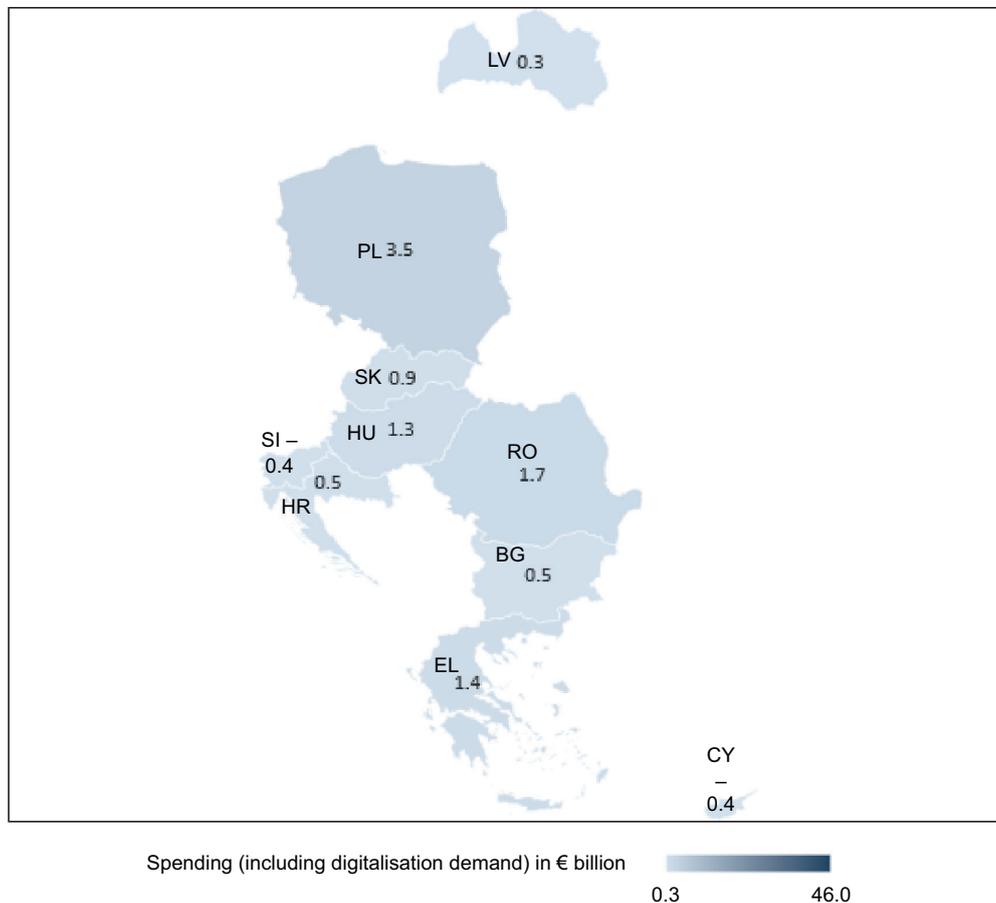
At a country level, the spending on information and communication technology and digitalisation is more homogeneous compared to the High Enabling Region. When adjusted for the size of the economy (based on gross domestic product), most of the countries in this group spend about 1% of their national gross domestic product on information and communication technology and digital transformation.

The analysis also reveals that Germany accounts for 23% of the enterprises in this cluster, but nearly 51% of the spending within the entire cluster. Meanwhile, Italy exhibits a more balanced ratio of the number of enterprises to information and communication technology spending (approximately 13%:17%).

<sup>34</sup> Source: Gartner forecast of small and medium-sized enterprise spending on information and communication technology

This may be due to the higher concentration of small and medium-sized enterprises in engineering and advanced manufacturing in Germany versus the other countries in the cluster.

### Modest Enabling Region cluster (ModEnabl Reg)



**Figure 22. Detailed country spending on information and communication technology by small and medium-sized enterprises within the Modest Enabling Region cluster<sup>35</sup>**

Small and medium-sized enterprises in the Modest Enabling Region show the lowest levels of spending and demand for information and communication technology and digitalisation. The total spend in this cluster is only €9.5 billion. When compared to the spending in the High Enabling Region, this is ten times lower.

Enterprises in this cluster spent only €19 000 on digitalisation; this is 90% lower than the average spend of enterprises in the High Enabling Region and 77% lower than the average information and communication technology and digitalisation spending of an enterprise in the Mid Enabling Region. At a country level, most of the states in this group spend less than 1% of their national gross domestic product on information and communication technology and digitalisation.

Within this cluster, Poland is an interesting case, because it accounts for only 17% of the small and medium-sized enterprise population but 37% of the spending in the cluster. This could be due to the fact that Poland has been rolling out large-scale programmes to support Industry 4.0, thereby driving change for small and medium-sized enterprises.<sup>36</sup>

<sup>35</sup> Source: Gartner forecast of small and medium-sized enterprise spending on information and communication technology

<sup>36</sup> European Commission, *Digital Transformation Scoreboard (2018)*  
[https://ec.europa.eu/growth/tools-databases/dem/monitor/sites/default/files/Digital%20Transformation%20Scoreboard%202018\\_0.pdf](https://ec.europa.eu/growth/tools-databases/dem/monitor/sites/default/files/Digital%20Transformation%20Scoreboard%202018_0.pdf)

A recent study<sup>37</sup> by the EIB Economics Department has analysed the performance of innovation/digitalisation in the CESEE, confirming the picture shown above.

Most CESEE countries are regarded as modest and moderate innovators, and the level of digital readiness is below the EU average, with some remarkable exceptions such as Estonia and Lithuania. The study identifies the reasons for the low level of innovation, including: 1) The low investment in intangible assets, such as research and development. Private research and development investments play a less significant role, on average, than in the rest of Europe, and the region relies more on government financing and financing from abroad (including European Structural and Investment Funds). 2) The lack of workers with the appropriate skills. 3) The low overall quality of the scientific and technological system.

**Industry is a clear driver of digitalisation. There is a wide sectorial gap in information and communication technology and digitalisation spending in Europe. Small and medium-sized enterprises' demand for information and communication technology and digitalisation is much lower in traditional sectors, such as construction, compared to more advanced industries.**

Nearly 60% of the total information and communication technology spend (including digitalisation demand) comes from the financial services, the information and communication technology sector itself and advanced manufacturing sectors. Traditional sectors, such as education, healthcare, construction and transportation, account for less than 12% of the total spend. While this gap is partially linked to idiosyncratic differences in the digital potential of each sector (for example, the potential of digitalisation of the construction sector is lower than that of the information and communication technology sector), a study from McKinsey<sup>38</sup> suggests that some of the largest sectors in the European economy (by gross domestic product and employment), such as construction, education, and healthcare, tend to be digital laggards. If these laggards were to accelerate their digital transformation, this could have a significant impact on economic growth.

Leaving aside the difference in digital potential, the variance in the level of digitalisation at the sector level can be explained by multiple factors, though the main driver often differs from industry to industry.

- **Construction** has a high concentration of very small companies (typically, the industry is highly fragmented and localised), which tend to be less digitalised.
- **Education and healthcare** are quasi-governmental sectors and therefore suffer from the low level of digitalisation of the public sector.
- **Transportation and basic manufacturing** are asset-heavy sectors with a large base of low-skilled employees, resulting in greater difficulties in digitalising.

With some exceptions, it should be noted that countries in the High Enabling Region tend to outperform small and medium-sized enterprises in the other clusters in all sectors, including traditional industries.

<sup>37</sup> *Innovation Investment in Central, Eastern and South-Eastern Europe*, European Investment Bank  
[https://www.eib.org/attachments/efs/innovation\\_investment\\_in\\_cesee\\_en.pdf](https://www.eib.org/attachments/efs/innovation_investment_in_cesee_en.pdf)

<sup>38</sup> *Digital Europe: pushing the frontier, capturing the benefits*, McKinsey  
<https://www.mckinsey.com/~media/McKinsey/Business%20Functions/McKinsey%20Digital/Our%20Insights/Digital%20Europe%20Pushing%20the%20frontier%20capturing%20the%20benefits/Digital-Europe-Full-report-June-2016.ashx>

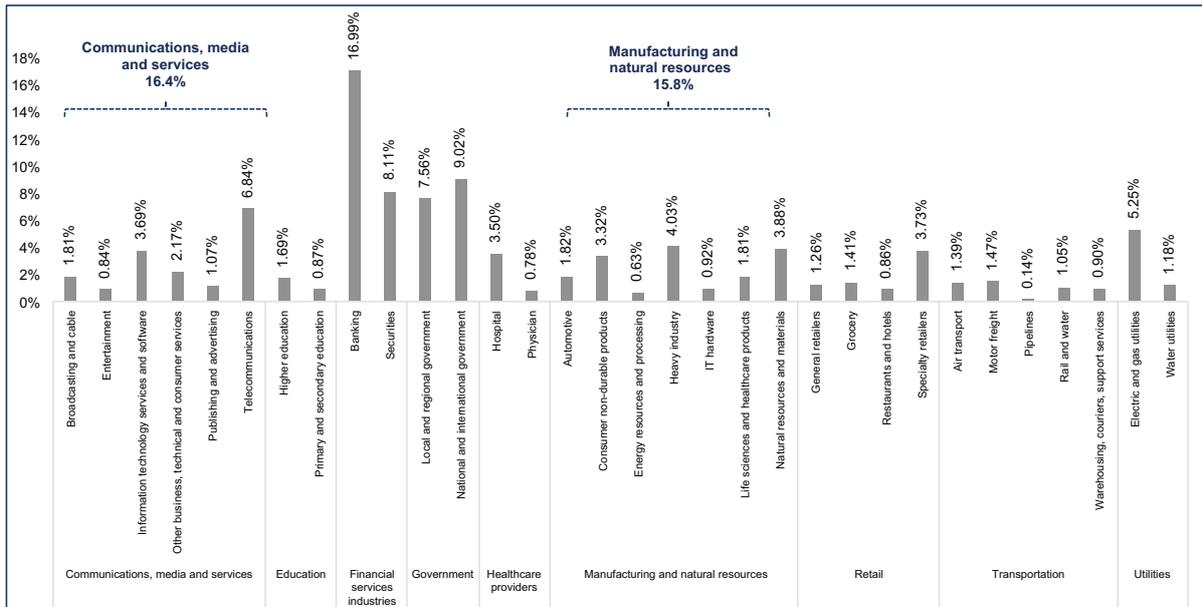


Figure 23. Percentage of information and communication technology spending by industry<sup>39</sup>

**European small and medium-sized enterprises are mainly investing in technologies for business optimisation. More transformative and high potential technologies are not sufficiently exploited by small and medium-sized enterprises.**

The survey has identified the technologies most used by European small and medium-sized enterprises in their digital projects. These are shown in Figure 24.

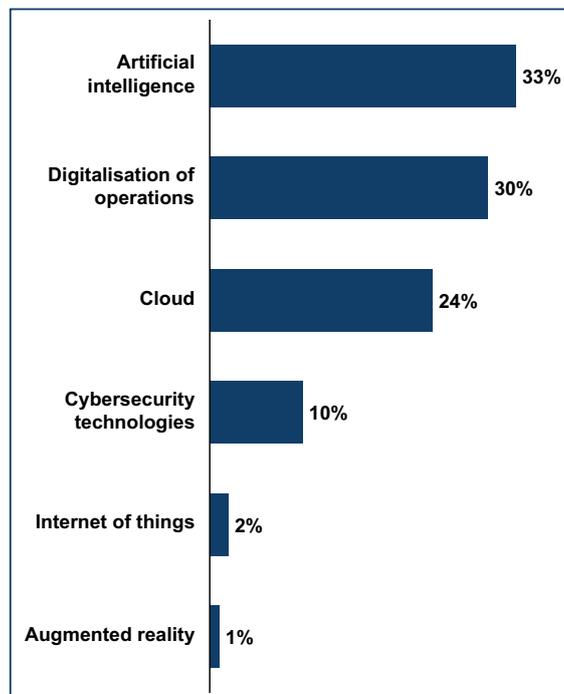


Figure 24. Small and medium-sized enterprises' choice of technologies for digitalisation<sup>40</sup>

<sup>39</sup> Source: Gartner forecast of small and medium-sized enterprise spending on information and communication technology

<sup>40</sup> Source: Gartner survey of small and medium-sized enterprises

The data show that European small and medium-sized enterprises are mainly investing in technologies for business optimisation.

Approximately one-third of these companies adopt technologies supporting the digitalisation of operations – such as Customer Relationship Management or Enterprise Resource Planning systems. These are well established technologies and they are not considered as new and promising technologies. This trend could be explained by the fact that many small and medium-sized enterprises are focusing on optimisation of their existing models and processes, rather than on more transformative digital projects.

Gartner Research has identified the ten most promising and transformative technologies for the digitalisation of small and medium-sized enterprises, based on the proportion of enterprises affected by 2020, the maturity of the technology for availability and use on the market, the benefit that the technology can bring (for example in cost reduction or new revenue generation), and the technology's impact on the user experience (which is often a strong driver for the adoption of the technology). These technologies include artificial intelligence, cybersecurity technologies, wearable devices, cloud computing, event-driven models and immersive technologies.

The survey suggests that European small and medium-sized enterprises are underinvesting in these more promising and transformative technologies. Among these technologies, only artificial intelligence and cloud computing are used by around one-third of European small and medium-sized enterprises, while the remaining technologies are either not used or only adopted by a small number of companies.

Even artificial intelligence, which is the most enabling technology and is cited the most often as a key technology for digitalisation, is underrepresented among European small and medium-sized enterprises. According to Gartner Research, artificial intelligence used in conversational systems and intelligent apps and analytics is expected to impact over 70% of small and medium-sized enterprises by 2020, while only 33% of European small and medium-sized enterprises have a project in this area.

Gartner Research shows that **small and medium-sized enterprises' interest in artificial intelligence increases as the enterprise grows in terms of the number of employees and revenue.** Revenue has a stronger impact than employee numbers, with interest in artificial intelligence among companies that generate less than \$10 million in annual revenue at 49%, compared to 62% among those generating annual revenue of \$10 million or more. This trend could owe to the fact that emerging technologies are often perceived as uncertain and expensive to implement and run. Therefore, decision-makers in small and medium-sized enterprises with lower revenue do not believe that they have the means to investigate these emerging solutions for their business issues or to gain a competitive advantage.

**To a lesser extent, the same trend also applies to cloud computing.** Only 24% of European small and medium-sized enterprises have projects in this area versus 30-50% of small and medium-sized enterprises expected to be impacted by 2020. While the use of cloud computing increased<sup>41</sup>, particularly in large enterprises where more than one in two (56%) used it in 2018 (which is an increase of 21% compared with 2014), the increase for small and medium-sized enterprises over this period was three times lower (between 18% and 25%).

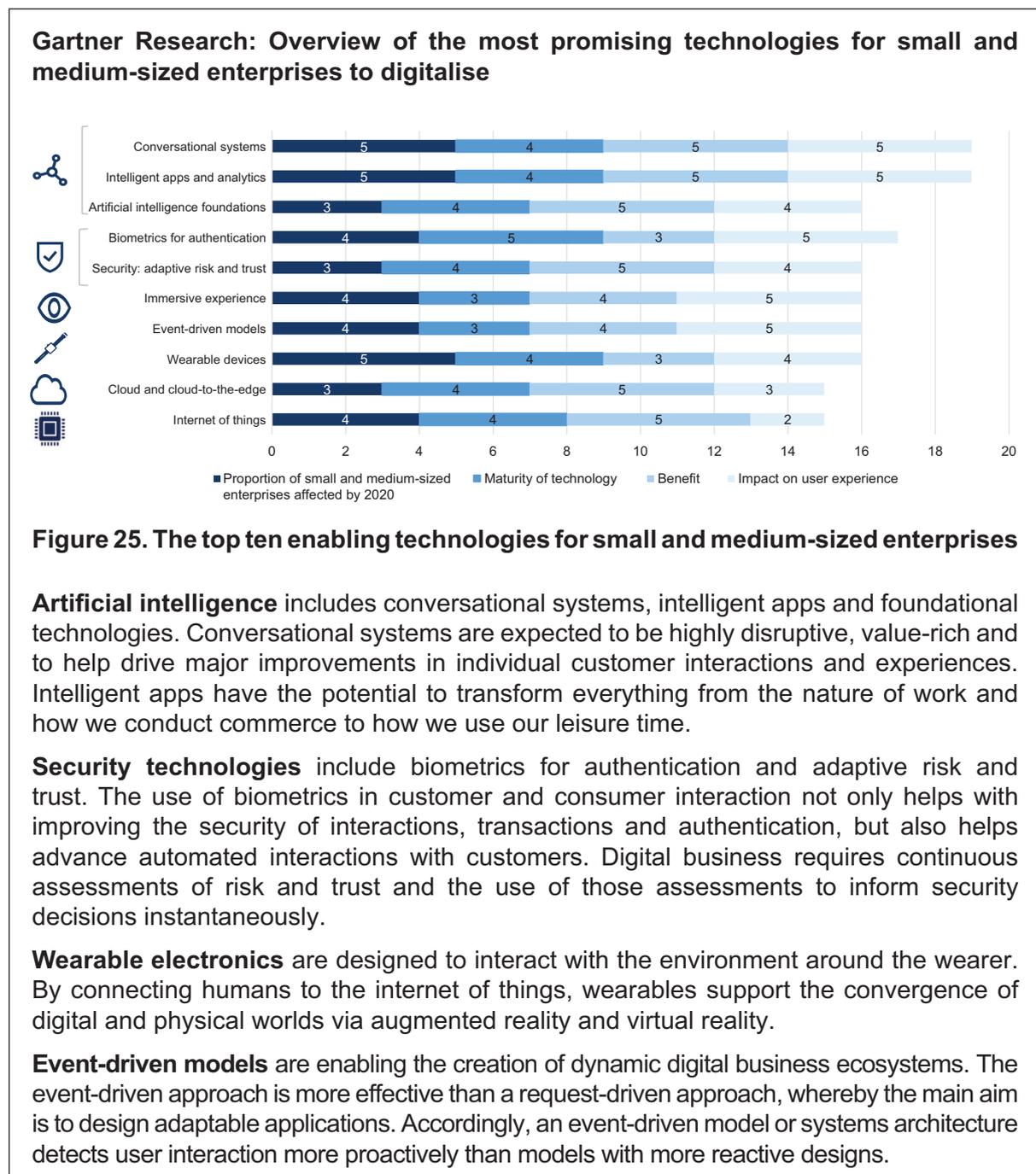
**Investment in cybersecurity technologies is cited by 10% of the small and medium-sized enterprises surveyed.** This proportion is low compared to the importance of security in enabling digitalisation, where trust is key for the user uptake of solutions. A survey by Eurostat highlights that four out of ten enterprises (39%) using the cloud reported the risk of a security breach as the main limiting factor in the use of cloud computing services.

<sup>41</sup> Source: Eurostat [https://ec.europa.eu/eurostat/statistics-explained/index.php/Cloud\\_computing\\_-\\_statistics\\_on\\_the\\_use\\_by\\_enterprises#Use\\_of\\_cloud\\_computing:\\_highlights](https://ec.europa.eu/eurostat/statistics-explained/index.php/Cloud_computing_-_statistics_on_the_use_by_enterprises#Use_of_cloud_computing:_highlights)

**Investment in technology related to the internet of things is cited by a very small proportion** of small and medium-sized enterprises. The low uptake of the internet of things by small and medium-sized enterprises is most likely because many are apprehensive about deploying a technology for which they have never witnessed tangible benefits.

**Investment in augmented reality is also cited by a very low number of the small and medium-sized enterprises surveyed.** Gartner Research shows that immersive technologies (augmented reality, virtual reality and mixed reality) are being evaluated and deployed by an increasing number of companies, but interest levels differ depending on a company's size.

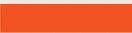
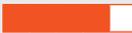
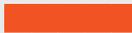
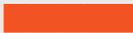
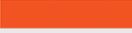
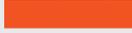
Overall, 19% of respondents from Gartner's Chief Information Officer survey (covering only large companies) have already deployed technologies or are planning to do so in the next 12 months, while 40% of respondents from a Gartner webinar targeting mid-size enterprises are **evaluating** these technologies.



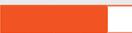
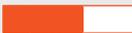
Organisations are using immersive technologies, such as **augmented reality, mixed reality, and virtual reality**, to create more compelling interactions.

The **internet of things** is helping blend the physical and digital world. It is expected to transform industries and the way we live and work.

**Cloud computing** enables the scalability of computer systems. The new approach of 'cloud to the edge' distributes appropriate levels of processing, data and autonomy to the 'edge' of the network, for example, the internet of things. Edge computing can be considered to be the next evolution of cloud computing, which distributes the load away from data centres and closer to the user wherever possible.

Artificial intelligence 	Proportion of small and medium-sized enterprises affected by 2020	Market maturity	Benefit	Impact on user experience
Conversational systems				
<p>A conversational system allows user and machine interactions to occur, mainly in the user's spoken or written natural language.</p> <p>Conversational systems are expected to be highly disruptive and value-rich. It is believed they will help drive major improvements in individual customer interactions and experiences.</p>	 <p>&gt;70%</p>	 <p>Adoption by multiple suppliers</p>	 <p>Transformational: Enables new ways of doing business within and across industries</p>	 <p>New use cases added to the user experience</p>
Intelligent apps and analytics				
<p>The development of natural-language recognition capabilities is making it possible to develop whole new categories of apps. Virtual personal assistants with voice interfaces and chatbots with text interfaces are two examples of this. Role-based assistants can handle many routine information-driven workloads (for example, simple customer or employee service requests). This frees humans to focus on more complex and higher-value tasks.</p> <p>These intelligent apps have the potential to transform everything, from the nature of work and how we conduct commerce to how we use our leisure time. However, these apps have challenges to overcome as they move from early-stage emerging technologies to more robust functional products.</p>	 <p>&gt;70%</p>	 <p>Adoption by multiple suppliers</p>	 <p>Transformational: Enables new ways of doing business within and across industries</p>	 <p>New use cases added to the user experience</p>

<b>Artificial intelligence</b> 	<b>Proportion of small and medium-sized enterprises affected by 2020</b>	<b>Market maturity</b>	<b>Benefit</b>	<b>Impact on user experience</b>
Artificial intelligence foundations				
<p>It is important for small and medium-sized enterprises to understand the data they already have, so that they will be ready when artificial intelligence technologies and tools mature.</p> <p>Foundational technologies for artificial intelligence deepen a software's ability to improve the performance of employees, for example. They are also expected to be able to improve business decisions, as well as to support various use cases around computer vision, video and audio analytics.</p>	 30% to 50%	 Adoption by multiple suppliers	 Transformational: Enables new ways of doing business within and across industries	 High impact
<b>Security</b> 	<b>Proportion of small and medium-sized enterprises affected by 2020</b>	<b>Market maturity</b>	<b>Benefit</b>	<b>Impact on user experience</b>
Biometrics for authentication				
<p>Biometric authentication uses unique biological or behavioural traits to corroborate users' identities when they access endpoint devices and networks, and when they access mobile, networked, web or cloud applications.</p> <p>Biometrics for authentication and wearables are expected to mature and reach mainstream adoption earlier than many other technologies. The use of biometrics in customer and consumer interactions not only helps to improve the security of interactions, transactions and authentication. It also helps advance automated interactions with customers and/or employees.</p>	 50% to 70%	 Availability on the market with proven usage	 Moderate: Incremental improvements resulting in increased revenue or cost savings	 Transformational: Enables new ways of doing business within and across industries
Security: Continuous adaptive risk and trust				
<p>Digital business requires continuous assessments of risk and trust. It also requires those assessments to be used to inform security decisions at the moment they're made.</p>	 30% to 50%	 Adoption by multiple suppliers	 Transformational: Enables new ways of doing business within and across industries	 High impact

Immersive experiences 	Proportion of small and medium-sized enterprises affected by 2020	Market maturity	Benefit	Impact on user experience
(Augmented reality, virtual reality, mixed reality)				
Organisations are using immersive technologies, such as augmented reality, mixed reality and virtual reality, to create more compelling interactions. Augmented reality integrates and adds value to the user's interaction with the real world, as opposed to being a complete simulation. Virtual reality, however, provides a full computer-generated 3D environment that surrounds a user and responds to that individual's actions in a natural way. This is usually achieved using immersive head-mounted displays and head tracking. Mixed reality is a combination of augmented reality and virtual reality.	 50% to 70%	 Adoption by very limited suppliers	 High: Enables new ways of performing processes, resulting in significantly increased revenue or cost savings	 New use cases added to the user experience
Internet of things 	Proportion of small and medium-sized enterprises affected by 2020	Market maturity	Benefit	Impact on user experience
Internet of things				
The internet of things is the network of physical objects that contain embedded technology to communicate and sense or interact with their internal states or the external environment. This technology is helping to blend the physical and digital world. It is expected to transform industries and the way we live and work.	 50% to 70%	 Adoption by multiple suppliers	 Transformational: Enables new ways of doing business within and across industries	 Limited
Cloud and cloud to the edge 	Proportion of small and medium-sized enterprises affected by 2020	Market maturity	Benefit	Impact on user experience
Cloud				
Cloud to the edge is the latest development in cloud computing. It exploits the cloud style for centralised control, management and back-end processing, while distributing appropriate levels of processing, data and autonomy to the edge.	 30% to 50%	 Adoption by multiple suppliers	 Transformational: Enables new ways of doing business within and across industries	 Improvement in user experience

<b>Wearable electronics</b> 	<b>Proportion of small and medium-sized enterprises affected by 2020</b>	<b>Market maturity</b>	<b>Benefit</b>	<b>Impact on user experience</b>
Wearables				
Wearable electronics are endpoint devices which are designed to be worn and to sense the human body or interact with the environment around the wearer, connecting humans to the internet of things. Wearables support the convergence of digital and physical worlds via augmented reality and virtual reality, as is the case with smart glasses and virtual reality headsets. Wearables can also help to create new solutions in healthcare, well-being and fatigue analysis for remote workers.	 >70%	 Adoption by multiple suppliers	 Moderate: Incremental improvements resulting in increased revenue or cost savings	 High impact
<b>Event-driven models</b> 	<b>Proportion of small and medium-sized enterprises affected by 2020</b>	<b>Market maturity</b>	<b>Benefit</b>	<b>Impact on user experience</b>
Event-driven models				
An event-driven approach can be more effective than a request-driven approach when the main aim is to design adaptable applications. Event thinking is driving the creation of dynamic digital business ecosystems and supporting application architectures.	 50% to 70%	 Adoption by very limited suppliers	 Transformational: Enables new ways of doing business within and across industries	 High impact

**Note:** Some technologies such as blockchain have not been ranked in the top ten technologies for small and medium-sized enterprises. There are several reasons for this. One being that their impact is too focused on a small number of industries, which hinders market penetration. Another reason for some technologies not being included in the top ten is that their maturity is only expected to be fully developed in ten years.

## 2.2 The digital profile of small and medium-sized enterprises: Digital adopters and digital natives

**This study recognises that there are two typical digital profiles for small and medium-sized enterprises: Digital adopters and digital natives.**

The digital profile of a firm determines its attitude towards digitalisation, the drivers of digital projects, the company’s digital journey and the funding strategy for digital projects. The summary overview below highlights the key characteristics and differences between digital natives and digital adopters.

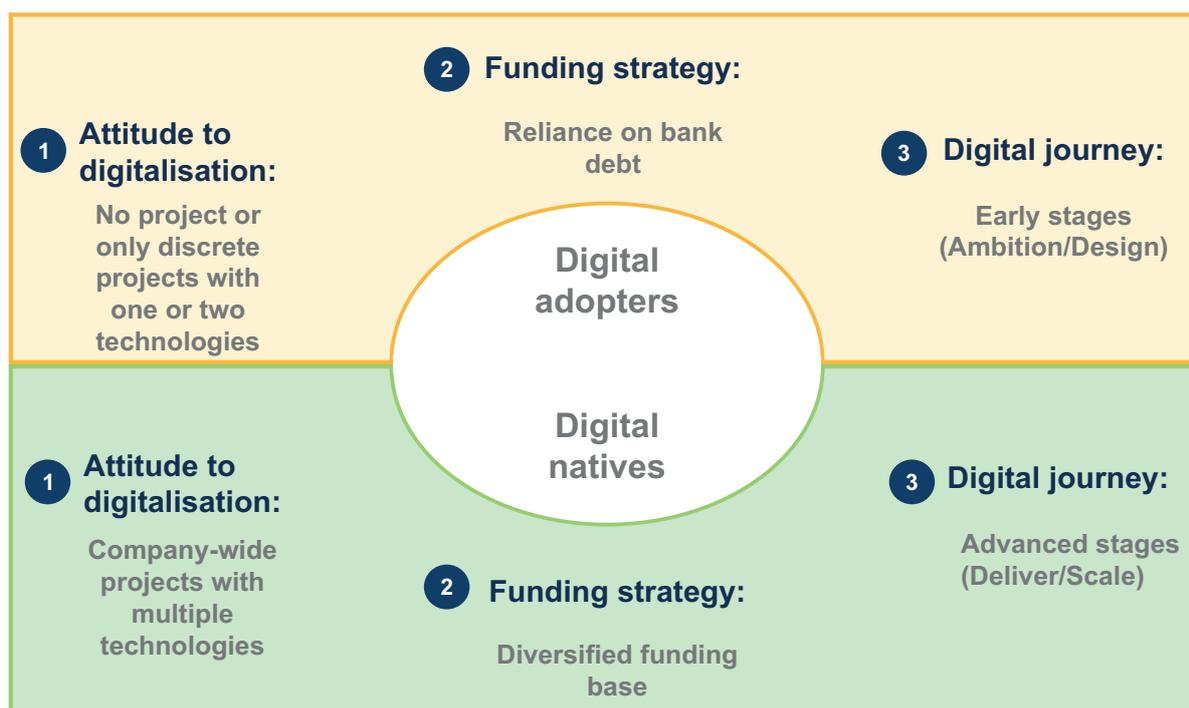


Figure 26. Overview of digital adopters versus digital natives

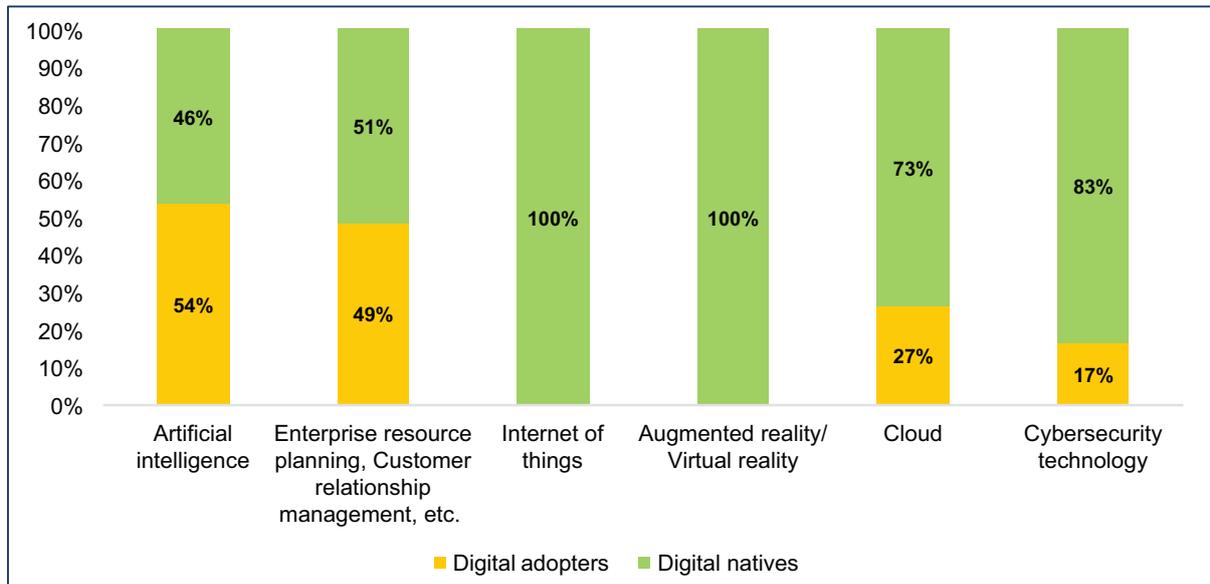
### Attitude towards digitalisation

**Digital natives experiment with multiple digital technologies, while digital adopters either have no projects or are focused on a limited number of technologies.**

The survey reveals that a larger proportion of digital native small and medium-sized enterprises (61%) use multiple technologies. This is because the natives have a more ‘experimental’ approach towards digital projects and they recognise the value in combining technologies. On the other hand, a large proportion of digital adopters (56%) are focused on only one or two technologies for digitalisation. This is because digital adopters have a more ‘conservative’ approach to digitalisation, whereby they conduct discrete projects which aim to deploy specific technologies in a singular, targeted way.

Digital adopters tend to use well-established technologies, such as Customer Relationship Management or Enterprise Resource Planning systems, to optimise business and processes, or to focus on technologies which generate great interest and receive high coverage such

as artificial intelligence. On the other hand, digital natives tend to have better expertise and knowledge to experiment and use different types of technologies.



**Figure 27. Technologies leveraged by adopters and natives (% of small and medium-sized enterprises’ total clicks by technology)<sup>42</sup>**

**Key drivers behind digitalisation and the digital journey**

**Digital natives often focus on the delivery and scaling up of transformative technologies, while digital adopters are often at the early stages of the digital journey and use digital technologies to optimise their businesses.**

There are **five** typical **stages** for the small and medium-sized enterprises’ **digital journey** to becoming a digital business: **desire/ambition, design, delivery, scale and harvest/refine.**

<i>Small and medium-sized enterprises’ journey toward digitalisation</i>	Ambition	Design	Deliver	Scale	Refine
	<i>Generate interest, develop ambition to digitalise</i>	<i>Create overall strategy and implementation plan for the digital project/initiatives</i>	<i>Deliver digitalisation project/digital initiatives</i>	<i>Scale up the digital projects or digital initiatives</i>	<i>Optimise digital projects and seek digital opportunities</i>
				<i>(In case of digital natives this often means scaling of the entire business)</i>	

**Figure 28. Typical digitalisation journey for small and medium-sized enterprises**

The stage of the digital journey which adopters and natives are at is significantly different. Many **digital adopters** are still in the early phases of the digital journey, addressing their desire/ambition and designing digital projects.

<sup>42</sup> Source: Based on data from the survey of small and medium-sized enterprises

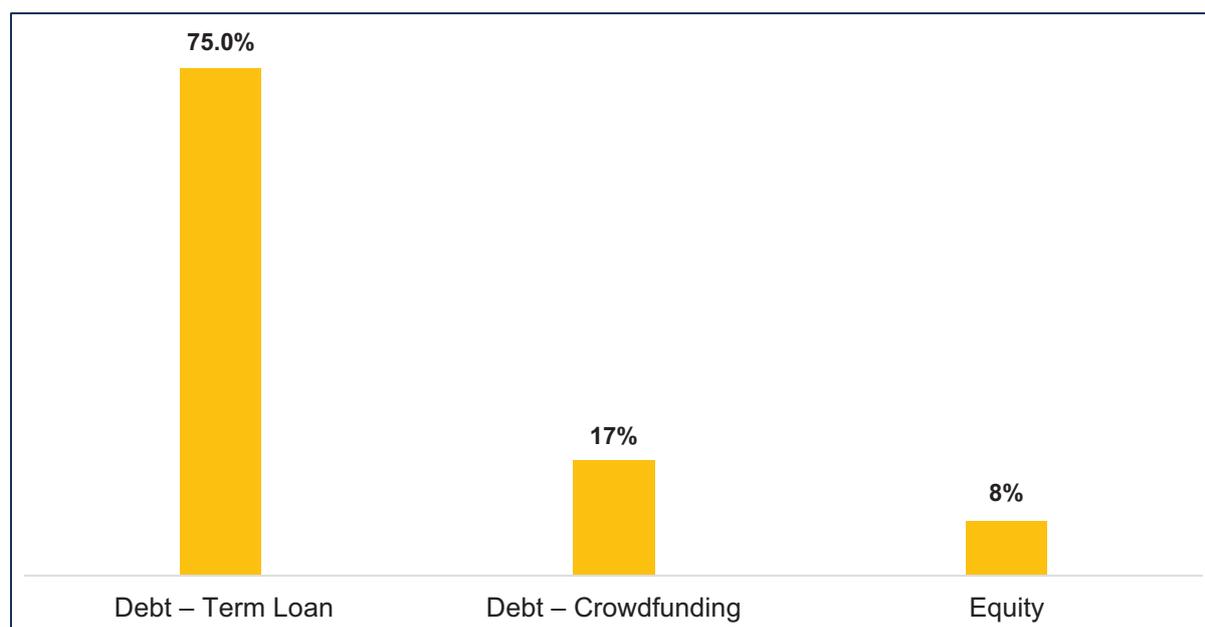
Digital adopters are businesses that have been established for a longer period of time, but without a strong focus on technology. They therefore engage in incremental improvement, focusing on digitalisation projects which increase their existing revenue streams and/or optimise their operations (**digital optimisation**). Digital adopters conduct digitalisation on a project-by-project basis, often through a siloed/waterfall-based approach.

Many **digital natives** are already in the ‘delivery’ or ‘scale’ portion of the digital journeys. Their digital initiatives are more advanced than many projects of the digital adopters. Digital natives are born digital, so they are more focused on wider digital initiatives to scale up their businesses (**digital transformation**). Compared to the smaller projects focusing on discrete business functions conducted by digital adopters, the digital initiatives of digital natives are organisation-wide projects. In other words, the digital initiative often involves the entire company.

### Funding strategy for digital projects

**Digital natives have a more diversified funding base for their digital projects, while digital adopters are typically dependent on traditional loans from banks.**

Digital adopters mainly rely on their relationship banks to finance their digital projects. According to the survey, approximately 60% of digital adopters claimed to have ongoing digitalisation projects. Of these digitalisation projects, 75% were financed via traditional debt (such as term loans) and only approximately 8% of projects were financed by equity.

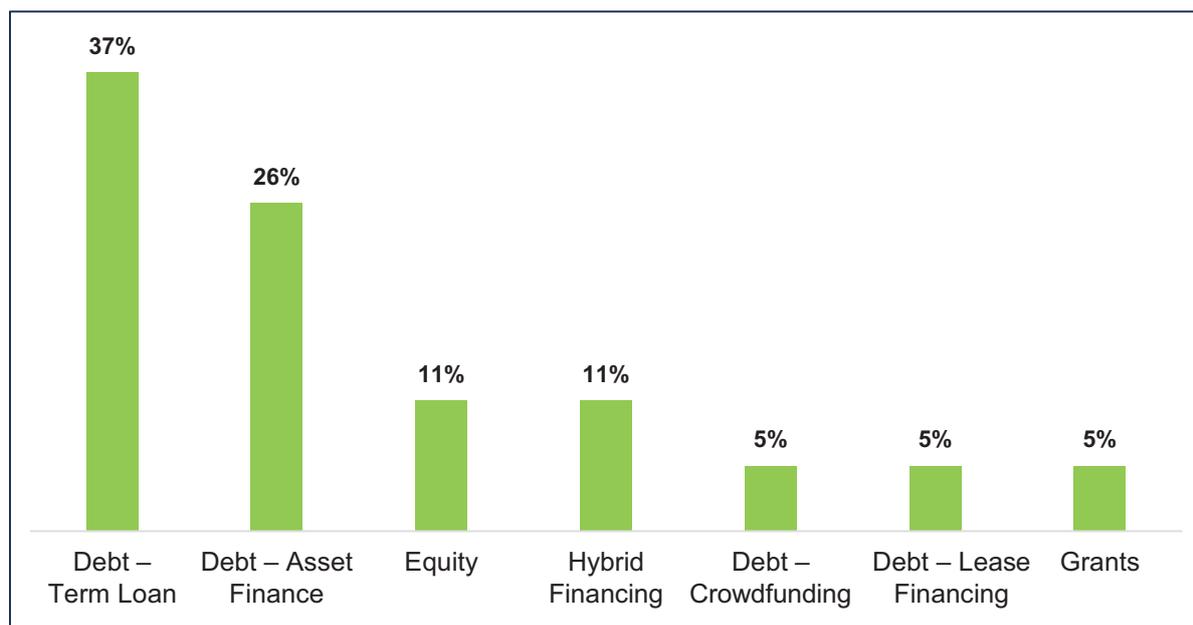


**Figure 29. Percentage of external funding by type used by digital adopters for digitalisation<sup>43</sup>**

Digital natives have a more diversified capital base with a higher focus on more innovative and alternative funding instruments, such as hybrid financing and crowdfunding. Digital natives are generally younger companies than digital adopters and they usually do not have a track record or established relationship with banks. Therefore, they often seek funding from

<sup>43</sup> Source: Based on data from the Gartner survey of small and medium-sized enterprises

multiple sources, including instruments with a higher risk-absorption capacity, such as hybrid instruments.



**Figure 30. Percentage of external funding used by digital natives for digital initiatives<sup>44</sup>**

These findings have been confirmed by a study conducted by the European Investment Fund.<sup>45</sup> Using data from the survey on the access to finance of enterprises (SAFE survey), the European Investment Fund study shows that innovative companies (which are typically younger companies) are mainly mixed-finance small and medium-sized enterprises, while more traditional and established small and medium-sized enterprises tend to be debt-financed.

### **A case study: Artificial intelligence**

#### **Key investment trends for artificial intelligence across Europe and the world**

An OECD analysis of the amount of investment in artificial intelligence start-ups reveals that start-ups operating in the United States (US) account for the majority of artificial intelligence start-up equity investments worldwide.<sup>46</sup> This applies when both the number of investment transactions (deals) and the amount of US dollars invested is considered. US start-ups account for two-thirds of the total value of investments since 2011. The People's Republic of China has seen a dramatic upsurge in artificial intelligence start-up investment since 2016 and now appears to be the second-largest market globally with regard to the value of artificial intelligence equity investments received. After receiving only 3% of total investments in 2015, Chinese companies attracted 36% of global artificial intelligence private equity investment in 2017. This represents an annual average growth rate of 21% over the period from 2011 through mid-2018. This growth reflects the efforts of the Chinese government and the Chinese technology sector to achieve leadership in the field of artificial intelligence.

<sup>44</sup> Source: Based on data from the Gartner survey of small and medium-sized enterprises

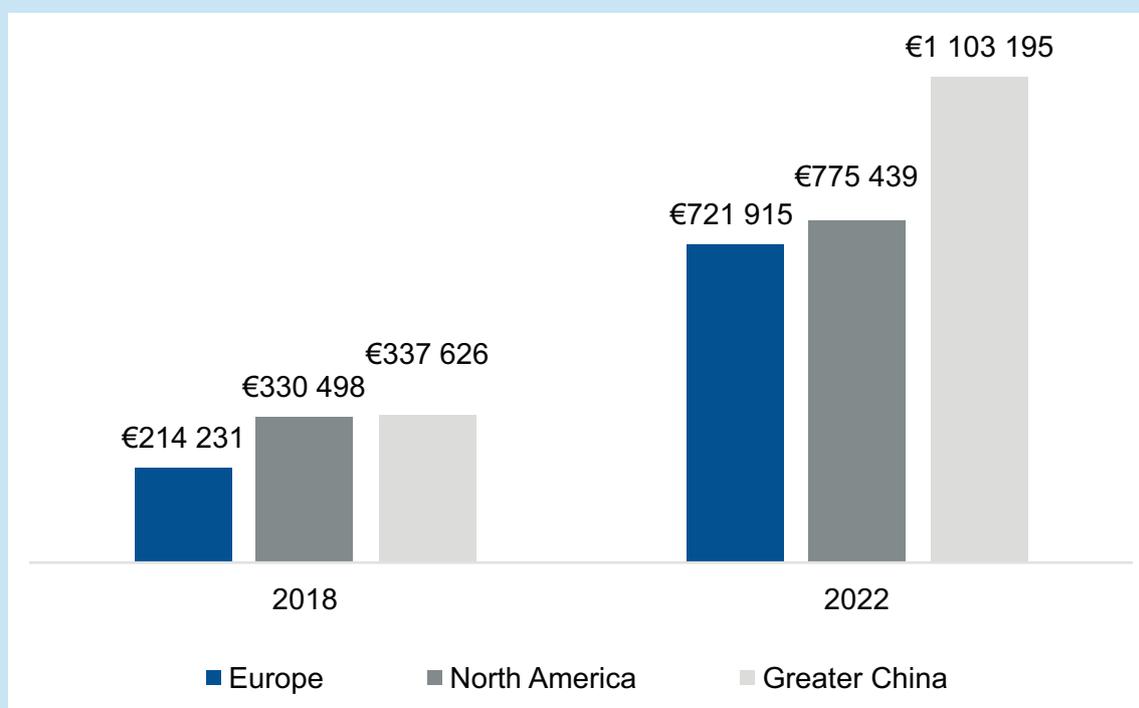
<sup>45</sup> EIF Working Paper 2017/40, *Financing Patterns of European SMEs Revisited: An Updated Empirical Taxonomy and Determinants of SME Financing Clusters*, [https://www.eif.org/news\\_centre/publications/eif\\_wp\\_40.pdf](https://www.eif.org/news_centre/publications/eif_wp_40.pdf)

<sup>46</sup> *Private Equity Investment in Artificial Intelligence – OECD report* <https://www.oecd.org/sti/ieconomy/private-equity-investment-in-artificial-intelligence.pdf>

Overall, three patterns in artificial intelligence can be observed<sup>47</sup>:

- There are few Chinese start-ups, but they have received very large investments
- EU start-ups are registering a steadily increasing number of smaller investments (\$3.2 million on average per investment in 2016, \$5.5 million in 2017 and \$8.5 million in the first half of 2018)
- The US shows a steadily increasing number of larger investments (\$9.5 million on average per investment in 2016, \$13.2 million in 2017, and \$32 million in the first half of 2018).

Europe is strong in core artificial intelligence systems (such as fundamental research in artificial intelligence not targeted at a specific sector or activity), but it is underrepresented in industrial applications, such as those related to the internet of things, autonomous vehicles and robotics.<sup>48</sup> For this reason, Gartner predicts that Europe will reap business value from artificial intelligence investments later than China and the United States.



**Figure 31. The business value of artificial intelligence in the world (€ million) – Projection for 2022<sup>49</sup>**

<sup>47</sup> *Private Equity Investment in Artificial Intelligence – OECD report*  
<https://www.oecd.org/sti/ieconomy/private-equity-investment-in-artificial-intelligence.pdf>

<sup>48</sup> *European Artificial Intelligence Leadership, the path for an integrated vision*  
[http://www.europarl.europa.eu/RegData/etudes/STUD/2018/626074/IPOL\\_STU\(2018\)626074\\_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2018/626074/IPOL_STU(2018)626074_EN.pdf)

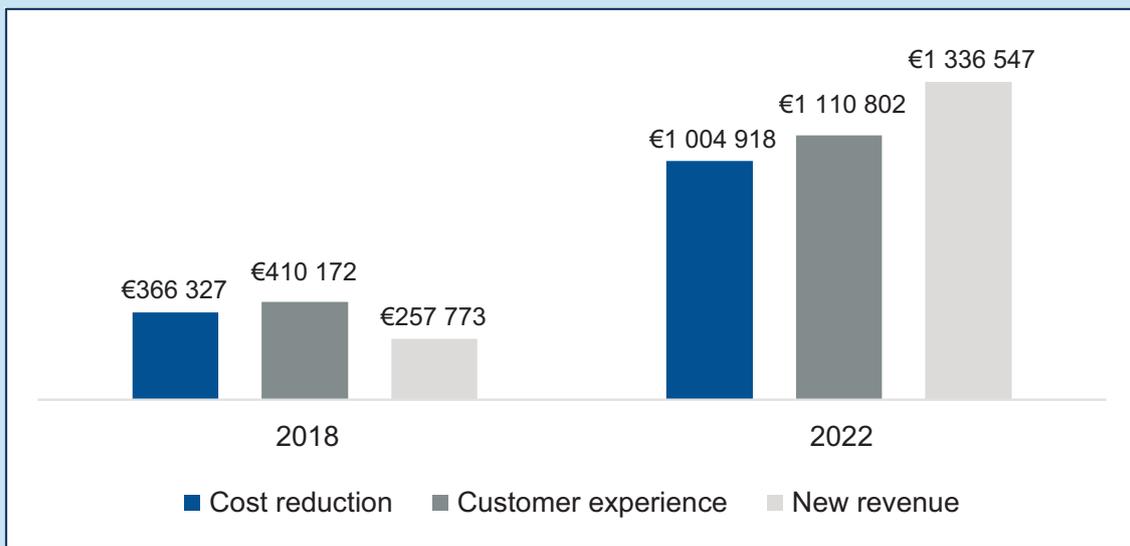
<sup>49</sup> Source: Gartner forecast of the business value of artificial intelligence

### The business case for artificial intelligence

The business value attributable to using artificial intelligence comes from the following:

- Efficiency gains
- Creation of insights that personalise the customer experience
- New automated processes

According to Gartner’s research and as shown in Figure 32, customer experience represents the majority of business value expected to be derived from artificial intelligence through 2020. By 2022, returns from new revenue sources are expected to become more prevalent. Cost reduction, while important, will not be a point of differentiation for most products and for most users, according to the Gartner forecast.



**Figure 32. The breakdown of the business value of artificial intelligence (€ million) by sources – Projection for 2022<sup>50</sup>**

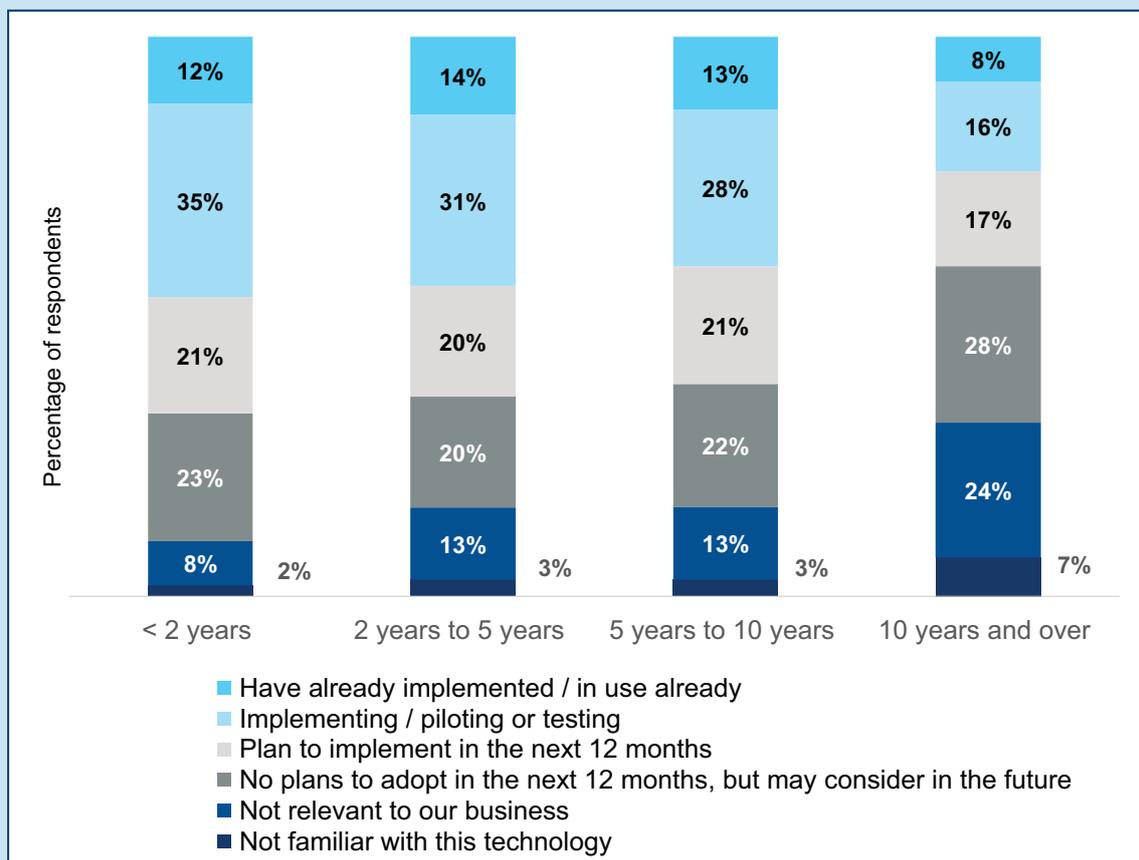
### A worldwide small and medium-sized enterprise perspective on artificial intelligence

According to Gartner’s annual small and medium-sized enterprises primary research survey<sup>51</sup>, artificial intelligence is already on the agenda of many small businesses around the world. Over 55% of this business segment stated that they have already implemented, are implementing/piloting or testing, or have plans to implement artificial intelligence solutions within the next 12 months. This figure is notably higher than the 33% of European small and medium-sized enterprises from our survey which indicated they are investing in artificial intelligence. This result confirms the overall underinvestment in this technology in Europe in comparison to the rest of the world.

<sup>50</sup> Source: Gartner forecast of the business value of artificial intelligence

<sup>51</sup> Source: Gartner Annual Small and Midsize Enterprise Survey: Annual survey of 1 405 small and medium-sized enterprises across North America, UK and China

The Gartner analysis shows that artificial intelligence is mainly adopted by younger companies. Small and medium-sized enterprises that have been in business for ten years or more are unlikely to have any plans to invest in artificial intelligence in the next 12 months or simply find artificial intelligence irrelevant to their business. This might be because they focus more on the cost optimisation potential of artificial intelligence, versus its growth potential. This finding is independent of company size and it holds irrespective of whether employee count or revenue is used to measure size.



**Figure 33. Small and medium-sized enterprise plans for the adoption of artificial intelligence<sup>52</sup>**

*'By 2020, artificial intelligence start-ups will increase their small and medium-sized enterprise focus by 35%, up from less than 5% today'<sup>53</sup>*

**Gartner Research**

### 2.3 Ecosystem and enablers for innovation and digitalisation

This section analyses the digital innovation hub network in Europe based on the following parameters: geographical distribution, types of services offered, technologies covered and sources of funding.

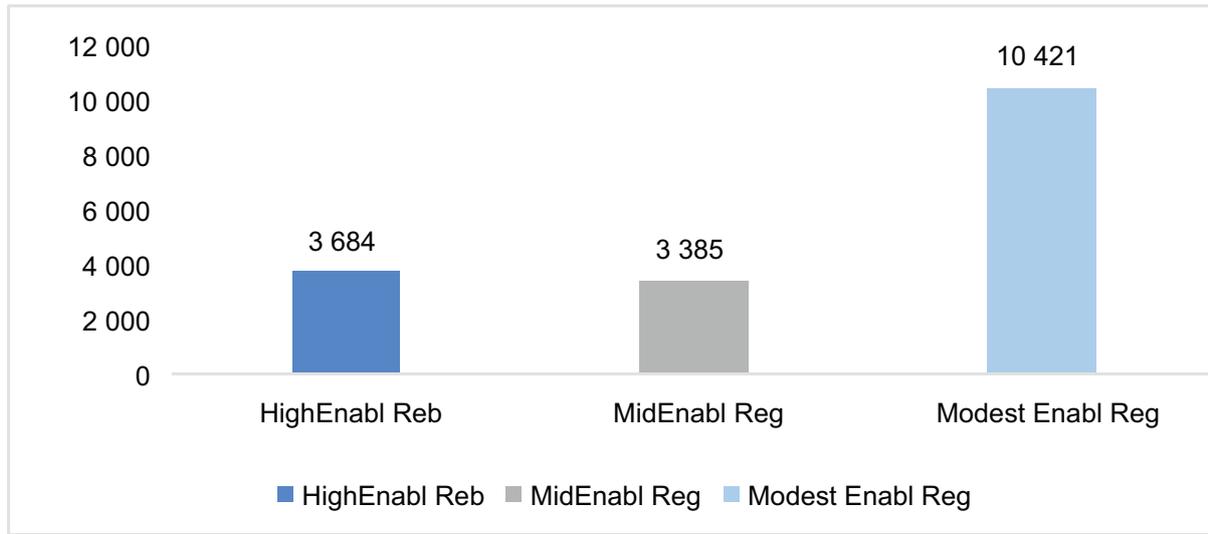
<sup>52</sup> Source: Gartner Annual Small and Midsize Enterprise Survey

<sup>53</sup> Source: Gartner Research

## Geographical distribution<sup>54</sup>

**Eastern and South-Eastern Europe are currently underserved and have fewer digital innovation hubs than the rest of Europe.**

At the time of this study, the online catalogue of digital innovation hubs includes 386 hubs across the 28 EU Member States. Of these 386, 128 digital innovation hubs are within the High Enabling Region, 164 are within the Mid Enabling Region and 50 are within the Modest Enabling Region.



**Figure 34. Regional distribution of small and medium-sized enterprises per digital innovation hub**

There is a regional disparity in the number of digital innovation hubs relative to the number of small and medium-sized enterprises across Europe, with the Modest Enabling Region being underserved (approximately 10 000 small and medium-sized enterprises per digital innovation hub) compared to the other two regional clusters (approximately 3 500 small and medium-sized enterprises per digital innovation hub).

## Types of services offered

**Among the services offered by digital innovation hubs, those of access-to-finance support, digital maturity assessment and market intelligence are underrepresented.**

In broad terms, the services available through digital innovation hubs may be categorised into three pillars<sup>55</sup>:

<sup>54</sup> From data in the Digital Innovation Hubs catalogue  
<http://s3platform.jrc.ec.europa.eu/digital-innovation-hubs-tool>

<sup>55</sup> *Roundtable on Digitising European Industry*, Working Group 1 Digital Innovation Hubs: Mainstreaming Digital Innovation Across All Sectors - Final version, June 2017  
[https://ec.europa.eu/futurium/en/system/files/ged/dei\\_working\\_group1\\_report\\_june2017\\_0.pdf](https://ec.europa.eu/futurium/en/system/files/ged/dei_working_group1_report_june2017_0.pdf)

**Table 6. The three pillars of the digital innovation hub categorisation framework**

Innovation activities: identifying opportunities for digitalisation, as well as developing and validating innovative solutions using cutting-edge technology	Business development: helping companies to apply their solutions, assess the business implications and manage the resulting changes	Skills creation: building the capacity for innovation by uplifting people’s skills
Awareness creation	Envisioning and strategy development	Technical training and skills development
Digital needs/maturity assessment	Matchmaking and brokering	Business and finance training and skills development
Innovation scouting	Business coaching and mentoring	Management training and skills development
Access to specialist expertise	Start-up support	
Access to platforms and infrastructure	Access-to-finance support	
Collaborative research		

Figure 35 lists the services currently being delivered by the fully operational digital innovation hubs for all EU countries, according to the EU catalogue at the time of writing.<sup>56</sup>



**Figure 35. Services available in digital innovation hubs**

The mapping of the service and product offering presented above shows that a limited number of digital innovation hubs (less than 50%) are providing support with regard to access to finance, digital maturity assessment and market intelligence. By contrast, the survey shows that access to finance support is one of the main requests from small and medium-sized enterprises with no digital projects, as explained later in the report.

<sup>56</sup> <http://s3platform.jrc.ec.europa.eu/digital-innovation-hubs-tool>

## Overview of the funding sources of digital innovation hubs

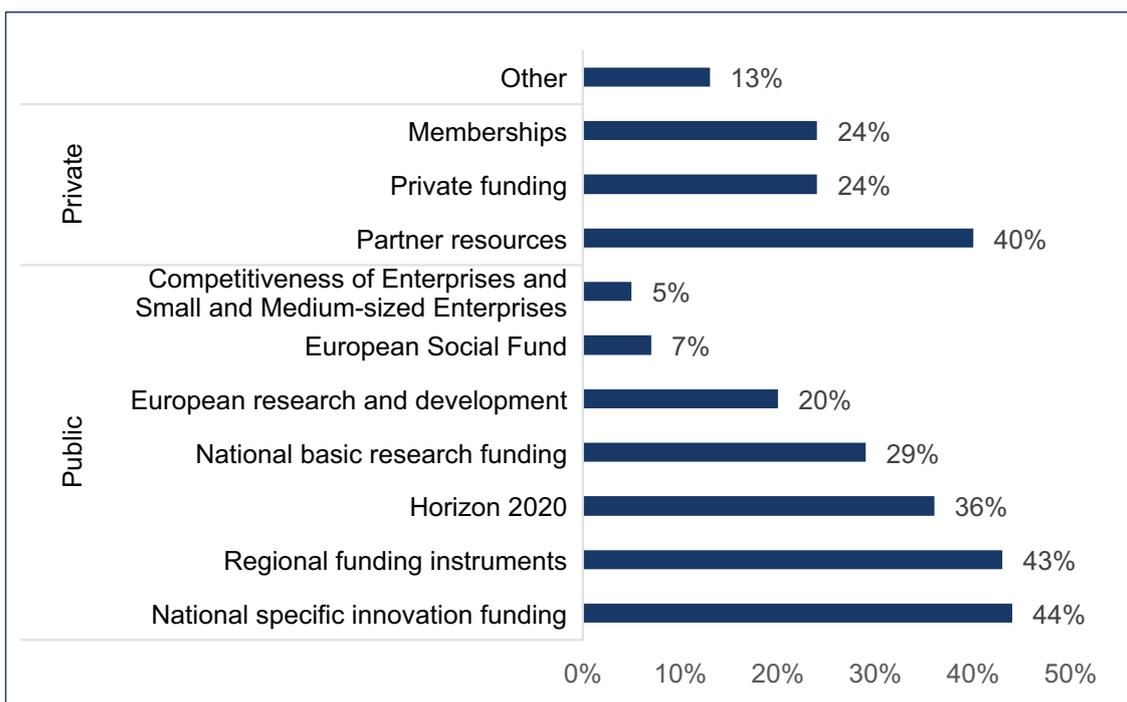
**Digital innovation hubs have a mixed funding model, though public funding from regional, national or European programmes is the most prevalent source of funding.**

Digital innovation hubs are funded by a mix of funding sources.<sup>57</sup> They have different funding models, combining public funds, membership fees and commercial incomes leveraging training fees, consulting fees or office space rent.

Most digital innovation hubs have funding from public sources for elementary services such as networking. This type of funding can be supplemented with revenue sources from the provision of more advanced services, such as initiating and managing digitalisation projects.

The main sources of funding are national funding instruments dedicated specifically to innovation and regional funding instruments. Around 40% of the digital innovation hubs receive funding from national innovation funding instruments, regional funding instruments, partner resources or the Horizon 2020 programme.

The rest of the funding comes from national basic research funding, private funding, memberships, the European Research and Development Fund, the European Social Fund and Competitiveness of Enterprises and Small and Medium-sized Enterprises funding. The data can be further<sup>58</sup> broken down according to the types of funding:



**Figure 36. Sources of funding used by the digital innovation hub network<sup>59</sup>**

<sup>57</sup> Final report *Digital Innovation Hubs Catalogue* SMART 2016/0002, TNO, 2017  
<http://publications.tno.nl/publication/34626116/UNdvt9/TNO-2017-R11340.pdf>

<sup>58</sup> Extrapolation of data from the Final report *Digital Innovation Hubs Catalogue* SMART 2016/0002, TNO, 2017

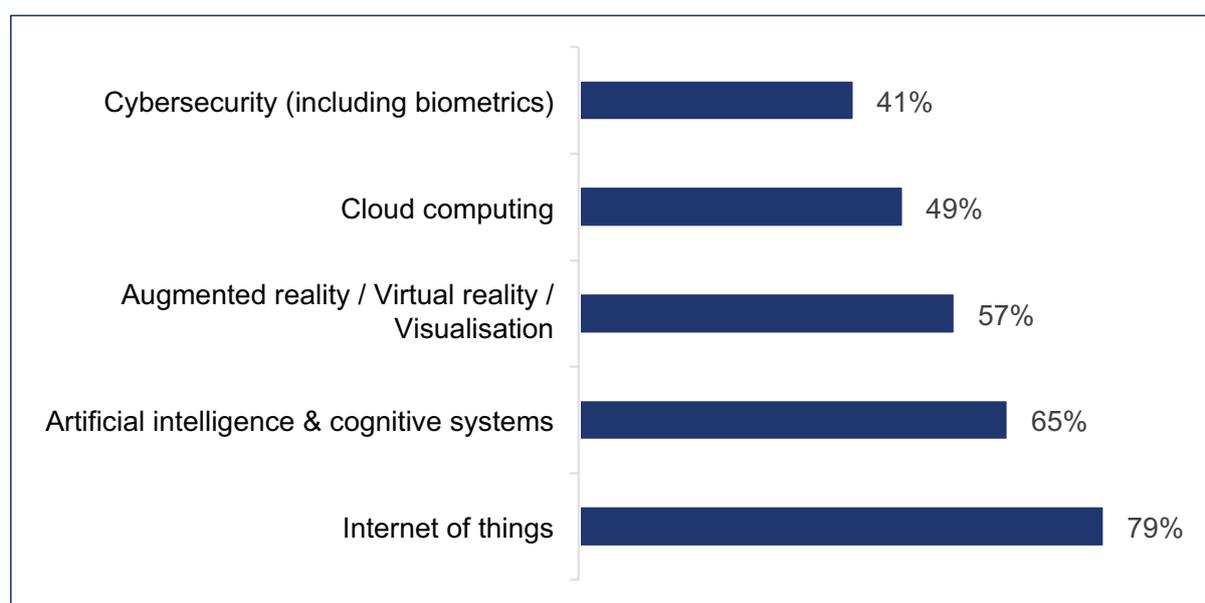
<sup>59</sup> Source: Extrapolation of data from the Final report *Digital Innovation Hubs Catalogue* SMART 2016/0002, TNO, 2017

## Overview of the technologies supported by the digital innovation hubs

**The contributions of digital innovation hubs embrace a wide array of the most promising and transformative technologies with regard to small and medium-sized enterprises.**

This section analyses the technologies supported by digital innovation hubs in comparison to those identified to be the most promising for small and medium-sized enterprises' digitalisation goals.

Figure 37 illustrates the percentage of digital innovation hubs which support the most promising technologies for small and medium-sized enterprises. (The list of all the technologies supported by the digital innovation hubs is much longer.) Most of the ten most promising technologies are well covered by the existing network of digital innovation hubs.



**Figure 37. Percentage of digital innovation hubs supporting a technology**

A high percentage of the digital innovation hubs supports internet of things technology (79%). Artificial intelligence and virtual reality are also well represented, with 65% and 57% respectively. Cloud computing is a focus for half of the digital innovation hubs, and cybersecurity technology is supported by 41% of the digital innovation hubs.

Figure 38 shows the mapping of the technologies which are supported by the digital innovation hubs<sup>60</sup> and the list of the top technologies currently used by European small and medium-sized enterprises, according to the survey. The digital innovation hubs' offering and technology coverage is substantially aligned with the technologies which are most frequently mentioned by the small and medium-sized enterprises.

<sup>60</sup> As described in the Commission's catalogue, <http://s3platform.jrc.ec.europa.eu/digital-innovation-hubs-tool>

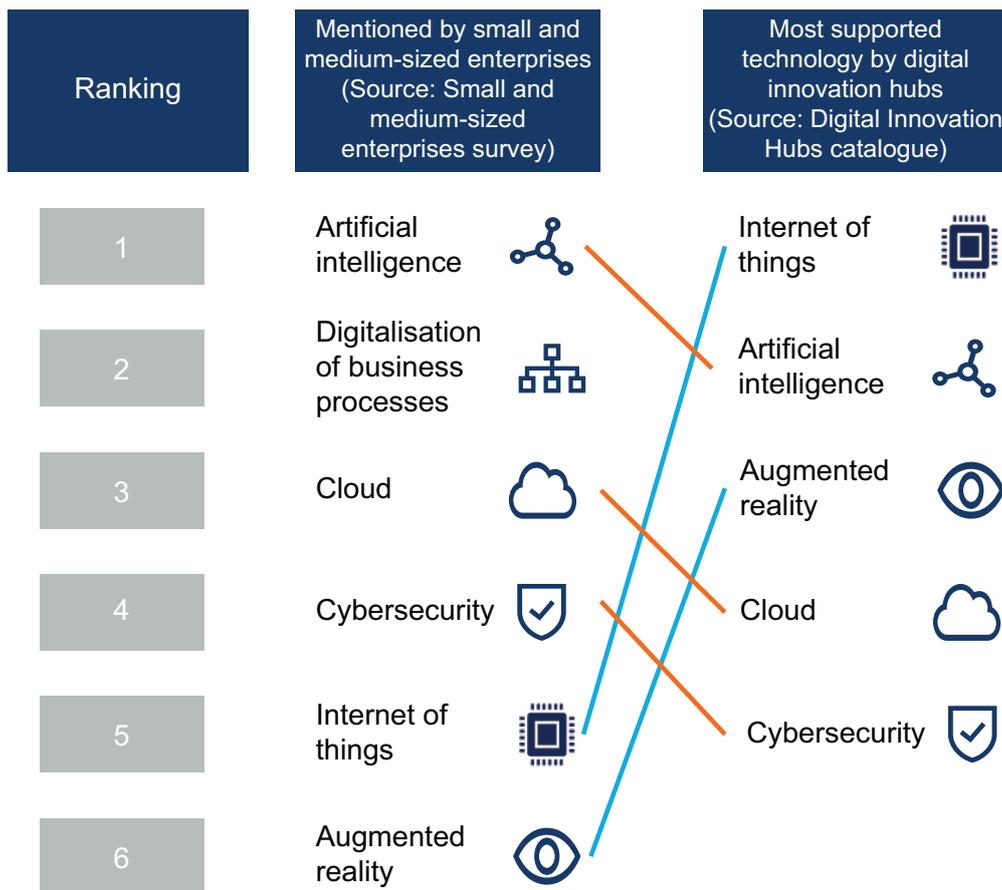


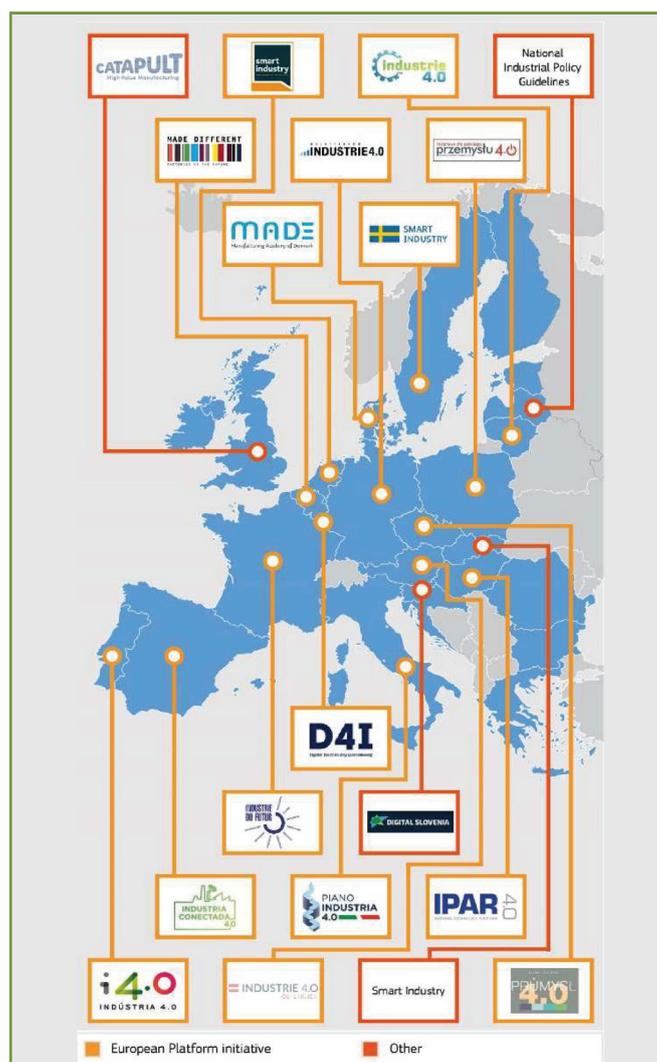
Figure 38. Mapping of enabling technologies with the technologies supported by the digital innovation hubs

## 2.4 Ecosystem and enablers for innovation and digitalisation: Overview of national and European programmes

**Digitalisation of industries and digital transformation are key policy priorities not only at the European level but also for many Member States.**

**At the national level,** there are currently **15 schemes and programmes** around digital transformation and Industry 4.0 and four other initiatives are at the development stage.<sup>61</sup>

<sup>61</sup> Digital Transformation Scoreboard (2018)



**Figure 39. Map of the national digitalisation programmes in Europe<sup>62</sup>**

The initiatives are varied and provide a wide range of funding options and models. The existing 15 programmes also use different financial measures to monitor the success of their digitalisation strategies, depending on the particular needs of the industries being supported. These measures are directed towards encouraging investments in research, development and innovation for the digitalisation of industry and industrial processes. Examples of different measures of success include measuring improvement in small and medium-sized enterprises' access to finance and fiscal incentives for research, development and innovation investment, patents and intellectual property rights development.

Figure 40<sup>63</sup> provides an overview of the measures and instruments as they appear in the existing national initiatives. The most used instruments to incentivise investments in research, development and innovation are tax relief and innovation vouchers, while support to venture capital markets and national innovation funds are the most common actions to support access to finance.

<sup>62</sup> Source: Digital Transformation Scoreboard (2018)

<sup>63</sup> *National Initiatives for Digitising Industry across the EU – Analysis – Draft* - 21 November 2017  
[https://ec.europa.eu/futurium/en/system/files/ged/national\\_initiatives\\_for\\_digitising\\_industry\\_across\\_the\\_eu.pdf](https://ec.europa.eu/futurium/en/system/files/ged/national_initiatives_for_digitising_industry_across_the_eu.pdf)

																
Incentives to invest in research, development and innovation	Innovation vouchers		✓	✓	✓			✓	✓		✓			✓	✓	
	Amortisation schemes					✓		✓		✓						
	Foreign debt investment measures	✓		✓											✓	✓
	Tax relief	✓	✓			✓	✓	✓		✓	✓		✓	✓		✓
Access to finance	Guarantee/Loan fund						✓	✓	✓	✓			✓	✓	✓	
	National innovation fund		✓	✓	✓	✓		✓				✓	✓	✓		✓
	Venture capital/Start-up support	✓			✓	✓	✓	✓		✓			✓	✓		✓
Patents and intellectual property rights incentives	✓	✓		✓					✓	✓	✓		✓			

**Figure 40. Measures and instruments in 15 national initiatives**

**At the European level, the main programme** focused on digitalisation and digital transformation is the **Digitising European Industry Strategy**, which was launched in April 2016. This programme aims to reinforce the EU's competitiveness in digital technologies and to ensure that every business in Europe can fully benefit from digital innovation.

With an EU investment of €5 billion, the Digitising European Industry Strategy is expected to mobilise close to €50 billion of public and private investment until 2020.

The strategy is based on five pillars:

- **European platform of national initiatives on digitising industry:** This EU coordination forum brings together all Member States to ensure coherence and collective action.
- **Digital Innovation Hubs:** One of the key priorities is to support a strong network of digital innovation hubs to ensure that every company in Europe can take advantage of digital opportunities. EU actions to establish and support these hubs have been carried out through EU-wide initiatives such as the 'Smart Anything Everywhere' initiative and the information and communication technology innovation initiative for small and medium-sized enterprises in manufacturing. To date, more than 150 digital innovation hubs and 500 start-ups, small and medium-sized enterprises and mid-caps have participated in 370 different innovation experiments. In these experiments, companies tested digital innovations in collaboration with digital innovation hubs.<sup>64</sup>
- **Partnerships and industrial platforms:** The Digitising European Industry initiative supports the development of digital industrial platforms, large-scale piloting and public-private partnerships (PPPs) that provide the digital technology building blocks of the future.
- **Regulatory framework fit for the digital age:** Clarifying or adopting EU regulations to ensure that the EU's industry and economy can thrive within the Digital Single Market.

**Preparing Europeans for the digital future:** Upskilling the workforce and piloting EU-wide initiatives to show how education systems could respond to the digital needs of Europeans. Furthermore, for **the next Multiannual Financial Framework 2021-2027**, the European Commission has responded to the challenge of the digital transformation of industry with its proposal for the Digital Europe Programme, involving total expenditure of €9.2 billion.

<sup>64</sup> Report from DG CONNECT: digital innovation hubs - October 2018

One of the key objectives of the Digital Europe Programme<sup>65</sup> will be to ensure the wide use of digital technologies across the economy and society. In particular, digital innovation hubs are expected to be the means of implementation to ensure that the digital transformation of all businesses, as well as the public administration, can be achieved. Accordingly, the Digital Europe Programme will fill the gap that currently exists in the market, as many companies lag behind in the adoption of technology.

### Proposal for the next Digital Europe Programme

With an overall budget of €9.2 billion, the Digital Europe Programme will shape and support Europe’s digital transformation for the benefit of people and businesses. The key pillars of the programme will include:

- Upscaling of digital innovation hubs to optimise the use of artificial intelligence
- European cooperation in supercomputing
- Investing in Europeans’ digital skills
- Developing very high capacity digital networks
- Consolidating efforts against cyber attacks

## 2.5 Selected examples of digitalisation programmes worldwide

**Some countries and regions have developed digitalisation programmes that aim to support Industry 4.0 initiatives, while also addressing the digital shortcomings of small and medium-sized enterprises operating in less advanced and traditional sectors.**

### Bavarian programmes

The **Bavarian Technology Promotion Programme** is tailored towards the needs of small and medium-sized enterprises. In particular, it aims to enhance the dynamics of digital progress.

**Table 7. Bavarian Technology Promotion Programme – Key terms<sup>66</sup>**

Dimension	Description
<b>Goal</b>	<ul style="list-style-type: none"> <li>• Support projects aimed at developing:                             <ul style="list-style-type: none"> <li>– Technologically new or significantly improved products</li> <li>– Production processes and knowledge-based services (development projects)</li> </ul> </li> </ul>
<b>Eligibility</b>	<ul style="list-style-type: none"> <li>• Project requirements <sup>67</sup></li> <li>• Small and medium-sized enterprise requirements <sup>68</sup></li> </ul>

<sup>65</sup> Report from DG CONNECT: digital innovation hubs - October 2018

<sup>66</sup> Based on Bayern Innovativ Gesellschaft fuer Innovation und Wissenstransfer website material <https://www.bayern-innovativ.de/>

<sup>67</sup> Project requirements: Projects must have a high innovation content, namely, the technologies, products and services to be developed or used must be better than state-of-the-art and be implemented by the applicant themselves; the project must have high economic potential, at least in the medium term, given the prevailing market conditions.

<sup>68</sup> Small and medium-sized enterprise requirements: Companies must have fewer than 400 full-time employees, be located in Bavaria and exhibit a sufficiently high level of creditworthiness.

Dimension	Description
<b>Type and extent of funding</b>	<ul style="list-style-type: none"> <li>The funding is provided as: <ul style="list-style-type: none"> <li>Grants (for products), covering up to 25% of the eligible costs</li> <li>Loans (for processes), covering up to 100% of the eligible costs of the project</li> </ul> </li> <li>Eligible costs are computed based on pre-determined amounts for each cost item <sup>69</sup></li> </ul>
<b>Sponsor(s)</b>	<ul style="list-style-type: none"> <li>The State Ministry of Economy and Media, Energy and Technology is the grant authority which issued the grant decision and pays the subsidies</li> <li>LfA Förderbank Bayern provides the application form and confirms that loan conditions are met</li> </ul>

The Bavarian Technology Promotion Programme provided almost €200 million in funding to small and medium-sized enterprises for innovative and digital projects between 2005 and 2012.

### Digital Bonus Bavaria

Digital Bonus Bavaria supports small and medium-sized enterprises with business premises in Bavaria for their journey towards digitalisation. The initiative supports the development, introduction, or improvement of processes, services and products using information and communication technology hardware or software. It also supports the migration or transfer of information and communication technology systems and applications in companies, as well as the introduction or improvement of information technology security.

Launched in October 2016, the Digital Bonus is offered under three modules:

1. Standard (grant only, max. €10 000),
2. Plus (grant only, max. €50 000),
3. Loan (max. €2 million).

Under the Standard and Plus programmes, some project costs may be subsidised (up to 50% for small enterprises and up to 30% for medium enterprises). Eligible costs include spending on services provided by external providers, which may be hardware or software expenditure that is necessary to implement the measures deemed necessary under the programme.

Due to high demand, the yearly tranche for 2017 was exhausted in May and the programme was discontinued until August 2017. Furthermore, by October 2018, approximately a further €100 million over and above the initial budget was mobilised. A monthly limit of 500 applications was enforced to ensure the continuity of the programme.

**Table 8. Digital Bonus Bavaria – Key terms<sup>70</sup>**

Dimension	Description
<b>Goal</b>	<ul style="list-style-type: none"> <li>Digitalisation of processes (Industry 4.0, Enterprise Resource Planning, Customer Relationship Management, DMS, MMS, etc.)</li> <li>Improvement of information technology security (firewalls, data security, etc.)</li> <li>Digital platforms (configurators, websites, online store, etc.)</li> <li>Extension of the Bavarian Digital Bonus Programme until the end of the next legislative period (according to a government declaration from 18 April 2018)</li> </ul>
<b>Eligibility</b>	<ul style="list-style-type: none"> <li>Small and medium-sized enterprises with business premises in Bavaria</li> </ul>

<sup>69</sup> Cost items include the following: personnel costs, costs for instruments and equipment used for the project, costs for contract research and other costs (material, supplies, etc.) that arise directly from the research activity. Process digitalisation items include: the costs of obtaining, validating, and defending patents and other intangible assets and a feasibility study.

<sup>70</sup> Based on Bayern Innovativ Gesellschaft fuer Innovation und Wissenstransfer website material <https://www.bayern-innovativ.de/>

Dimension	Description
<b>Type and extent of funding</b>	<ul style="list-style-type: none"> <li>• Approximately 9 000 applications received since launch</li> <li>• &gt; €100 million requested in grants</li> <li>• Total investment of approximately €330 million mobilised</li> </ul>
<b>Sponsor(s)</b>	<ul style="list-style-type: none"> <li>• The State Ministry of Economy and Media, Energy and Technology</li> </ul>

## Singapore – The Small and Medium-sized Enterprises Go Digital programme

### Industry Digital Plans

The Small and Medium-sized Enterprises Go Digital programme was launched in 2017 by the government agencies Infocomm Media Development Authority (IMDA) and Enterprise Singapore. The programme aims to help small and medium-sized enterprises to keep up with the pace of technological change in the digital economy.

Key targets of the initiative are small and medium-sized enterprises operating in sectors where digital technology can significantly improve productivity. Initially, six sectors were selected: food services, logistics, retail, wholesale trade, environmental services and security.

For each of these sectors, Infocomm Media Development Authority is developing Industry Digital Plans (IDPs) that will make it easier for small and medium-sized enterprises to adopt digital technology to boost growth and productivity and to participate in national innovation initiatives.<sup>71</sup> These plans introduce a broad range of initiatives, advice, self-learning tools and other services. Each Industry Digital Plan is tailored towards a specific industry and is structured around five key focal areas, as illustrated in Figure 41 and explained below.



**Figure 41. Five key thrusts of industry digital plans under the Small and Medium-sized Enterprises Go Digital programme**

<sup>71</sup> Infocomm Media Development Authority website: Industry Digital Plans <https://www.imda.gov.sg/>

The **Digital Roadmap** helps small and medium-sized enterprises to assess their digital readiness and identify opportunities for going digital, as well as providing training to improve employees' digital skills. The map can be considered as a starting point to embark on the digital journey. It comprises an Industry Digital Guide, Industry Fact Sheet and a Self-Assessment Checklist for small and medium-sized enterprises. The Industry Digital Guide includes an Industry Transformation Map and outlines a three-step approach for small and medium-sized enterprises in that industry to: 1) get the digital economy ready, 2) grow in the digital economy, and 3) leap ahead. Moreover, the Industry Digital Guide suggests training courses for various types of employees working at small and medium-sized enterprises and introduces the remaining four focal areas of the Industry Digital Plan.

**Digital Consultancy** is offered to small and medium-sized enterprises. The offering distinguishes between basic and specialist consultancy. Enterprises that wish to have a more comprehensive review of their business can approach the Small and Medium-sized Enterprise Centre business advisors for a free business diagnosis and advice on the relevant digital solutions for their diagnosis ('basic advisory and consultancy'). Small and medium-sized enterprises that require specialist advice on more advanced digital solutions (for example cybersecurity, data analytics, internet of things) will be referred by the Small and Medium-sized Enterprise Centre business advisors to the Digital Tech Hub ('specialist advisory and consultancy').

To ease small and medium-sized enterprises' adoption of digital technologies, the Infocomm Media Development Authority has pre-approved **Digital Solutions** that are proven and robust and which meet small and medium-sized enterprises' business needs. Companies can explore the list of pre-approved digital solutions supported under the Productivity Solutions Grant on the website of the Tech Depot on the Small and Medium-sized Enterprise Portal. With the Productivity Solutions Grant, small and medium-sized enterprises can get up to 70% of their funding needs for implementing these digital solutions covered by a grant. Further details on the Production Solutions Grant Singapore, the high-tech procurement pipeline and technology vendor selection are described in the section below.

Through the Industry Digital Plans, Infocomm Media Development Authority is identifying **Digital Sector Projects** that aim to uplift the whole sector and help small and medium-sized enterprises to grow. This is done by partnering smaller companies with large companies or industry leaders to co-create the solutions that are in the best interests of the small and medium-sized enterprises in these projects. At the same time, these projects must align with national initiatives such as the National Trade Platform.

Small and medium-sized enterprises can engage the **Digital Project Management Services** under the Small and Medium-sized Enterprises Go Digital programme to help change their business processes, redesign jobs and better manage the implementation of digital technology for a more holistic and sustainable outcome. Digital project managers can help small and medium-sized enterprises yield more sustainable outcomes from digitalisation. The Singapore Manufacturing Federation (SMF) has been appointed as the first operator. Small and medium-sized enterprises looking to engage the digital project management services can receive funding support of up to 70% of the qualifying costs.

### **Digital Solutions – Deep dive**

This section further explores the Digital Solutions offered to small and medium-sized enterprises as part of the Go Digital programme, detailing the Digital Solutions on offer as well as the technology vendor selection process.

Small and medium-sized enterprises can explore the list of pre-approved digital solutions supported under the Productivity Solutions Grant on the website of the Tech Depot, which is on the Small and Medium-sized Enterprise Portal. There are approximately 50 pre-approved

solutions, covering customers, inventory, workflow, finance, marketing, human resources and project management, as well as quality assurance and data analytics.

Singapore-based small and medium-sized enterprises can access these solutions through the Productivity Solutions Grant, which offers up to 70% funding support. The Productivity Solutions Grant streamlines existing grant schemes with pre-scoped solutions, requiring businesses that wish to undertake productivity solutions to apply for support under only one grant scheme.

*‘We believe every business needs to be a digital business to remain relevant and thrive in the future economy. As part of the Small and Medium-sized Enterprises Go Digital programme, the Infocomm Media Development Authority partners with the Infocomm industry to offer small and medium-sized enterprises a list of pre-approved digital solutions that can be readily adopted to meet their business needs. These pre-approved solutions were identified with the help of relevant government agencies and have been tried and tested by pilot small and medium-sized enterprise users. We encourage small and medium-sized enterprises to make full use of these digital solutions in their digitalisation efforts.’*

– Mr. Tan Kiat How, Chief Executive, Infocomm Media Development Authority

Vendors of high-tech solutions play a key role in the Small and Medium-sized Enterprises Go Digital programme by submitting their ready-to-use digital solutions, which are proven to deliver productivity gains to small and medium-sized enterprises. Infocomm Media Development Authority is the agency appointed to pre-approve the pre-scoped digital solutions covered by the Productivity Solutions Grant.

The assessment is comprehensive. It encompasses a number of different dimensions, such as a description of the company and the solution, eligibility criteria, a cybersecurity risk assessment, personal data protection requirements, data analytics and internet of things requirements.

Infocomm Media Development Authority will then approve or deny the offering of a product or service under the grant scheme. The selection criteria focus on functionality, whether a product or service meets small and medium-sized enterprises’ requirements, the solutions’ ease of use, price, affordability and Infocomm media, as well as suppliers’ capability and capacity. In the future, beyond typical requirements to enhance productivity and drive transformation, digital capabilities such as cybersecurity, data protection, data analytics and interoperability will be considered in pre-approved solutions. All in all, this programme is expected to better enable small and medium-sized enterprises to thrive in the digital economy.

At the end of 2017, Infocomm Media Development Authority had officially recognised 50 digital solutions under the Small and Medium-sized Enterprises Go Digital programme. These solutions are now pre-approved for small and medium-sized enterprises to choose from. Since the launch of the initiative, the Development Bank of Singapore’s DBS TechMatch scheme has connected 13 small and medium-sized enterprises with start-ups that are designing solutions ranging from low-cost enterprise resource planning systems to customised online sales platforms.

### **Digital Project Management Services – Deep dive**

Small and medium-sized enterprises can engage the digital project management services under the Go Digital programme to help change their business processes, redesign jobs and better manage the implementation of digital technology for a more holistic and sustainable outcome. Small and medium-sized enterprises looking to engage the digital project management services can receive funding support of up to 70% of the qualifying costs.

The Singapore Manufacturing Federation has been appointed as the first operator offering the programme, with support from the National Trades Union Congress, Enterprise Singapore, Infocomm Media Development Authority, SkillsFuture Singapore and Workforce Singapore.

Figure 42 outlines the methodology enabling successful digital transformation of small and medium-sized enterprises by applying the digital project management services. The process starts with the Singapore Manufacturing Federation sending a digital project manager to the firm to diagnose processes and identify opportunities for digital transformation. At the end, the firm receives a final report including the technology solutions identified and an implementation roadmap.



**Figure 42. Methodology for digital project management services<sup>72</sup>**

These solutions are attractive for small and medium-sized enterprises, given that they can access a pool of skilled digital project managers and thereby maximise their business outcomes. Specifically, this means that they can implement their digital transformation faster and more sustainably.

<sup>72</sup> Infocomm Media Development Authority website: Industry Digital Plans <https://www.imda.gov.sg/>

### 3. Key findings

The key findings are focused on two main areas: 1) the ecosystem for innovation and digitalisation of small and medium-sized enterprises, where the network of digital innovation hubs plays a key coordinating role, and 2) the barriers to digitalisation.

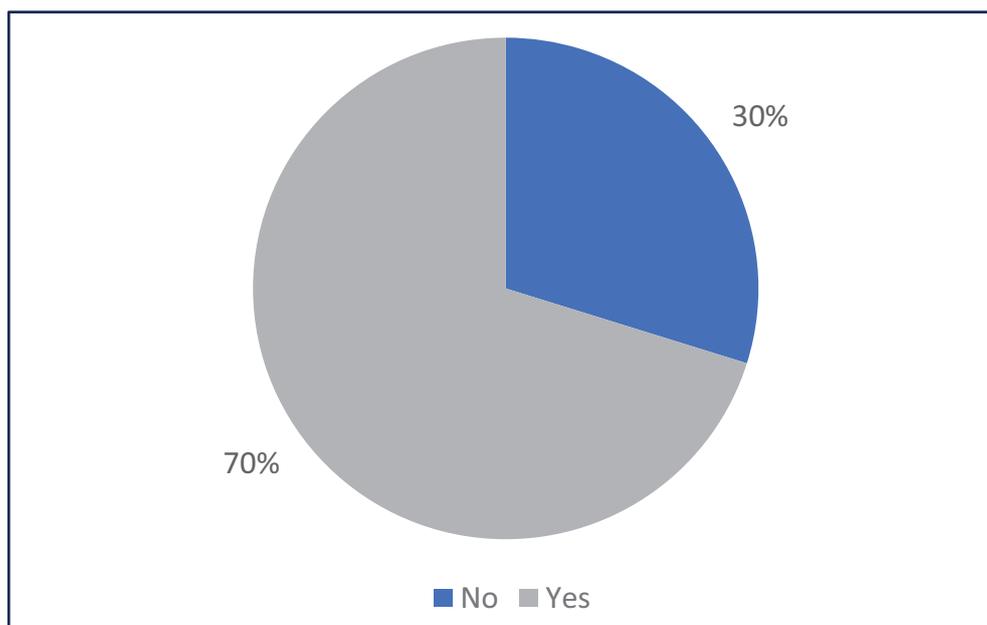
**Table 9. Summary of key findings**

Dimension	Finding	Description
<b>Findings focused on ecosystem development</b>	<b>1 Digital innovation hubs play a crucial role but there is potential to strengthen their offering</b>	<ul style="list-style-type: none"> <li>• Digital innovation hubs are at the core of the ecosystem for innovation and the digitalisation of businesses.</li> <li>• Digital innovation hubs play a critical role in supporting European small and medium-sized enterprises in their digital journey.</li> <li>• However, the analysis suggests that there are opportunities to further strengthen the contribution of digital innovation hubs to the digitalisation of industries across Europe and, as such, help them recover from the impact of the coronavirus pandemic.</li> </ul>
	<b>2 Public funding is dominant for digital innovation hubs, but new financing models are emerging</b>	<ul style="list-style-type: none"> <li>• Most digital innovation hubs have a mixed funding model, but there is a high dependency on public funding from European, national or regional programmes.</li> <li>• However, there is a growing (but limited) number of digital innovation hubs focused on developing more commercial services and activities. This expanded offering, which means going into revenue-generating activities, is an important step to develop sustainable and more commercially-oriented business models, paving the way to a more diversified and sustainable funding base.</li> </ul>
	<b>3 Perceived complexity and low visibility of public funding programmes</b>	<ul style="list-style-type: none"> <li>• National and regional programmes for digitalisation are an important source of financing for digital projects. However, the use of these programmes is limited by lack of awareness of the programmes, the perceived complexity of the application processes and the length of the process. Digital innovation hubs may be able to help small and medium-sized enterprises to navigate this complexity.</li> </ul>
<b>Findings focused on barriers to digitalisation for small and medium-sized enterprises in Europe</b>	<b>4 Knowledge gap of small and medium-sized enterprises is a key barrier to digitalisation</b>	<ul style="list-style-type: none"> <li>• The majority of small and medium-sized enterprises in Europe are facing issues and difficulties in digitalising.</li> <li>• A key barrier to the digitalisation of small and medium-sized enterprises is the lack of knowledge, whereby one should distinguish projects which only partially embed digitalisation features in a company versus full digitalisation projects.</li> <li>• Digital adopters are generally at the early stages of their digital journey and their knowledge gap is often linked with the ambition, design and delivery phases of the digital projects.</li> <li>• Digital natives are usually further advanced along the digital journey, but they are not immune to the knowledge gap.</li> </ul>
	<b>5 Financing of digital projects is limited by the knowledge gap of banks</b>	<ul style="list-style-type: none"> <li>• The intrinsic nature of digital projects exacerbates the issue of access to finance that many small and medium-sized enterprises are already facing across Europe.</li> <li>• Banks often do not have enough expertise to assess digital projects.</li> <li>• Credit departments of banks are often unable to assess the potential value and risk profile of a digital project.</li> <li>• This lack of knowledge and expertise within the banks puts digital projects at a comparative disadvantage when compared with other sorts of projects.</li> <li>• This is particularly evident for digital natives, which often have only digital projects with no collateral and no track record.</li> </ul>

### 3.1 Finding 1: Digital innovation hubs are critical enablers with strong potential to strengthen their offerings

Our analysis shows that digital innovation hubs play a critical role in supporting European small and medium-sized enterprises in their digital journey. However, there is room to expand and improve the current offering.

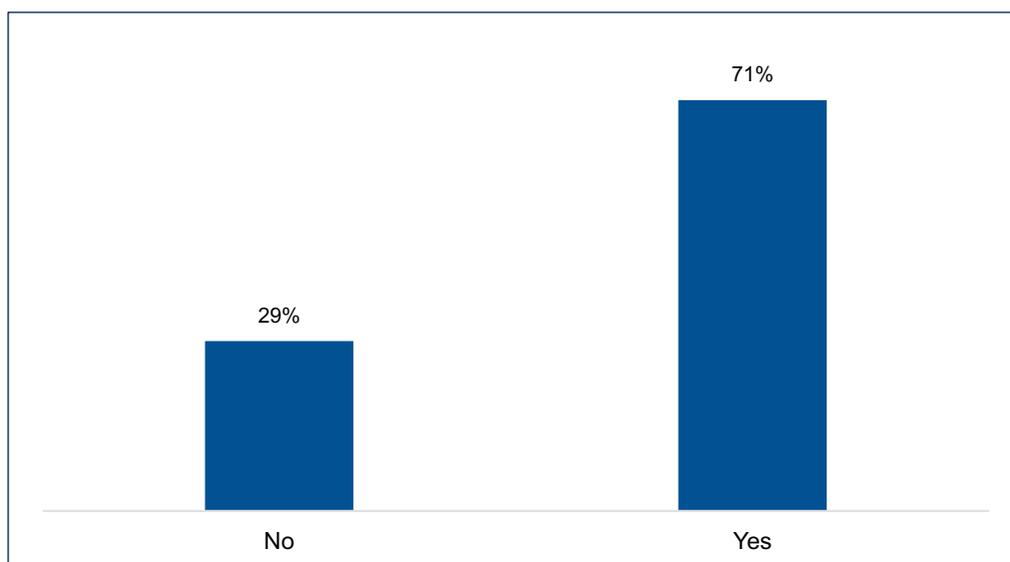
According to the survey data, about 70% of the enterprises with a digital project have used a digital innovation hub in their region. This is independent of the digital profile of the small and medium-sized enterprises; that is, this statistic holds irrespective of whether the sample considered is that of digital natives or digital adopters.



**Figure 43. Percentage of small and medium-sized enterprises with access to a digital innovation hub within their region<sup>73</sup>**

For those small and medium-sized enterprises which have accessed digital innovation hubs, the data collected show that resident small and medium-sized enterprises consider the contribution from digital innovation hubs to be overwhelmingly positive. Over 70% of small and medium-sized enterprises believe that the support from digital innovation hubs has improved their digital projects.

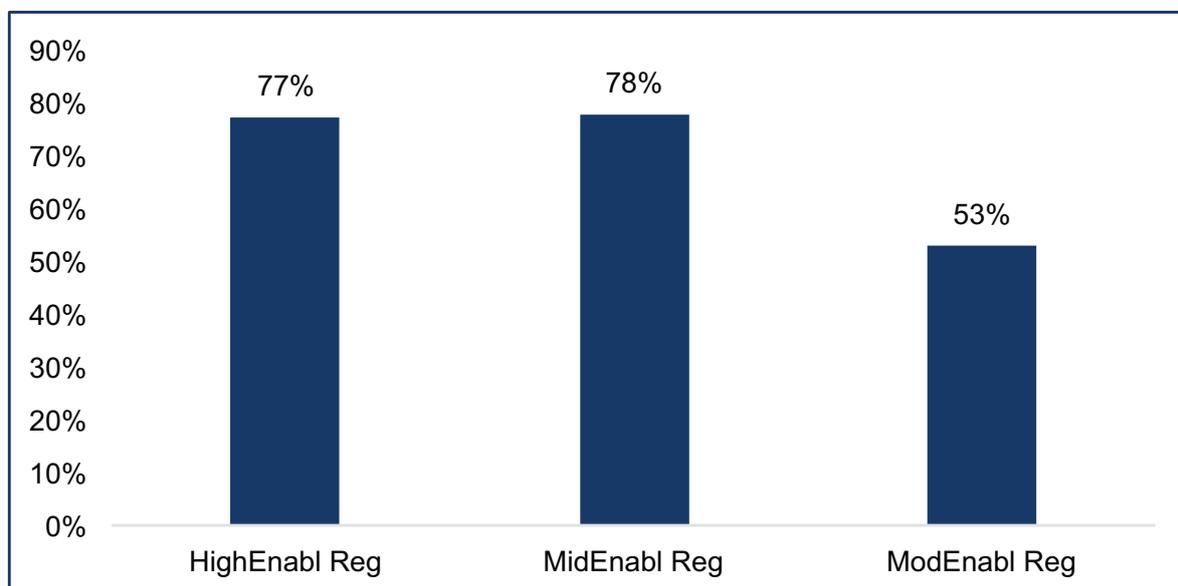
<sup>73</sup> Source: Based on data from the Gartner survey of small and medium-sized enterprises



**Figure 44. Percentage of small and medium-sized enterprises which cited digital innovation hub support as a key enabler for attaining access to finance<sup>74</sup>**

Nonetheless, although digital innovation hubs have a strong positive impact, our analysis suggests that there are important opportunities to increase the contribution of digital innovation hubs to the digitalisation of industries across Europe, and in, particular in the context of the response to the coronavirus pandemic. The main areas for improvement are identified below.

- **Unbalanced geographical distribution.** There are clear geographical variances across Europe, which belies a lack of digital innovation hubs in the Modest Enabling Region. Only approximately 50% of companies with digital projects in this geographical cluster have used a hub, compared to almost 80% in the High and Mid Enabling Regions.

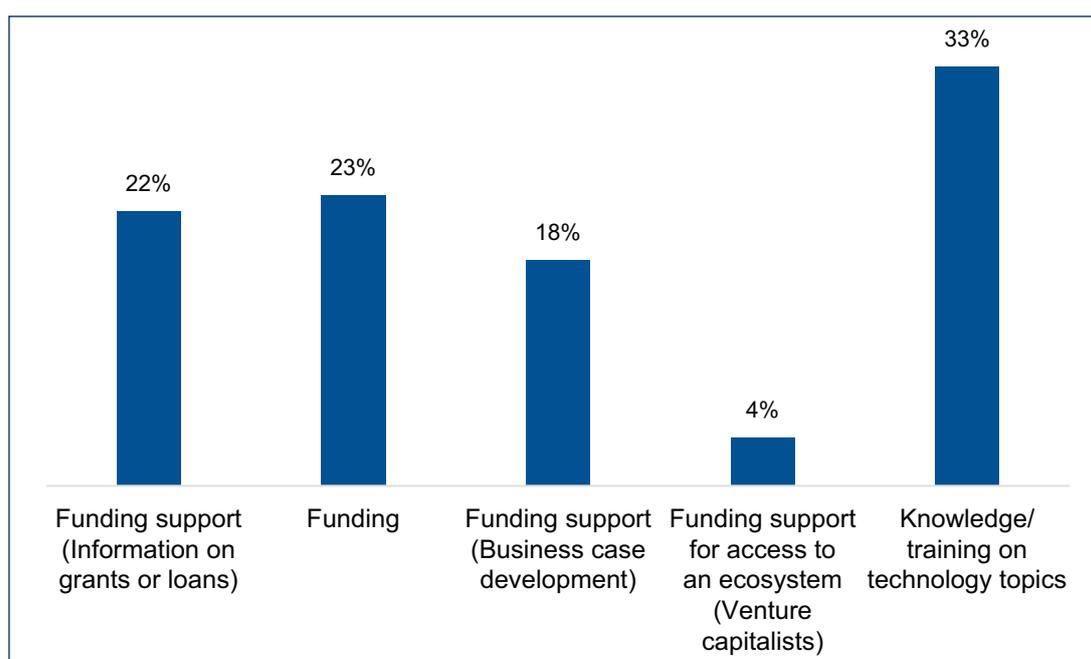


**Figure 45. Percentage of small and medium-sized enterprises with access to a digital innovation hub within their region<sup>75</sup>**

<sup>74</sup> Source: Based on data from the Gartner survey of small and medium-sized enterprises

<sup>75</sup> Source: Based on data from the Gartner survey of small and medium-sized enterprises

- **Partial mismatch between small and medium-sized enterprise demand and digital innovation hub offering.** There is a material demand for services related to ‘access to finance’ from digital natives and digital adopters. However, this demand is not fully met by the offering provided by digital innovation hubs. Only 41% of the digital innovation hubs in the EU catalogue list ‘support in access to finance’ among their services, while two-thirds of the services received by small and medium-sized enterprises with digital projects are related to ‘access to finance’. Specific services in this area include the provision of information on grants and loans, funding, support for developing a business case, and access to venture capital or business angels.



**Figure 46. Percentage of small and medium-sized enterprises with a digital project that received support from a digital innovation hub<sup>76</sup>**

- **Not enough awareness of digital innovation hubs among small and medium-sized enterprises.** There is still room for creating awareness around digital innovation hubs among small and medium-sized enterprises. For companies that have not used digital innovation hubs, the main reason cited is the lack of information about digital innovation hubs and their offering.

*‘We have not approached any such hub as we are not aware of them.’*

***Small business in the High Enabling Region***

*‘We don’t have information about this.’*

***A firm in the Mid Enabling Region***

*‘We don’t have much information about this and neither do we have much time to devote to this.’*

***A small business in the Modest Enabling Region***

<sup>76</sup> Source: Based on data from the Gartner survey of small and medium-sized enterprises

### 3.2 Finding 2: Public funding is dominant in digital innovation hubs, but new financing models are emerging

The landscape of digital innovation hubs in Europe is diversified and heterogeneous. There are significant differences in the level of maturity and sophistication of digital innovation hubs across Europe. Some are fairly advanced and have a well-defined business model and clear links to the digital ecosystem, while many are still developing and have been established only in the last few years.

Most hubs have a mixed funding model, but they are mainly skewed towards public funding from European, national or regional programmes. Private funding for digital innovation hubs is limited and it generally comes only in the form of membership fees and contributions (often in kind) from partners. Repayable capital is rare and limited.

However, an increasing number of digital innovation hubs recognise that the public funding landscape is changing rapidly and the future availability of grants is becoming increasingly uncertain. This means that there is a need to shift the funding paradigm towards a more diversified model with an increasing role for private funding.

This transition is not only important for reducing the dependence on public grants and for 'future-proofing' digital innovation hubs, but also for generating additional financial resources to improve and expand the services offered to small and medium-sized enterprises.

This shift towards private funding is often constrained by the current business models of many digital innovation hubs. In the vast majority of cases, digital innovation hubs lack or have too little focus on commercial and market-driven activities. Only a limited number of digital innovation hubs have a more commercially-driven approach.

While some important activities provided by the digital innovation hubs are, and will always be, non-commercially viable activities (for which some sort of public funding will continue to be necessary), our analysis shows that a growing (but limited) number of digital innovation hubs are focused on developing more commercial services and activities. This expansion by digital innovation hubs into revenue-generating activities is an important step to develop sustainable and more commercially-oriented business models. This will pave the way to a more diversified funding base, including repayable capital. In turn, this will reduce the dependence on public funding and increasingly stretched public budgets.

Our research has identified two main emerging business models among digital innovation hubs focused on developing more commercially-oriented approaches:

- **Private–public partnership.** These hubs are pooling resources from the private and public sector. The presence of the private partner brings a more commercially-focused approach to the modus operandi of the digital innovation hub, while the public sector offers access to research centres, scientific infrastructure and basic funding. All of which are essential to support innovation and the development of advanced digital solutions. An example of this approach is a hub in Ireland. This hub is a not-for-profit partnership between a private enterprise, a public research institute and the local public authority. The digital innovation hub aims to support Irish and international talent by fostering a design-led living lab ecosystem focused on digitalisation and scaling businesses through training, accelerator programmes for start-ups and innovation services for established companies. The public–private partnership structure leverages public and private assets via: 1) the private sector's contribution of a 20 000 square foot building, donated under a 15-year nominal lease, 2) the research institute's expertise in the higher education sector (developing skilled talent, which meets industry needs and stimulates innovation, research and the development of intellectual property), and 3) local governmental knowledge and networks to drive economic development. The digital innovation hub generates revenues through various services including rental income, monthly/annual memberships, utilisation

fees for testing and research facilities, coaching and other investment readiness support, milestone success fees, etc. It aims to be self-sustainable within five years.

- **Research and technology organisation model.** These digital innovation hubs are leveraging financing models used by research and technology organisations across Europe. Many research and technology organisations have broadened their financing mix by including grants with repayable sources of financing. While basic research is largely public-funded, these organisations have exploited their expertise and knowledge to expand their offering towards project-oriented research, which is often paid for by private and public counterparties. This enables them to monetise their discoveries via technology-transfer funds, intellectual property management and spin-offs. More advanced digital innovation hubs are adopting a similar approach. Besides basic activities such as improving awareness and developing skills, they are expanding their offering towards fee-based services such as advanced training, membership fees, etc. An example of this approach is another hub, also based in Ireland. This hub was founded in 2003 by the Irish government to support companies involved in the information and communication technology sector. It was originally fully funded through public funding but today, over two-thirds of its income is generated from private sources. The main source of income is the rent paid by over 70 small and large companies hosted on the campus of the digital innovation hub. In addition to office space, the digital innovation hub offers business support (including regular seminars, workshops and business clinics) and networking opportunities to its residents.

#### Case Study: The Research and Technology Organisation Model<sup>77</sup>

The European Association of Research and Technology Organisations (EARTO), which represents about 350 research and technology organisations, defines such organisations as follows:

*‘Organisations whose predominant activity is to provide research and development, technology and innovation services to enterprises, governments and other clients...’*

This definition distinguishes research and technology organisations from universities, for which the primary activity is education, and from companies, for which the main activity is the production and sale of goods and services. According to the definition, research and technology organisations could be considered as a separate research, development and innovation participant that can be positioned between academia and industry. The core mission of these organisations, according to EARTO, is to harness science and technology to serve innovation, improve quality of life and build economic competitiveness.

Research and technology organisations operate across the value chain of innovation, from fundamental to technological research, to product and process development, prototyping and demonstration, and finally, to applying the technology in the public and private sectors. By developing and helping to implement new technology platforms and by clustering new and existing knowledge, they enable companies and other producers to transcend the limits of their internal technological capabilities. Hence, research and technology organisations occupy a hybrid position between public and private participants.

<sup>77</sup> Source: *Access-to-finance conditions for Research and Technology Organisations (RTOs)*  
<https://www.eib.org/en/publications/access-to-finance-conditions-for-rto>

The research and technology organisation ecosystem includes a variety of participants such as small and medium-sized enterprises and large companies, universities, vocational and educational institutes, authorities and agencies (from municipal and regional to national and pan-European). By housing complex large-scale research and technological infrastructure/facilities, which are needed by many stakeholders of the ecosystem but are too resource-intensive for any single stakeholder to invest in, research and technology organisations promote the maturity of technologies for the long-term benefit of European society. These organisations usually partner with either single industry players or form a consortium of several industrial participants in an attempt to address different research, development and innovation activities according to the timelines of challenges they intend to tackle.

According to EARTO (2015)<sup>78</sup>, research and technology organisations' operations and services can be clustered into three main types of research, development and innovation activities:

**1. Research, development and innovation activities with an 'immediate' market readiness level**

Research and technology organisations provide immediate added value to their industrial partners and foster knowledge dissemination by enhancing market participants' access to validation, testing and certification. The clients involved in these close-to-market activities are typically from industry (large, medium and small companies in the research and technology organisation's country of origin and abroad), but collaboration with national regulators and other entities also occurs.

**2. Research, development and innovation activities with a 'precompetitive' market readiness level**

These activities concern cooperative projects and applied research programmes under regional, national or European competitive calls. Here, research and technology organisations liaise with industry players and collaborate in the early-stage development of products. Any other relevant stakeholders may be involved to maximise the research, development and innovation impact and the dissemination of research results.

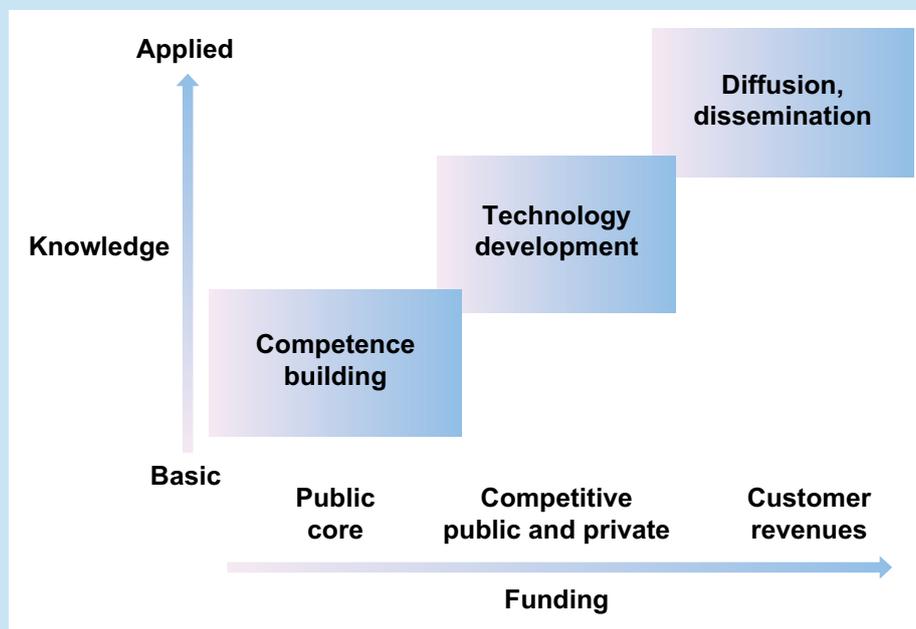
**3. Research, development and innovation activities with a 'future' market readiness level**

Research and technology organisations have strong links with national and regional governments in defining strategic innovation plans. They collaborate closely with universities to harvest ideas from their basic research and bring them to higher technology readiness levels by conducting applied research. Collaboration with universities also takes place on long-term forward-looking research, development and innovation activities through staff sharing (such as joint professors, guest researchers), hosting PhD students, joint educational programmes, joint research activities, joint facilities, etc.

The financial profile of research and technology organisations indicates that they are generally non-profit organisations and their revenues from dissemination and deployment are re-employed to fund new innovation cycles. They generally operate according to a three-stage innovation dynamic, which broadly correlates with a three-part funding model (see also Figure 47):

<sup>78</sup> European Association of Research and Technology Organisations  
[http://www.earto.eu/fileadmin/content/Website/EARTO\\_Paper\\_-\\_Data\\_on\\_European\\_RTOs\\_-\\_Final\\_01.pdf](http://www.earto.eu/fileadmin/content/Website/EARTO_Paper_-_Data_on_European_RTOs_-_Final_01.pdf)

- Public core funding to support exploration of needs and competence-building
- Competitive public and private income for technology development
- Customer revenues from dissemination and deployment



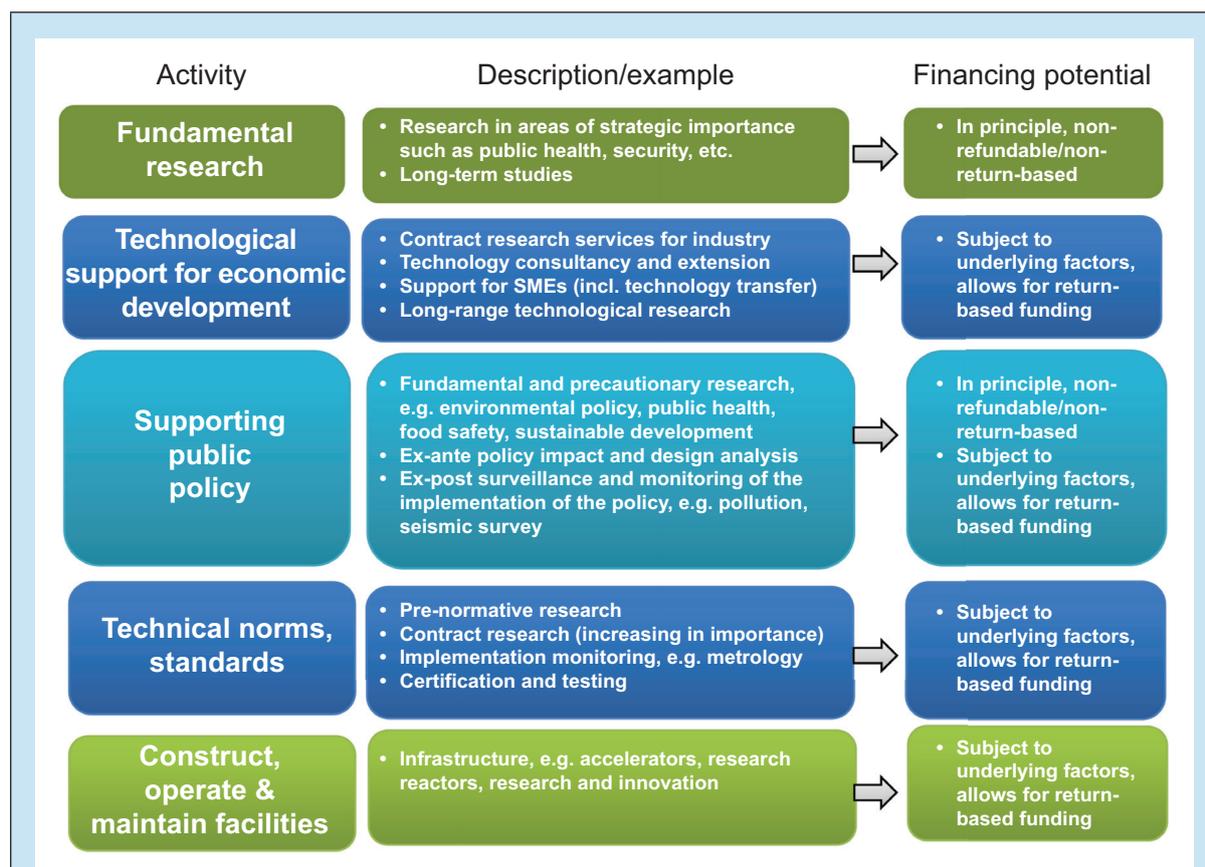
**Figure 47. Research and technology organisations' three-stage innovation dynamic and funding model<sup>79</sup>**

Most research and technology organisations have financial models that rely heavily on public core funding (grants) as their key funding source, while only a few have developed business models that rely on the attraction of private sources of income. The generation of enough customer revenues, as part of the overall cash flow generation, is often a precondition for the so-called 'bankability' and associated repayment capacity of investments.

Research and technology organisations' research activities exhibit features of both basic and applied research. Basic research allows research and technology organisations to develop the knowledge and technologies needed to complete their service offering (and therefore, their mission), while their applied research activity allows for prompt/short-term or longer-term horizon cash flow generation. Figure 48 offers an indicative layout of the research and technology organisations' activities and their content, as well as showing which of them could potentially be fit for return-based (commercial) financing.

The more the research and technology organisation is able to generate sizeable and stable revenues from its portfolio of projects and activities, the stronger the credit support it can provide to a project. De-risking paves the way for improved bankability and broadens the organisation's access to financial instruments. Furthermore, a reinforcement of research and technology organisations' business model can be expected to add financial flexibility and a balance sheet buffer, which is vital if research and technology organisations are expected to become more active investors in the future. Figure 48 illustrates the indicative access-to-finance potential that research and technology organisations have, based on their free cash flow generation potential.

<sup>79</sup> European Association of Research and Technology Organisations



**Figure 48. Research and technology organisation activities and positioning vis-à-vis potential return-based financing<sup>80</sup>**

The way activities are performed and the combination of those activities (that is, the broader business model) lays the foundations for research and technology organisations' financial flexibility. For example, innovation infrastructure services and intellectual property ownership may be a source of cash flow. However, these assets are subject to, among other things, the soundness of the engagements which have generated the assets (for example, the duration of the relationship, the stability of the counterparty and the granularity of the asset should be considered). In the case of intellectual property, the degree of monetisation of the asset and how this monetisation will be achieved also needs to be evaluated (for example, royalties versus technology transfer).

### 3.3 Finding 3: Perceived complexity and low visibility limit demand for funding from public digitalisation programmes

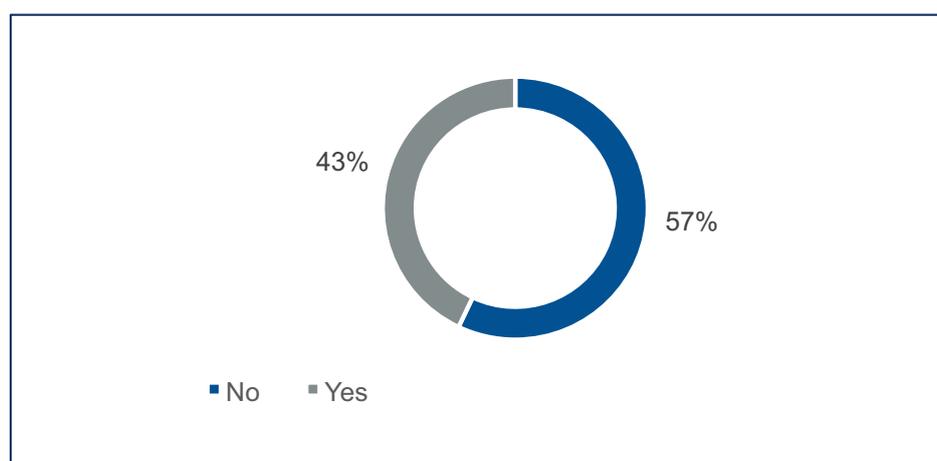
National and regional programmes for digitalisation are an important source of financing for digital projects. On average every year<sup>81</sup>, €18 billion is invested in funding the digitalisation of European industries.

However, the use of these programmes is limited. According to the survey, only 43% of small and medium-sized enterprises are aware of national and European programmes for digitalisation and less than one in five small and medium-sized enterprises have used national

<sup>80</sup> Source: Research and Technology Organisations and European Research Advisory Board (December 2005), EIB

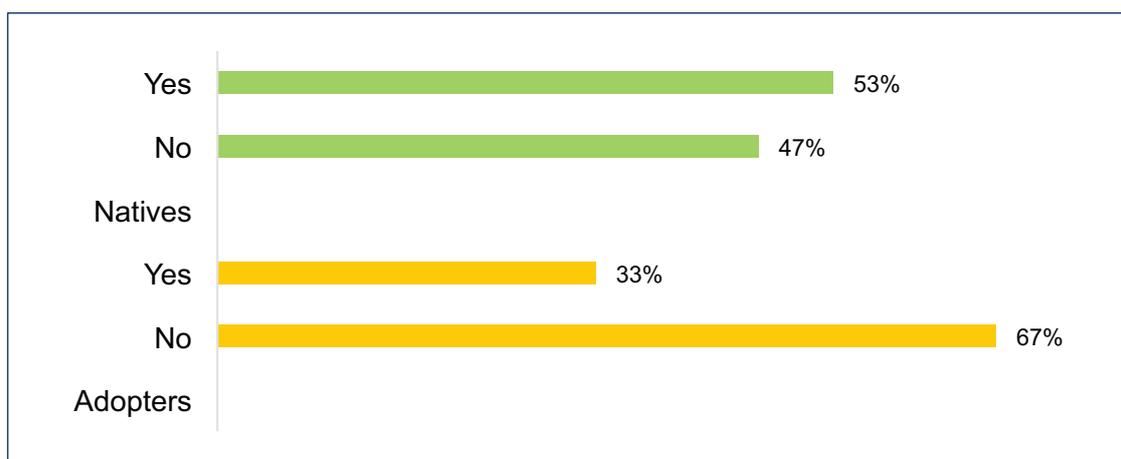
<sup>81</sup> European Commission, Digital Transformation Scoreboard (2018)  
[https://ec.europa.eu/growth/tools-databases/dem/monitor/sites/default/files/Digital%20Transformation%20Scoreboard%202018\\_0.pdf](https://ec.europa.eu/growth/tools-databases/dem/monitor/sites/default/files/Digital%20Transformation%20Scoreboard%202018_0.pdf)

and European programmes for digitalisation. Similar feedback was also received from digital innovation hubs and small and medium-sized enterprises during the market consultation, confirming that this is a widespread issue among companies.



**Figure 49. Percentage of small and medium-sized enterprises aware of EU/national programmes<sup>82</sup>**

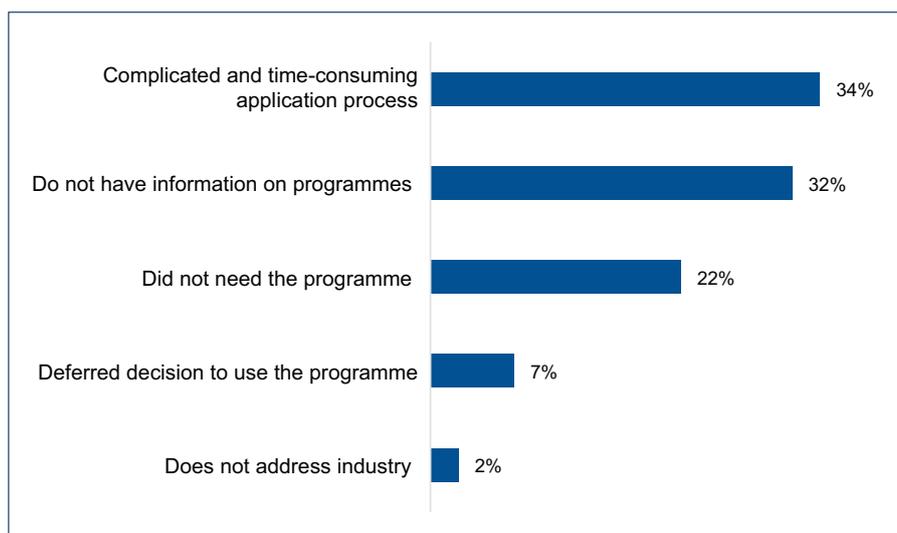
This percentage is particularly low for digital adopters, with only 33% of adopters questioned in the survey being aware of EU or national funding programmes.



**Figure 50. Percentage of small and medium-sized enterprises aware of EU/national programmes – Breakdown by digital adopters and digital natives**

The survey data also showed that the key reasons for not using these programmes are enterprises' lack of awareness/information and that they perceive the complexity of the application and the length of the process to be high (which means they need to invest a lot of time to fill in the applications).

<sup>82</sup> Source: Based on data from the survey of small and medium-sized enterprises



**Figure 51. Key reasons for not using an EU/national programme (% of small and medium-sized enterprises)<sup>83</sup>**

*‘Their documentation procedure and serviceability are quite complex.’*

***A small business in the High Enabling Region***

*‘Getting support from these programmes is quite difficult and time-consuming. Also, the documentation procedure is very lengthy.’*

***A firm in the Mid Enabling Region***

*‘The procedure and limitations are quite complicated with national programmes and it is very time-consuming too.’*

***A firm in the Mid Enabling Region***

*‘We don’t have much information about these programmes. Also, the procedure is quite lengthy and complex.’*

***A small business in the Modest Enabling Region***

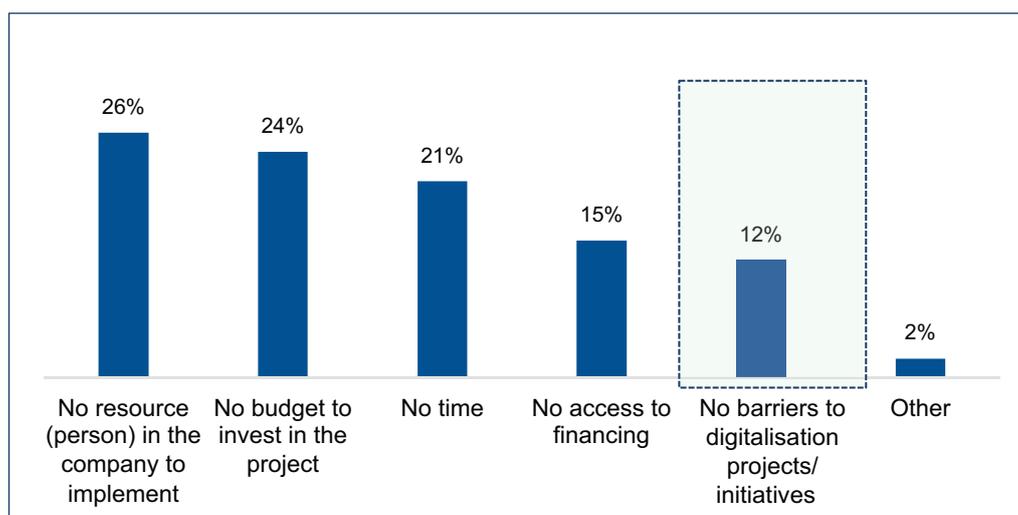
### **3.4 Finding 4: A key barrier to digitalisation of small and medium-sized enterprises (different manifestation for natives versus adopters) is the lack of knowledge**

Many European small and medium-sized enterprises face significant hurdles as they try to digitalise and, although various initiatives exist at the national and European levels, the digital journey is still challenging for many small and medium-sized enterprises across Europe. Lack of knowledge and expertise is still a pervasive barrier among European small and medium-sized enterprises.

The feedback collected from our market consultations with digital innovation hubs and our survey confirms this issue. The small and medium-sized enterprise survey revealed that almost one in three small and medium-sized enterprises do not have enough knowledge to

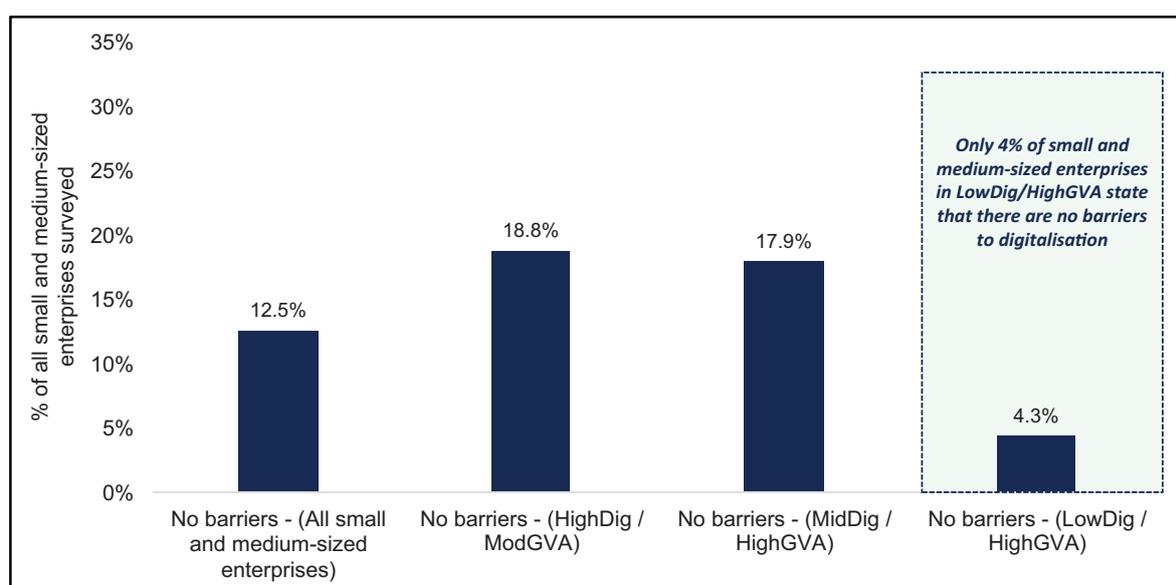
<sup>83</sup> Source: Based on data from the survey of small and medium-sized enterprises

implement digital projects and only 12% of small and medium-sized enterprises state that they do not encounter any barriers to digitalisation.



**Figure 52. Barriers to digitalisation projects/digital initiatives (% of all small and medium-sized enterprises)<sup>84</sup>**

It appears that there is a strong correlation between the level of digitalisation (that is, the digital profile) of an enterprise and the industries in which they operate. Our survey shows that within the industry cluster 'Low Digital/High GVA', which includes real estate, health, education, defence and scientific and technical activities, only 4.3% of the small and medium-sized enterprises state that they do not encounter any barriers to digitalisation. Given the relevance of this cluster for the European economy (whereby it is a high gross value added contributor), this is an area of potential concern, as small and medium-sized enterprises in this industry are vulnerable to a high risk of a loss of competitiveness due to low levels of digital maturity.

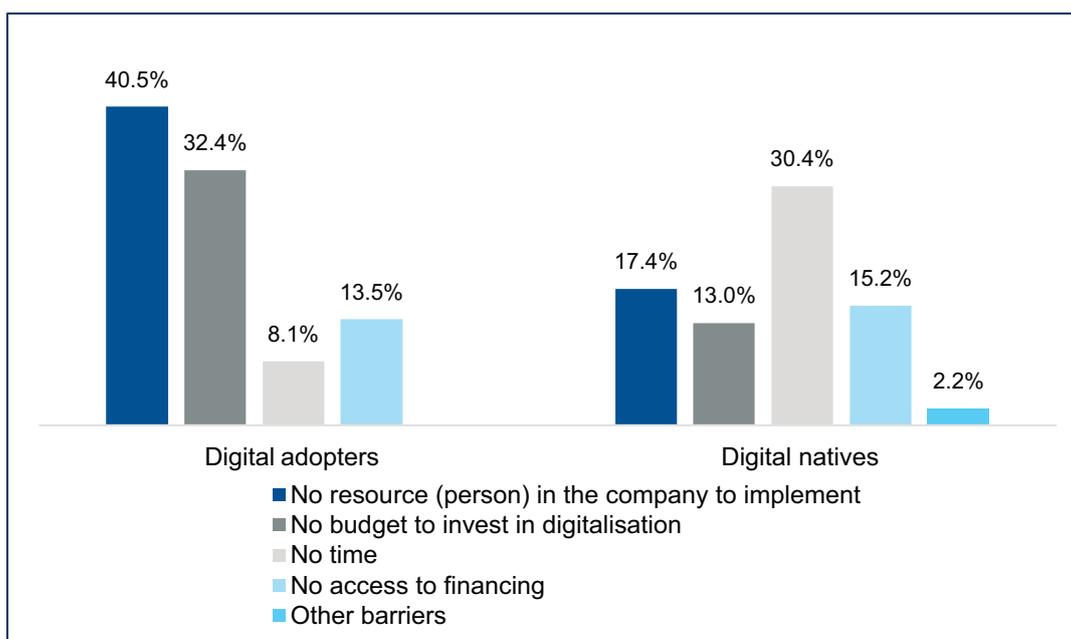


**Figure 53. Barriers to digitalisation across industry clusters (% of all small and medium-sized enterprises)<sup>85</sup>**

<sup>84</sup> Source: Based on data from the survey of small and medium-sized enterprises

<sup>85</sup> *ibid.*

**Digital adopters** are generally at the early stages of their digital journey. Their knowledge gap is often linked with the ambition, design and delivery phases of the digital projects. The small and medium-sized enterprise survey shows that the main hurdles to digital projects for digital adopters are a) no resource (person) in the company to implement the projects for 41% of the small and medium-sized enterprises, and b) no budget to invest in digitalisation (32% of the small and medium-sized enterprises). These percentages are significantly higher when compared to digital natives, for which one of the main barriers is time. This could be due to the fact that digital natives are busy scaling up the company and do not have the resources to engage in new digital initiatives.



**Figure 54. Barriers explaining the lack of prioritisation of digital projects (% of adopters and natives)<sup>86</sup>**

Based on the survey, we can infer that the knowledge gap for digital adopters takes the following forms:

- **Ambition:** Digital adopters often lack awareness of the potential of digital technologies and do not prioritise these investments, which means that digitalisation projects do not receive the budget they require.
- **Design and deliver:** Digital adopters lack the internal knowledge and technical expertise to design and implement digital projects. Our survey shows that over 40% of digital adopters struggle to find this expertise.

**Thus, our survey suggests that more than 70% of digital adopters face barriers that can be explained by the lack of knowledge about digitalisation.**

*‘The journey of small and medium-sized enterprises needs to begin with awareness and education as opposed to pure access-to-finance incentives. While challenges exist in access to finance, most traditional small and medium-sized enterprises struggle to even commence their digital journeys.’*

### **Digital innovation hub in the Modest Enabling Region Cluster**

<sup>86</sup> Source: Based on data from the survey of small and medium-sized enterprises

*'We need to encourage small and medium-sized enterprises to understand how digitalisation can help them stay high in the value chain and relevant within their market in future. After information sharing and education, they can then be incentivised to undergo digitalisation.'*

***Digital innovation hub in the Modest Enabling Region Cluster***

*'We are providing training on digitalisation, which improves small and medium-sized enterprises' understanding of the benefits of digitalisation and creates a relationship between the small and medium-sized enterprises and the hub. Following this stage, we will guide the small and medium-sized enterprises towards financing services, etc. We have seen better results with this approach.'*

***Digital innovation hub in the Modest Enabling Region Cluster***

*'The return on investment in digitalisation is not well understood by adopter small and medium-sized enterprises; they do not fully recognise the value that digitalisation can bring to their business.'*

***Digital innovation hub in the High Enabling Region Cluster***

**Digital natives** are usually more advanced in terms of their digital journey and often try to deliver or scale up digital initiatives, but they are not immune to the effects of the knowledge gap. For digital natives, their digital initiatives often represent the entirety of their business and therefore they are aware of the potential of digital technologies and have in-house technical knowledge and expertise to design, develop and implement technologies. However, digital natives often lack expertise in building sound business cases for their projects, creating well-supported valuations and planning and executing fundraising. Further, they often lack market intelligence and contact with relevant investors. Some also lack the management skills to execute the project. This results in a constrained capacity to scale up their businesses.

During an interview with a business angel association, the association shared some insights into the main challenges that investors face when assessing digital natives. Based on a survey of over 600 early-stage investors, the most widespread reasons preventing investment in digital natives are:

- High levels of unmitigated risk attached to the native small and medium-sized enterprise business model (87% of investors)
- Unsound business cases (approximately 70% of investors)
- Lack of skills to execute the digital initiatives (65% of investors)
- Incorrect evaluation/overvaluation of digital natives (approximately 55% of investors)

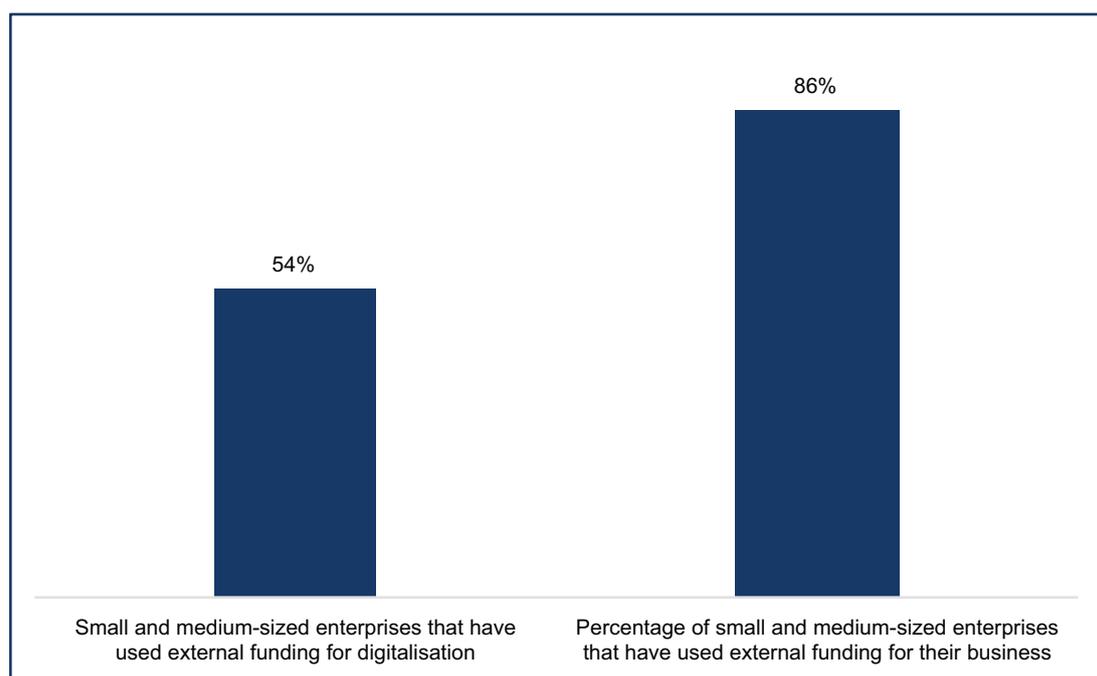
*'The management/owners of digital native small and medium-sized enterprises are often technology experts who have limited experience in developing business cases and valuations and coordinating the timing of funding rounds.'*

***Interview with a North American digital innovation hub***

### 3.5 Finding 5: Financing of digital projects is limited by the knowledge gap of banks

The intrinsic nature of digital projects exacerbates the issue of access to finance that many small and medium-sized enterprises are already facing across Europe. Data from the market consultation and small and medium-sized enterprise survey show that there is a funding gap and not enough financing available for digital projects of digital natives and digital adopters. This issue is particularly prominent for small and medium-sized enterprises that are digital adopters.

The data from the survey reveal that the number of small and medium-sized enterprises capable of raising external financing for their digital projects is significantly less when compared to those raising financing for general corporate purposes.



**Figure 55. Percentage of use of external funding for digitalisation versus business funding by small and medium-sized enterprises<sup>87</sup>**

Only 54% of the small and medium-sized enterprises surveyed have used external funding for digital projects. By comparison, 86% of the small and medium-sized enterprises cited using external funding for their general business needs. At the same time, about one-third of the small and medium-sized enterprises surveyed which had not planned any digitalisation projects indicated that the main support which would be required to embark on the digital journey is in the area of 'access to finance'.

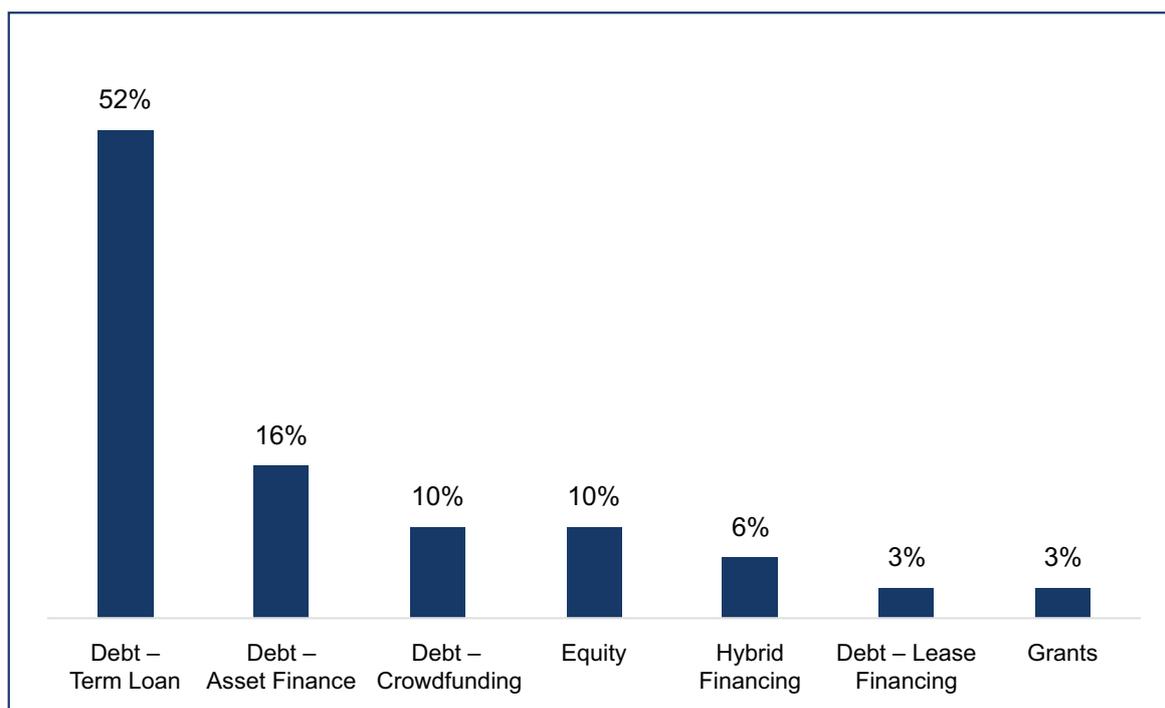
Based on these two observations, it becomes apparent that funding digital projects is more challenging than financing other investments. There is a funding gap for digitalisation initiatives.

Although banks are still one of the main funding providers for digitalisation, they often lack the expertise to assess digital projects and their lending products are not always fit for purpose in the case of digitalisation. (This is particularly true for the high risk and complex business models of digital natives.) **The limitations faced by banks offer an opportunity for financial technology start-ups and alternative funding providers to support digitalisation.**

<sup>87</sup> Source: Based on data from the survey of small and medium-sized enterprises

**Banks play a key role in financing the economy, especially in Europe, and they are the main source of external financing for small and medium-sized enterprises. According to the latest data from the SAFE survey, small and medium-sized enterprises reported that their three most important sources of financing are credit lines, leasing and bank loans. Furthermore, more than 60% of small and medium-sized enterprise external financing comes from banks.<sup>88</sup>**

The survey of small and medium-sized enterprises conducted within this study finds a similar pattern, with over 50% of financing for all digital projects/initiatives originating from banks in the form of loans.



**Figure 56. Funding sources for small and medium-sized enterprises' digital projects<sup>89</sup>**

It is evident that most small and medium-sized enterprises (especially digital adopters) prefer to approach their banks for digitalisation funding. However, banks often do not have in-house expertise to assess digital projects because of the specific characteristics of these projects. The credit departments of banks are often unable to assess the potential value and risk profile of a digital project, and therefore they rely on the company's historical track record, past performance, capital strength, and collateral for their assessment of creditworthiness.

Interviews with multiple banks revealed the following:

- Banks do not have specific evaluation criteria for digitalisation projects
- Banks cannot easily assess the value that digitalisation projects may generate<sup>90</sup>

<sup>88</sup> ECB SAFE Survey: [https://www.ecb.europa.eu/stats/ecb\\_surveys/safe/html/ecb.safe201905~082335a4d1.en.html#toc1](https://www.ecb.europa.eu/stats/ecb_surveys/safe/html/ecb.safe201905~082335a4d1.en.html#toc1)

<sup>89</sup> Source: Based on data from the survey of small and medium-sized enterprises

<sup>90</sup> Gartner interviews with bank employees

### Highlights from interviews with bank employees

During interviews with banks across Europe, the banks were asked: *‘What are the key criteria you would employ to evaluate a digitalisation funding request?’*

The responses from the banks indicate that even for digital projects, banks still use historical evidence, cash flows and proof of debt repayment capacity as key evaluation criteria.

**Table 10. Sample of evaluation criteria for digital projects cited by banks**

<i>Evaluation criteria for digital projects as cited by banks</i>	
<b>Bank 1</b>	<ul style="list-style-type: none"> <li>• <i>Visibility of future cash flows from the project</i></li> <li>• <i>Loan payments and financial history</i></li> <li>• <i>Availability of collateral</i></li> </ul>
<b>Bank 2</b>	<ul style="list-style-type: none"> <li>• <i>Strong cash flows – historical (for the firm) and future (for the project)</i></li> <li>• <i>Business tenure &gt; 5 years</i></li> <li>• <i>Availability of collateral</i></li> </ul>
<b>Bank 3</b>	<ul style="list-style-type: none"> <li>• <i>The small business has been active for at least a few years</i></li> <li>• <i>The firm can provide collateral and sponsorship</i></li> </ul>
<b>Bank 4</b>	<ul style="list-style-type: none"> <li>• <i>Creditworthiness of the borrower</i></li> <li>• <i>Historically strong cash flows</i></li> </ul>

*“In 2018, Gartner conducted a survey of banks across the world, in which banks were asked: ‘Which of the following are the most significant barriers to achieving your organisation’s goals?’*

*34% of the banks responded that a key barrier is insufficient depth or breadth of digital knowledge or skills.”*

**Gartner Research**

This lack of knowledge and expertise within the banks places digital projects at a disadvantage when compared with other sorts of projects. Digitalisation is perceived as an inherently riskier proposition by banks. This is due to the unique characteristics of digital projects:

- **Digital projects often lack any tangible collateral.** Digitalisation projects are driven by the adoption of technologies and while these technologies can significantly improve the performance of small and medium-sized enterprises, they do not create the kind of traditional assets that banks have historically used to derive comfort when lending.

A majority of digital projects involve transformation of small and medium-sized enterprise businesses from asset heavy to asset light models, which involves the pivoting of the small and medium-sized enterprises from a capital expenditure approach (investment in assets and bolting on technologies) to an operational expenditure approach (buying and using technology and assets as a service).

Technology type	Spending type	Creation of collateral/assets
 <b>Artificial Intelligence</b>	Mostly operational expenditure	Deployment of artificial intelligence: None Development of artificial intelligence-based product: Intellectual property
<b>Enterprise Resource Planning/Customer Relationship Manager</b>	Mostly operational expenditure	None
 <b>Cloud</b>	Operational expenditure	None
 <b>Security</b>	Mostly operational expenditure	Deployment of cybersecurity technologies: None Development of cybersecurity technology product: Intellectual property
 <b>Internet of Things</b>	Mostly operational expenditure	Deployment of internet of things: None Development of internet of things-based monetisation strategy: Intellectual property

**Figure 57. Type of technology and creation of collateral**

- **Intellectual property and intangible assets are not widely recognised as collateral.** There are still some challenges for this asset class:

#### *Banking regulation*

To provide loans to clients, banks are required to hold regulatory capital against the risk of these exposures based on Basel III Rules (enshrined in the Capital Requirements Regulation and the Capital Requirements Directive).

These standards set out the criteria for the use of assets as collateral when approving loans. Loans that are secured by eligible collateral typically result in lower losses in the event that a borrower defaults and therefore require less capital. Unfortunately, since intellectual property does not satisfy this criterion, banks do not derive any capital benefit from its use as security for loans.

#### *Legal enforceability*

The enforcement of rights may be difficult in certain jurisdictions, expensive and time consuming.

#### *Valuation*

A key criterion for collateral is to have easily identifiable value. However, there is no widely accepted criterion for the valuation of intellectual property. Furthermore, the complexity of intellectual property valuation needs specialist expertise, which is not always readily available.<sup>91</sup>

#### *Liquidity*

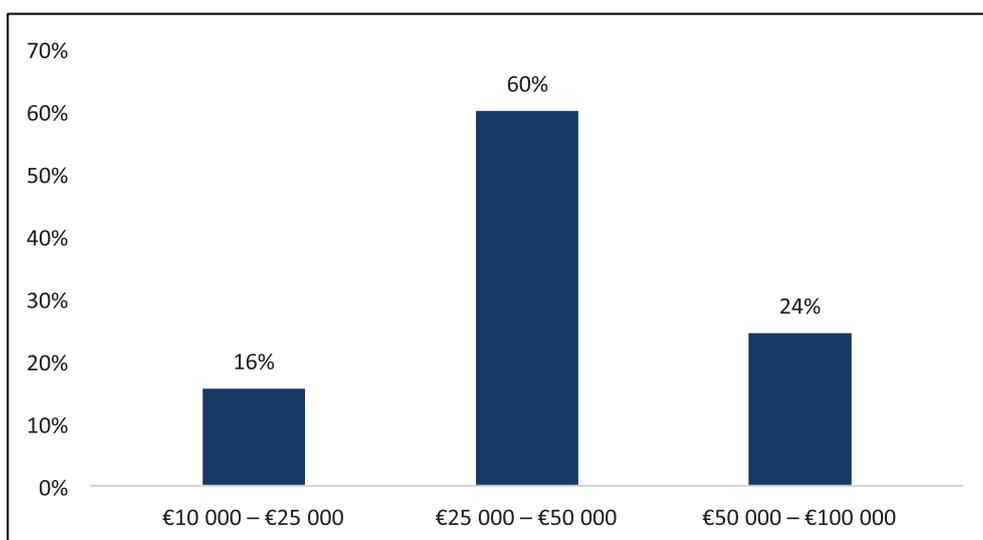
Banks view intellectual property collateral as an asset that is illiquid as there is no secondary market for it. Hence, banks risk being saddled with an asset that they are unable to sell and which has no immediate liquid cash value.

<sup>91</sup> It is estimated that only 600 people work in this field in the UK. Source: UK Government – intellectual property office <https://www.gov.uk/government/organisations/intellectual-property-office>

- Due to the innovative characteristic of many digital projects, **there is often a lack of evidence and historical track record to support the business case** and prove debt repayment capacity and future cash flow generation.

The data from the survey show that small and medium-sized enterprises are often unable to provide evidence, justify their business cases or justify new business models. Nearly 23% of the small and medium-sized enterprises within the survey cited that they could not get funding in the past, either because they could not provide evidence or could not justify their business case/new business models.

- **Small loan ticket size.** Loan ticket size and funding requirements for digital projects are relatively small, resulting in higher transaction costs and a less attractive proposition for banks compared to larger ticket loans. This translates into a lower expected return for the bank. Data from the survey show that small and medium-sized enterprises with no digital projects require a small loan ticket size. Over half of the small and medium-sized enterprises in the survey indicated an external funding need of €25 000–€50 000. Funding needs tend to be correlated with the size of the company, with a higher portion of small and medium-sized enterprises requiring funding in the €50 000–€100 000 range if their annual revenue exceeded €10 million. These findings are corroborated by a study conducted by the KfW.<sup>92</sup> The data collected from over 9 000 German small and medium-sized enterprises show very similar trends. The average total spending for digitalisation is around €35 000 for companies with ten to 50 employees and around €150 000 for small and medium-sized enterprises with over 50 employees.



**Figure 58. Distribution of ticket size for external funding of digital projects<sup>93</sup>**

For digital adopters, banks are able to bundle the financing for digital projects with financing for other investments such as hardware and machinery, which provides collateral and mitigates the risk of the digital/intangible projects. However, this option is not generally available for digital natives, which often only have digital projects. Hence, **it is even more challenging for digital natives to access bank debt.** In many cases, the digital initiative for which a digital native is seeking funding is, in fact, the entire business model of the company. In other words, the digital natives are often late-stage start-ups, or scale-up projects, which require growth capital. In this light, the current bank offering (which is focused on traditional bank loans) and

<sup>92</sup> *KfW SME Digitalisation Report 2018*, KfW Research  
[https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-Digitalisierungsbericht-Mittelstand/KfW-Digitalisierungsbericht-EN/KfW-SME-Digitalisation-Report-2018\\_EN.pdf](https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-Digitalisierungsbericht-Mittelstand/KfW-Digitalisierungsbericht-EN/KfW-SME-Digitalisation-Report-2018_EN.pdf)

<sup>93</sup> Ibid.

in-house expertise are often not suitable for digital natives, which are defined by high risk profiles and complex business models.

Banks mention three constraints on their capabilities as risk managers to enhance their credit allocation to digital natives<sup>94</sup>:

- The high risk profile that these companies have, especially those younger than ten years. Start-ups have little credit history and normally use people to innovate. This means their income streams are more difficult to forecast and they do not have suitable underlying collateral.
- The complexity that their highly innovative business models bring. This means that digital natives often need digital products that are not well known or not as readily available as the ones non-digital firms would require as inputs.
- Moreover, regardless of the creditworthiness of the company, the project becomes subject to risk assessment, during which innovation is analysed from many perspectives (impact on the business model, company experience with technology, financial standing, etc.).

Given these banking constraints, small and medium-sized enterprises and, in particular, digital natives are using alternative finance and financial technology start-ups as new sources of funding. Non-traditional players are leveraging new technologies and presenting new opportunities to improve small and medium-sized enterprises' access to finance. Financial technology start-ups are transforming many aspects of the small and medium-sized enterprise funding process from alternative credit scoring systems to digital account services and online lending. Figure 59 shows the key trends and areas of action for alternative finance.

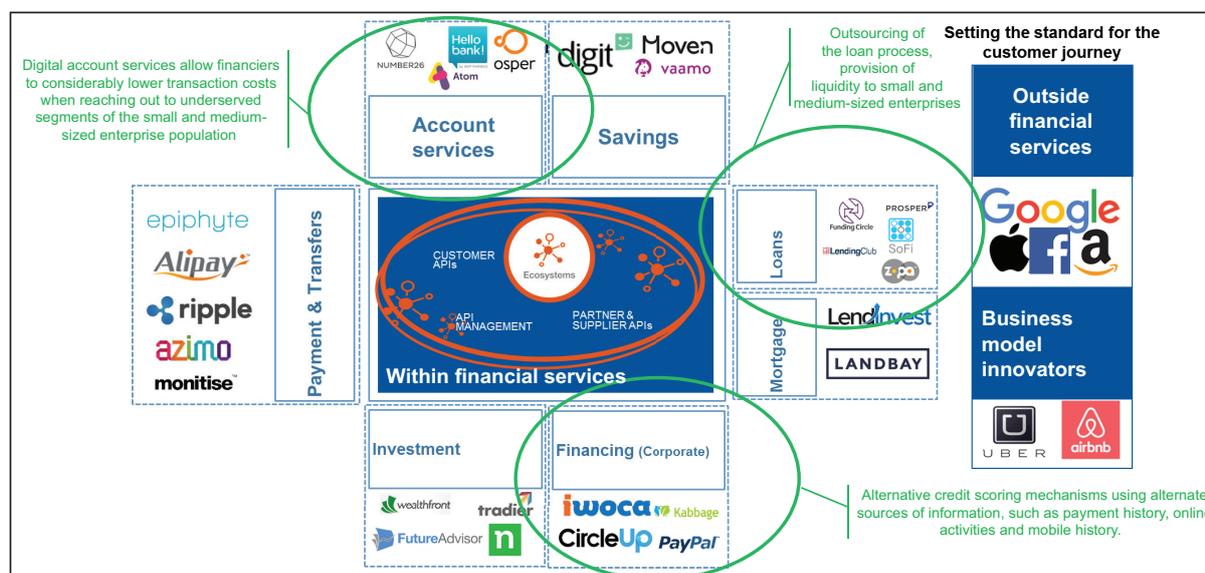


Figure 59. Overview of the financial technology start-up landscape

<sup>94</sup> Input from member banks of a leading banking federation in Europe.

## 4. Recommendations

The recommendations in the framework presented below aim to: 1) enhance support for the ecosystem for innovation and digitalisation and leverage the central coordinating role of digital innovation hubs for the initiatives proposed below, 2) improve access to finance for digital projects by developing or expanding dedicated financial instruments and providing support to banks, 3) reduce the digital gap in the CESEE region by exploring the development of dedicated instruments and advisory support. These recommendations are also expected to help the economic recovery following the coronavirus pandemic and increase the future resilience of European small and medium-sized enterprises.

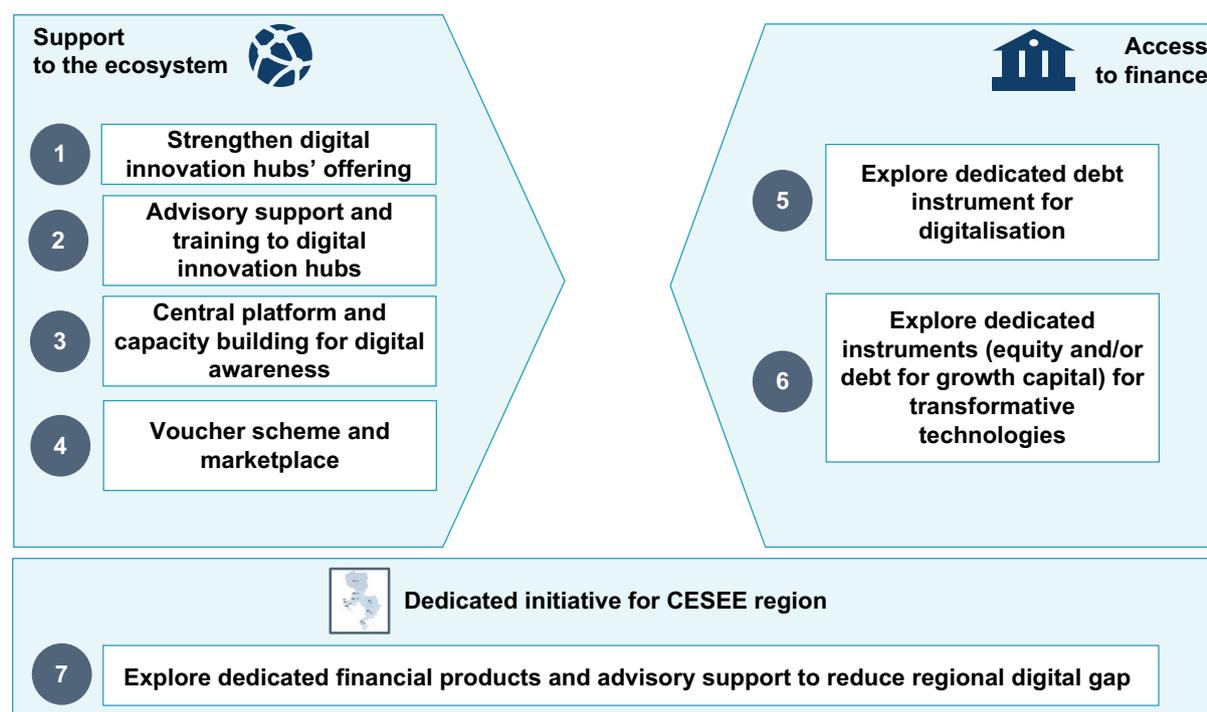


Figure 60. Recommendation framework

The proposed set of recommendations is not only based on the key findings and feedback from the market consultation of this study but also draws from the lessons learnt from the Innovation Finance Advisory's direct project advisory experience on the topic of digitalisation. This includes two previous assignments undertaken on behalf of the Department of Business, Enterprise and Innovation in Ireland<sup>95</sup> and COTEC in Portugal.<sup>96</sup> Both of these assignments focused on the digitalisation of small and medium-sized enterprises in the respective country.

The key lessons learnt and findings from these studies include:

- To address the financing gap for digitalisation projects by small and medium-sized enterprises, **it is important to develop a set of dedicated financial instruments for digital projects;**

<sup>95</sup> *The digitalisation of small and medium enterprises in Ireland*, European Investment Bank [https://www.eib.org/attachments/thematic/digitalisation\\_of\\_smes\\_in\\_ireland\\_summary\\_en.pdf](https://www.eib.org/attachments/thematic/digitalisation_of_smes_in_ireland_summary_en.pdf)

<sup>96</sup> *The digitalisation of small and medium-sized enterprises in Portugal*, European Investment Bank [https://www.eib.org/attachments/thematic/digitalisation\\_of\\_smes\\_in\\_portugal\\_summary\\_en.pdf](https://www.eib.org/attachments/thematic/digitalisation_of_smes_in_portugal_summary_en.pdf)

- To address the knowledge gap for traditional small and medium-sized enterprises, **financial instruments should be accompanied by dedicated soft measures;**
- **Demand for digitalisation** from traditional small and medium-sized enterprises **can be accelerated by leveraging the supply side** (such as technology companies selling digital solutions). This ‘push and pull’ strategy is based on creating a technology marketplace for traditional small and medium-sized enterprises;
- Highly digitalised countries (such as Denmark and Finland) show that their **success is based on developing a well-coordinated strategy** to ensure a holistic and coherent approach **to digitalisation**, encompassing all the socio-economic dimensions (from education to technology, and to business and regulation) in the digital strategy.



### *Brief summary*

#### **The Irish case**

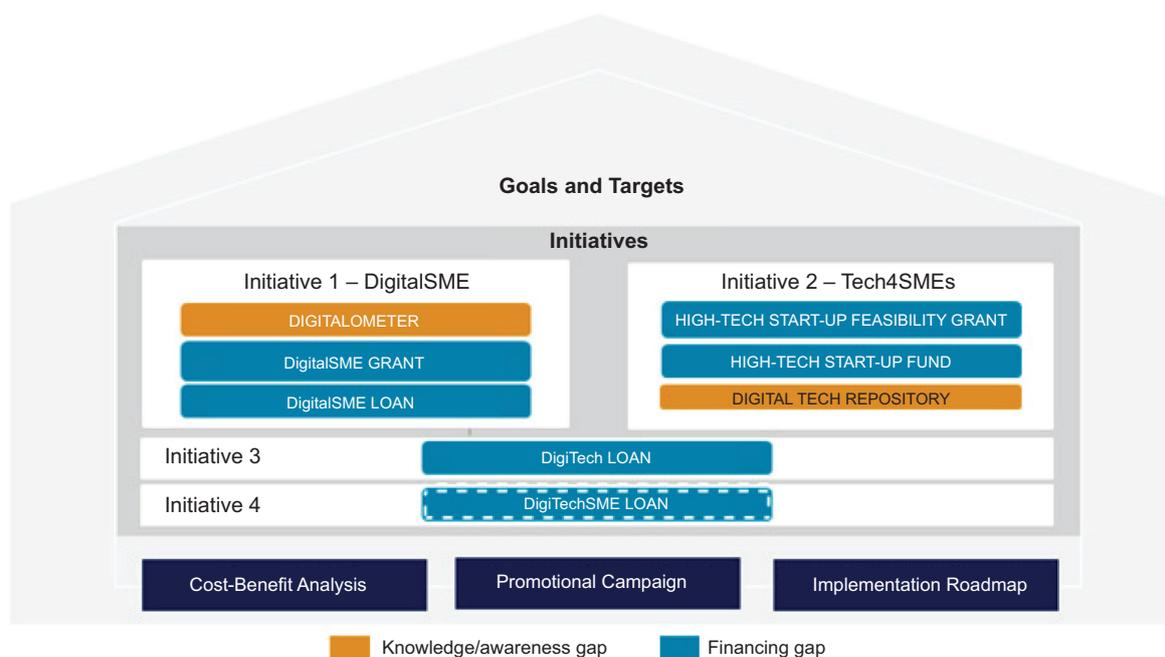
##### THE STATUS OF DIGITALISATION IN IRELAND

- The Irish economy is dominated by small and medium-sized enterprises. Ireland’s peculiarity is its unusually high concentration of companies (almost 50 000) in traditionally less productive sectors such as construction.
- A thorough analysis of the digitalisation of the Irish economy has revealed a two-speed digital economy.
- While Ireland is already in a strong position, being among the most digitalised countries in the world (6<sup>th</sup> in the EU Digital Economy and Society Index) for many years, the digital economy appears to run at two different speeds, with a small number of foreign-owned multinationals with high digitalisation levels and productivity, and traditional indigenous small and medium-sized enterprises that are slower in leveraging digital solutions to reduce costs, drive innovation and expand market presence.
- The primary barriers to the further implementation of digital solutions across small and medium-sized enterprises are lack of knowledge of digital opportunities, technical know-how and financing issues.
- **Financing gap: Issues experienced by small and medium-sized enterprises** in accessing financing from the traditional banking channels, **especially for large-scale digital transformation programmes**, derive from **a combination of high cost of funding** (second highest in the EU), **low profitability, already high indebtedness of the enterprises, and lack of expertise in the banking sector**. Banks often lack the expertise to assess projects with a strong digital and artificial intelligence component and concentrate on more tangible ones (for example constructing a new building or buying traditional equipment), where the availability of tangible collateral for the loan is clear.
- **Knowledge gap:** The primary barrier to implementing information technology-related process improvements is a **lack of awareness of the available solutions and of their potential benefits**. With the rapid pace of change in digital technologies, many companies encounter difficulties in deciding when to invest, up to what level and in which innovative field. Often, **companies are working with a budgeting logic instead of an investment logic. Digitalisation is considered as a cost factor and is not seen as an opportunity.**

## KEY RECOMMENDATIONS

- **The study developed four sets of initiatives**, each targeted at a different combination of companies and project types. These initiatives aim to **address the key barriers** identified in the analysis: **the knowledge gap and the funding gap**.

The overall framework, as outlined in Figure 61, encompasses an inclusive approach with the central goals and targets being delivered by a series of initiatives. These initiatives are supported by a cost-benefit analysis, a promotional campaign and an implementation roadmap.



**Figure 61. Framework for proposed digital initiatives<sup>97</sup>**

- **Initiative 1 – The DigitalSME programme** aims to help bridge the lack of awareness of opportunities which digitalisation presents in traditional industry sectors. The programme would specifically target small and medium-sized enterprises operating in traditional, low-digital sectors such as manufacturing, construction and services.
- **Initiative 2 – Tech4SMEs** is targeted at enhancing the supply of digital solutions designed to improve the productivity of small and medium-sized enterprises. The goal of Tech4SMEs is to incentivise start-ups and high-tech companies to develop technology solutions (for example data analytics, workflow tracking, inventory management) specifically for traditional small and medium-sized enterprises.
- **Initiative 3 – DigiTech Loan** is an income-contingent loan scheme targeted to provide financing for traditional small and medium-sized enterprises in non-digital sectors and potential suppliers of new digital solutions. It will provide a new financing option for small and medium-sized enterprises that are looking to implement digital projects end-to-end, and/or to finance transformational projects with highly technical solutions.

<sup>97</sup> *The digitalisation of small and medium enterprises in Ireland*, European Investment Bank  
[https://www.eib.org/attachments/thematic/digitalisation\\_of\\_smes\\_in\\_ireland\\_summary\\_en.pdf](https://www.eib.org/attachments/thematic/digitalisation_of_smes_in_ireland_summary_en.pdf)

- **Initiative 4 – DigiTechSME Loan** represents an alternative implementation strategy combining the two financial instruments under Initiative 1 (DigitalSME Loan) and Initiative 3 (DigiTech Loan) into a single instrument (DigiTechSME Loan).

For more information, please refer to the summary report: *The digitalisation of small and medium enterprises in Ireland*.<sup>98</sup>

## The Portuguese case

### THE STATUS OF DIGITALISATION IN PORTUGAL

- **Small and medium-sized enterprises play a particularly important role in the non-financial business economy in Portugal.** The economy is dominated by small and medium-sized enterprises with fewer than ten employees, largely concentrated in traditional sectors.
- **Productivity remains a challenge** for Portuguese companies' competitiveness, particularly in traditional sectors. This is an area where digitalisation can have a major impact.
- **Overall, digital adoption in Portugal is slightly lower than the EU average** as measured by aggregate rankings. This is particularly true for **traditional sectors where companies' abilities to develop digital assets tend to be more limited.**
- **Public support for small and medium-sized enterprises encompasses a number of government initiatives and financial instruments** which are intended to support small and medium-sized enterprises at various stages of development and across sectors.
- **For the adoption of digital solutions, there are a number of knowledge gaps, which limit the ability of small and medium-sized enterprises to develop and integrate digital assets.** Gaps include:
  - Awareness: Owners and managers often do not know how and where to apply digital solutions to business processes/channels
  - Capabilities: There is a need for technical know-how by employees to integrate digital solutions. There is also a need for skills to approach larger-scale, transformational projects and to communicate these in robust technical implementation roadmaps and/or business plans.
- **For funding, there is a well-developed supply of public instruments and mutual guarantee schemes.** Overall, small and medium-sized enterprise access-to-finance conditions are improving and converging towards the EU average. However, **there remain certain issues limiting the financing of digitalisation projects**, specifically in the case of:
  - Small and medium-sized enterprises that lack physical/tangible collateral, as can be the case for digital projects, which may be of a more intangible nature
  - Financing for more advanced, larger-scale and riskier technological projects, which rely on the effective realisation of forward-looking business assumptions
  - Availability of own funds can also be a constraint for these projects where bank funding is not available.

<sup>98</sup> *The digitalisation of small and medium enterprises in Ireland*, European Investment Bank  
[https://www.eib.org/attachments/thematic/digitalisation\\_of\\_smes\\_in\\_ireland\\_summary\\_en.pdf](https://www.eib.org/attachments/thematic/digitalisation_of_smes_in_ireland_summary_en.pdf)

- **Providers of digital solutions are fragmented** across digital/start-up small and medium-sized enterprises and competence centres or research and development centres associated with clusters and larger enterprises. This can be difficult to navigate for traditional small and medium-sized enterprises seeking to digitalise.

#### KEY RECOMMENDATIONS

- **Recommendation 1:** The utilisation of existing digitalisation financing instruments should be improved by facilitating access to available instruments and by easing and simplifying applications. The complementarity of digitalisation financing instruments with existing financial instruments should be enhanced.
- **Recommendation 2:** Debt financing for larger, transformative digital projects should be promoted by developing a new instrument to raise guarantee coverage. This could increase risk-sharing between private and public investors and reduce pressure on collateral requirements.
- **Recommendation 3:** The role of clusters and digital innovation hubs should be strengthened and clarified as part of the national digital strategy. This could be achieved by developing a structured approach to the expansion of the digital innovation hub network.
- **Recommendation 4:** Awareness about digitalisation should be increased by establishing a digital self-assessment tool for small and medium-sized enterprises. A centralised 'yellow pages' repository for digital providers should also be developed and the issue of skills adequacy for digitalisation should be explored.

For more information, please refer to the summary report: *The digitalisation of small and medium-sized enterprises in Portugal*.<sup>99</sup>

Building on the experience of the Digitising European Industry initiative, the InnovFin Programme and the European Fund for Strategic Investments, **the recommendations below could be considered for the upcoming Digital Europe Programme and InvestEU Programme (where relevant and applicable), as well as for the post-pandemic economic response and recovery.**



#### **RECOMMENDATIONS FOCUSED ON SUPPORTING THE ECOSYSTEM**

The recommendations below should be implemented in close cooperation with the digital innovation hubs network and should leverage the critical role of coordinators of the different players and organisations in the ecosystem.

#### **4.1 Recommendation 1: Strengthen digital innovation hubs' reach and role in helping small and medium-sized enterprises to access financing support**

**It is recommended to increase the number of digital innovation hubs across underserved regions of Europe, including the Modest Enabling Region (mainly South-Eastern**

<sup>99</sup> *The digitalisation of small and medium enterprises in Portugal*, European Investment Bank  
[https://www.eib.org/attachments/thematic/digitalisation\\_of\\_smes\\_in\\_portugal\\_summary\\_en.pdf](https://www.eib.org/attachments/thematic/digitalisation_of_smes_in_portugal_summary_en.pdf)

Europe), and to further strengthen key services, such as providing small and medium-sized enterprises with access to financial support. Digital innovation hubs play a key role in accelerating the digitalisation of small and medium-sized enterprises and are already adopting initiatives to better support small and medium-sized enterprises in adjusting to the new reality of the coronavirus pandemic.

#### 4.1.1 Increase the number of digital innovation hubs in underserved regions

Main objective: Address the knowledge gap in regions and sectors with low levels of digitalisation. As outlined in the findings of this study, there are regional clusters within Europe which exhibit low digitalisation levels. Furthermore, there are also industry verticals which are lagging in the adoption of digitalisation.

Target companies: Small and medium-sized enterprises in regional clusters and industries with a low level of digitalisation.

Brief description: A policy level initiative to promote the creation of extra digital innovation hubs operating in the Modest Enabling Region, which is underserved when compared to other clusters, and in industries which exhibit a low level of digitalisation. The selection of these industries should be based on well-defined criteria taking into account industries with material economic contribution in Europe, high levels of employment, high potential benefits from digitalisation, etc.

Key design principle: A combination of dedicated funds and incentives. Regarding the incentives, for instance, the criteria for accessing European funds could privilege digital innovation hubs linked to a specific geographical/sector focus. This initiative could be considered for the upcoming Digital Europe Programme and associated response to the coronavirus pandemic. Furthermore, it could build on the experience from the existing Digitising European Industry initiative, which has supported the creation of new digital innovation hubs in Eastern Europe.

#### 4.1.2 Strengthen the link between digital innovation hubs and banks

Main objective: Address banks' knowledge gaps related to digitalisation. Our study shows that banks often lack the knowledge and expertise to assess digital projects, and given the idiosyncratic characteristics of these projects, they are often at a comparative disadvantage when lending for these projects as compared to other projects, creating a negative bias for digitalisation.

Target companies: Digital natives and digital adopters.

Brief description: Promote stronger cooperation between digital innovation hubs and banks or other financial investors. Hubs have a wealth of technical expertise and knowledge, which could benefit banks during the assessment of digital projects. Digital innovation hubs could design and manage an independent 'digital score' to assess and evaluate digital projects. This score could be used by banks and investors to improve risk assessments and strengthen the due diligence process. During our interviews, several banks raised the point that they would benefit from specific methodologies/frameworks to measure the value of digitalisation, and from third-party certifications/accreditation as they would provide them with extra comfort in their lending activities.

Key design principle: Develop policy initiatives to promote stronger collaboration between digital innovation hubs and banks. This could include a policy incentive for digital innovation hubs, whereby selection criteria for the EU Digital Innovation Hubs catalogue and/or access to European grants require digital innovation hubs to cooperate with banks. This initiative could be considered for the upcoming Digital Europe Programme and national or regional economic recovery actions following the coronavirus pandemic.

Example: This recommendation could leverage the experience of an existing pilot involving a partnership between a digital innovation hub and a national bank (see box below).

### **Case Study: Digital innovation hub Lombardia – a partnership model with a national bank**

#### Overview of digital innovation hub Lombardia

- **Description:** The goal of the hub is to strengthen the level of knowledge and awareness on behalf of local, regional companies (Lombardy region in Italy) about the opportunities offered by digital transformation. This is part of the National Industry 4.0 Plan and the Digitising European Industry strategy, including: 1) Promoting the training of qualified human resources; 2) Raising awareness about Industry 4.0; 3) Providing mentoring to companies, support in the choice and planning of investments for innovation, etc.
- **Set-up:** The digital innovation hub Lombardia is purely private and was founded by the Italian association of companies.
- **Services offered:** Awareness creation, ecosystem building, scouting, brokerage, networking, collaborative research, digital maturity assessment, market intelligence, access to funding and investor readiness services, mentoring, education and skills development
- **Customers:** Small and medium-sized enterprises (60% are digital adopters and 40% are digital natives)

#### Overview of the partnership

The Italian industry association has commenced cooperation on digital projects with a major national bank using its network of digital innovation hubs.

The purpose of this agreement is for the digital innovation hub to close the link between the customer (small and medium-sized enterprises) and the partner bank.

The agreement, valid until 31 December 2020, provides for:

1. A loan programme of €1 billion for medium and long-term financing to companies investing in research, development and innovation. The members of the association will benefit from a privileged access channel through the digital innovation hub network.
2. A number of initiatives through the digital innovation hub network to provide financial support and advice to companies looking to benefit from Industry 4.0 National Plan opportunities. The bank makes dedicated experts in digital transformation projects available to companies through the digital innovation hub.

At the outset of this cooperation, there is a digital and financial assessment in the form of a four-hour joint interview with digital experts from the digital innovation hub and financial experts from the bank. The outcome is a set of recommendations, specifically focused on innovation gaps and a detailed analysis of the digital projects.

The agreement includes collaboration to develop a value chain model based on digital integration and, in particular, the participants work to enhance supply chains to improve the ability to generate credit for the companies that are part of it. Accordingly, the digital innovation hub network and the partner bank deepen their understanding of the needs of companies belonging to specific industrial value chains (which are particularly relevant for the region). This will enable investment projects for which the bank can tailor a specific credit offer to be developed.

This partnership benefits both sides, as follows:

**Benefits for the bank:**

- The product offering to clients is improved by augmenting the digital assessment and providing technical support via the digital innovation hub;
- An independent quality assessment of the digital project, for which the bank does not have the specific expertise, is obtained. The bank obtains comfort on the technical soundness of the project.

**Benefits for the digital innovation hub:**

- Early involvement of the bank in the digital projects of small and medium-sized enterprises;
- Ability to offer a full package solution to small and medium-sized enterprises (digital assessment and financing).

#### 4.1.3 Strengthen links between digital innovation hubs, large corporations and equity investors

Main objective: Address digital innovation hubs' limited ability to assess the market potential and business case for highly innovative technologies. Digital innovation hubs often have strong technical skills and the expertise to assess a new technology, but they are not always best positioned to determine the market potential of an innovation.

Target companies: Small and medium-sized enterprises developing complex and innovative digital projects, mainly digital natives.

Brief description: By involving larger corporates and equity investors in the early stages of a project, a digital innovation hub can benefit from an early assessment and market validation of the potential of a new technology. This could help digital innovation hubs to prioritise projects, and select companies developing digital technologies with a clearer path to market.

Key design principle: Develop policy initiatives to promote stronger collaboration among small and medium-sized enterprises, large corporations and equity investors. This initiative could be considered for the upcoming Digital Europe Programme and associated coronavirus response package. This could include a policy incentive for digital innovation hubs, whereby the selection criteria for the EU Digital Innovation Hubs catalogue and/or access to European grants require digital innovation hubs to cooperate with large corporates and/or equity investors. This initiative could be considered for the upcoming Digital Europe Programme.

Example: A concrete example of this kind of partnership appears in the case study below. It shows the potential benefits of stronger collaboration between small and medium-sized enterprises and equity investors.

#### **Case Study: North American digital innovation hub**

##### Overview of the digital innovation hub

- **Description:** This North American digital innovation hub is one of the largest urban innovation hubs in the world. Founded in 2000, this digital innovation hub supports over 1 200 science and technology companies from start-up to scale-up. The digital innovation hub focuses on four areas: clean technology, health, financial technology and enterprise software. Since 2008, digital innovation hub-supported companies have raised 4.8 billion Canadian dollars and employed over 12 800 people.

- **Set-up:** The hub was initially started as a research hub for the regional university hospital network and has grown to become a hub for science and technology companies in the region. The digital innovation hub has 1.5 million square feet of office space with over 120 tenants.
- **Services offered:** The services offered are summarised in Table 11.

**Table 11. Summary of services offered by the North American digital innovation hub**

	<b>Start</b>	<b>Grow</b>	<b>Scale</b>
<b>Overview:</b>	<i>Receive advice on generating early revenue, attracting seed-stage capital and building a strong team.</i>	<i>Receive support to increase revenue, acquire new customers, attract and retain top talent and raise Series A capital.</i>	<i>Receive strategic, tailored support to achieve growth milestones, access international markets and navigate regulatory hurdles.</i>
<b>Target companies:</b>	<i>Have a minimum viable product Have early customer interest; be close to product-market fit/early validation Have raised or could raise (pre-)seed investment for clinical trials or for product trials</i>	<i>Have a product in the market with strong customer demand Building go-to-market capabilities or advanced product trials with input from key partners Have raised or could raise series A investment for initial deployments</i>	<i>Revenue and team are scaling rapidly Have completed clinical studies or customer pilots and have received regulatory approval Investigating new markets, new products and organisational growth strategies</i>
<b>Services:</b>	<i>Workshops Market intelligence services Group advisory Event discounts Grant and funding guidance</i>	<i>Workshops Market intelligence services Group advisory Event discounts Grant and funding guidance 1:1 expert mentorship Connections to investors, customers and partners Access to talent and recruitment help Media and public relations promotion Priority access to digital innovation hub's office space Peer-to-peer events</i>	<i>Workshops Market intelligence services Group advisory Event discounts Grant and funding guidance 1:1 expert mentorship Connections to investors, customers and partners Access to talent and recruitment help Media and public relations promotion Priority access to digital innovation hub's office space Peer-to-peer events Benchmarking service to measure against peers</i>

<i>Start</i>	<i>Grow</i>	<i>Scale</i>
		<i>Exclusive events for large companies</i> <i>Client engagement experts assigned specifically to the company</i> <i>Proactive engagement plans to develop a long-term strategy</i> <i>Thought leadership training and speaking opportunities</i> <i>Mentorship and community engagement opportunities</i>
<ul style="list-style-type: none"> <li>• <b>Customers:</b> Mainly digital natives with a growing percentage of manufacturing companies (digital adopters) looking to catch up in terms of investment in advanced manufacturing, automation and robotics.</li> <li>• <b>Funding mix:</b> The digital innovation hub currently relies on public funding for approximately 60% of its funding needs. In the next three years, the digital innovation hub aims to reduce this to 20% of the total funding needs.</li> </ul>		

#### Overview of the partnership

The digital innovation hub's business model is based on strong partnerships with large corporates. The hub has over 50 partners across numerous sectors, including Microsoft, Samsung, etc. This partnership plays a key role in the selection of the start-ups that the digital innovation hub agrees to support. The screening process is very selective and less than 30% of the candidates are successful. The selection process combines a standard process based on criteria such as technology readiness, management team, organisation, etc. with market validation done. The market validation is done in cooperation with the large corporate partners. The large corporates provide important insight on the potential of the technology solution to attract customers and create a market for the product.

This screening process allows the digital innovation hub to prioritise the best projects. Companies supported by the hub have a 45% higher chance of fundraising compared to the overall start-up population.

#### **4.2 Recommendation 2: Diversify funding sources where possible and support digital innovation hubs to develop more commercially-oriented business models.**

**It is recommended to provide advisory services and training to digital innovation hubs to help them develop more commercially-oriented business models, which could lead to a more diversified funding mix, reducing dependencies on public sources.**

**Main objective:** Facilitate and promote the development of more commercially viable activities and services among digital innovation hubs. Some hubs are already expanding their offerings to include more fee-based services and products to create more sustainable business models and reduce the dependence on public funding.

**Target companies:** Digital innovation hubs across Europe

**Brief description:** Develop a platform for knowledge exchange and training for digital innovation hubs focused on developing commercially viable business models. European, national, and/or regional policymakers should also support the research and technology organisations by putting the right incentives in place and by creating appropriate framework conditions.

**Key design principle:** The platform should include workshops, networking events, face-to-face training and online support (webinars, e-learning portals, etc.).

**Example:** This initiative could build on the experience from the Digital Innovation Hub Enhanced-Learning Programme (DIHELP).

### **Case Study: Digital Innovation Hub Enhanced-Learning Programme**

DIHELP aims to develop a coherent, coordinated and sustainable approach to support European industries in all EU Member States at the regional level using the concept of digital innovation hubs.

To achieve this objective, DIHELP supports 30 digital innovation hubs to develop and/or scale up their activities through a mentoring and coaching programme that lasts nine months.

Selected digital innovation hubs are receiving training and coaching on business development, financing and innovation management, delivered face-to-face or remotely as a part of the Digital Innovation Hub Academy.

### **Digital Innovation Hub Academy**

The Digital Innovation Hub Academy is a newly-developed mentoring and coaching programme that lasts nine months.

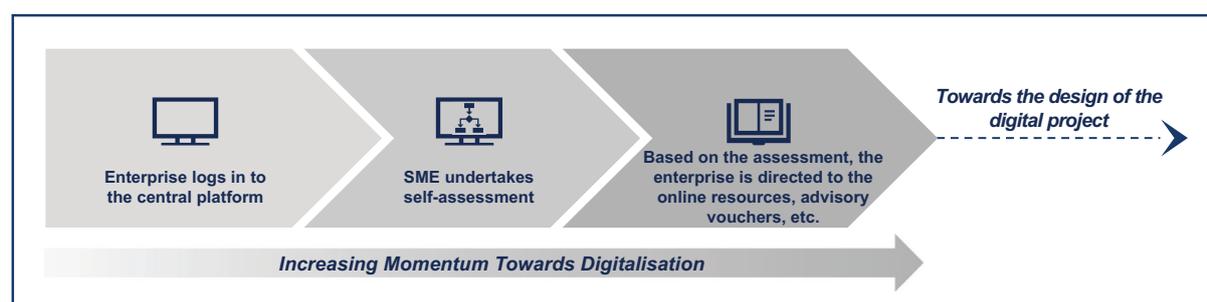
The 30 digital innovation hubs selected for the academy receive training and coaching on business development, financing and innovation management. Training will be delivered face-to-face or remotely as a part of the Digital Innovation Hub Academy.

The Digital Innovation Hub Academy includes the following **items**:

- Three-day kick-off conference with all participating digital innovation hubs in Brussels
- Individual on-site coaching
  - Two-day personalised on-site workshop with tangible results
  - One-day regional workshop to engage stakeholder network
- Digital Innovation Hub Academy virtual back office
  - Webinars
  - E-learning portal
  - On-demand coaching.

### 4.3 Recommendation 3: Develop a central platform to drive awareness and ambition.

It is recommended to establish a central platform with standardised tools that would enable small and medium-sized enterprises to assess their digital maturity and banks to address their knowledge gaps. The online tool would provide small and medium-sized enterprises with access to a central library of training materials and case studies. The tool could also make specific recommendations on the digital options that an enterprise could use as a positive response to the coronavirus pandemic. Similarly, the platform could also provide training material to improve banks' knowledge and skills such as in assessing the risks and value of digital projects. This could be further enhanced with capacity-building activities bringing together the financial community and digital Financial Technology.



**Figure 62. Journey of a small business via a central platform which creates the momentum to digitalise**

**Main objective:** Address the knowledge gap in small and medium-sized enterprises (in the early stages of digital journeys) and banks. As outlined within the findings of this report, small and medium-sized enterprises and particularly digital adopters in the early stages of the digital journey often lack the knowledge and ambition to digitalise. They do not invest in digital projects because they do not understand the potential and benefits for their enterprises, and so do not prioritise these investments, resulting in an insufficient budget for digitalisation. At the same time, banks often do not have the in-house expertise necessary to assess digital projects, and rely on standard credit assessments, which put digital projects at a comparative disadvantage compared to other kinds of investments.

**Target companies:** Small and medium-sized enterprises in the early stages of their digital journeys, mainly digital adopters, and banks with limited knowledge of digitalisation.

**Brief description:** A single online central platform (to reduce fragmentation of the current offering) available to all European small and medium-sized enterprises, offering:

- A standardised on-line assessment of their digital maturity. This online tool allows companies to measure their level of digital maturity and to identify their progression phases, needs and challenges. The platform analyses and provides recommendations on the relevant digital actions that can be activated by companies at all levels to improve selling, production and administrative processes, and to change the organisation. The online tool also provides links to an online library for extra information, suggestions about potential financial instruments, EU and national funding programmes for digitalisation, and an indication of the most relevant digital innovation hub for extra support in response to the coronavirus crisis. (For example, the DIH4CPS project aims to support European small and medium-sized enterprises by enabling them to test the technologies that will make them more competitive and efficient in the wake of the coronavirus pandemic).

- An exhaustive online library with training material, case studies, assessment tools and training for the credit risk of digital projects and typical digitalisation roadmaps prepared and vetted by digital innovation hubs. With the support of digital innovation hubs, this library could also include material specific to countries or industries, as needed.
- A matchmaking tool linking small and medium-sized enterprises with concrete digital projects to banks.

Key design principle: The tool should be simple and user-friendly. It should be designed, developed and implemented in cooperation with digital innovation hubs. This initiative could be considered for the upcoming Digital Europe Programme.

Promotion: The initiative should be promoted via an online and offline promotional campaign at European level. At a local level, it should be promoted via digital innovation hubs, clusters, industry associations, etc.

Example: Digitalometer launched by BPI France (see case study below).

	<b>Digitalometer</b>
<p>In 2018, Bpifrance enriched its support programme for the digital transformation of small and medium-sized enterprises and mid-caps by launching the Digitalometer. This online tool allows companies to measure their level of digital maturity and to identify their needs and challenges.</p>	
<p>The Digitalometer is a free 15-minute online questionnaire for entrepreneurs to:</p> <ul style="list-style-type: none"><li>• Conduct a self-assessment of the level of digital maturity of his/her company, across four dimensions;</li><li>• Receive personalised recommendations to enhance the company's digital transformation;</li><li>• Access the Bpifrance offer to support the digital transformation process. This includes e-learning modules, consulting modules, LAB study, as well as testimonials from companies and experts on the subject.</li></ul>	
<p><b>The Digitalometer is combined with coaching and education programmes to address the knowledge gap of small and medium-sized enterprises</b> (mainly digital adopters) by: 1) raising awareness of the benefits of digitalisation by providing education and training to entrepreneurs; 2) supporting companies (mostly small and medium-sized enterprises) in developing implementation plans and roadmaps, through dedicated coaching programmes.</p>	
<b>Coaching Programmes</b>	
<p>The <b>Diagnostic Innovation</b> programme allows small and medium-sized enterprises to become familiar with innovation, particularly technological innovation, by integrating this dimension into their development strategy and facilitating the use of skills that are helpful in a start-up environment. The Diagnostic Innovation programme provides grants capped at €8 000 and is reserved for small and medium-sized enterprises.</p>	

The **Diagnostic Data – Artificial Intelligence** programme is aimed at small and medium-sized enterprises that are considering the launch of specific innovative projects related to data and artificial intelligence, even if a final decision has not yet been made.

**Table 12. Key terms of Bpifrance’s coaching programmes**

	<b>Diagnostic Innovation</b>	<b>Diagnostic Data – Artificial Intelligence</b>
<b>Goal</b>	<ul style="list-style-type: none"> <li>Financing the provision of advisory and/or technical services from external providers to allow small and medium-sized enterprises which are unfamiliar with innovation to integrate this dimension into their development strategy</li> </ul>	<ul style="list-style-type: none"> <li>Financing the provision of expert advice from external providers to entrepreneurs to explore the implementation of data and artificial intelligence to their business</li> <li>Bpifrance have identified their own list of experts in data/artificial intelligence; small and medium-sized enterprises can either propose an expert to Bpifrance or request an expert from their list</li> </ul>
<b>Services in scope</b>	<ul style="list-style-type: none"> <li>Pre-technical studies, trials, modelling, market research, research of technological partners, filing of a first French patent, etc.</li> <li>Excluded: mandatory regulatory services, quality diagnostics, collective studies, legal fees. Services performed by an entity having a legal relationship with the applicant are also excluded.</li> </ul>	<ul style="list-style-type: none"> <li>Generate awareness in the company of benefits from/challenges posed by big data, by considering the sectoral and entrepreneurial context of the company</li> <li>Analysis of potential implementation options, by considering: <ul style="list-style-type: none"> <li>Context of evolution, overall strategy, customer basis, distribution channels, financial capacity, regulatory framework, financials, SWOT</li> <li>Value creation opportunities from optimisation of operations, enhancement of customer experience, new products, third-party monetisation of data, etc.</li> <li>Potential barriers for implementation (such as human and financial capital)</li> </ul> </li> <li>Recommendations, including project prioritisation, risks and implementation plan</li> </ul>
<b>Eligibility</b>	<ul style="list-style-type: none"> <li>Small and medium-sized enterprises (according to the European definition)</li> <li>Not having benefited from innovation support for at least two years</li> </ul>	<ul style="list-style-type: none"> <li>Small and medium-sized enterprises or intermediate-sized enterprises (ETI) with a workforce of &lt;2 000 employees (not majority-controlled by a company which is not itself a small and medium-sized firm or ETI)</li> <li>Registered in France</li> <li>Not in financial difficulty (sales/turnover ≥ €500 000)</li> </ul>
<b>Duration</b>	<ul style="list-style-type: none"> <li>Not specified</li> </ul>	<ul style="list-style-type: none"> <li>Three to six days, depending on the maturity of the company, the complexity of the project and the intensity of the support.</li> </ul>
<b>Cost</b>	<ul style="list-style-type: none"> <li>Subsidy capped at €8 000, co-financed up to 50% by Bpifrance</li> </ul>	<ul style="list-style-type: none"> <li>Eligible expenses amount between €3 000 and €10 000, co-financed 50% by Bpifrance</li> </ul>

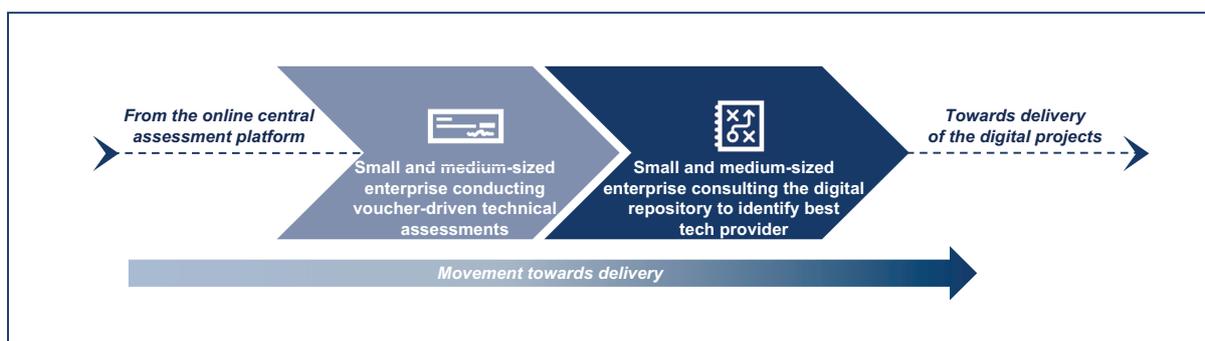
### Education programmes

**Bpifrance University** offers online training to small and medium-sized enterprise clients and members of Bpifrance’s communities. The offer includes:

- Free e-learning platform
- Seminars in partnership with business schools and thematic workshops with experts

## 4.4 Recommendation 4: Develop a voucher scheme to provide technical assistance to small and medium-sized enterprises and a marketplace to facilitate matchmaking.

This study recommends creating a pan-European voucher system that would provide small and medium-sized enterprises with access to technical support and developing a central digital repository to act as a market matching system, bringing together small and medium-sized enterprises and technology providers. Under this measure, priority could be given to small and medium-sized enterprises that have been heavily affected by the coronavirus pandemic.



**Figure 63. Small and medium-sized enterprises’ digital journey through the voucher scheme and the central digital repository**

### 4.4.1 Pan-European voucher scheme

Main objective: Address the knowledge gap in the planning and implementation of a digital project. After small and medium-sized enterprises realise the potential of digitalisation, and have the ambition to digitalise, they often lack the technical expertise to plan and implement such a project. Our study has shown that this issue is particularly prominent among digital adopters.

Target companies: Small and medium-sized enterprises during the planning and implementation phase of digital projects, mainly digital adopters (possibly with priority given to small and medium-sized enterprises hit hard by the coronavirus pandemic).

Brief description: A pan-European voucher scheme to cover the cost of hiring external consultants (including digital innovation hub experts) to develop business cases and feasibility studies for digital projects.

Key design principle: The application process for the voucher scheme should be simple and straightforward, with a limited amount of paperwork and documentation. It should be designed and developed in cooperation with digital innovation hubs, which can then provide a quality label or accreditation for potential service providers in the ecosystem.

Promotion: The initiative should be promoted via an online and offline promotional campaign at the European level. At the local level, digital innovation hubs can play a key role in promoting this service to small and medium-sized enterprises. They could also support small and medium-sized enterprises in the application process.

#### **4.4.2 Central digital repository**

Main objective: Support small and medium-sized enterprises as they navigate through the labyrinths of digital markets to identify the best technology providers for their projects. To do this, the knowledge gap in the planning and implementation of a digital project needs to be addressed. Due to the knowledge gap, and rapid technology changes, small and medium-sized enterprises (and in particular digital adopters) often struggle to navigate through the digital market offerings and identify the best tech providers for their digital projects.

Target companies: Small and medium-sized enterprises during the planning and implementation phase of digital projects, mainly digital adopters (possibly with priority given to small and medium-sized enterprises that have been hit hard by the coronavirus pandemic).

Brief description: A central digital repository (to avoid fragmentation and multiplication of platforms) with information on technology providers and products to assist companies in identifying the best products to support their business models and to optimise their digitalisation strategies with a view to post-pandemic recovery and future resilience.

Key design principle: The platform should be simple and user-friendly. Its search tool should allow searching by industry, country, digital solution, etc. Digital innovation hubs should properly screen and regularly vet all technology providers for quality before including them in the digital repository. This initiative could be considered for the upcoming Digital Europe Programme.

Promotion: The initiative should be promoted via an online and offline promotional campaign at the European level. At the local level, digital innovation hubs can play a key role in promoting this service to small and medium-sized enterprises.

Example: A similar initiative has been implemented in Singapore in the context of its national digital strategy (see section 2.5 for further details).



## **RECOMMENDATIONS FOCUSED ON ACCESS TO FINANCE**

### **4.5 Recommendation 5: Explore the development of dedicated financial instruments to support digitalisation.**

**The study recommends the development of a dedicated risk-sharing financial instrument for digital projects, which could include a First Loss Piece from the European Commission.**

Main objective: Address banks' negative bias towards digital projects. Banks often do not have the in-house expertise required to assess digital projects, which have very specific characteristics. The credit departments of banks are often unable to assess the potential value and risk profile of a digital project, and therefore rely on the company's historical track record, past performance, collateral and capital strength, resulting in a negative bias. A large proportion of interviewed banks cited that they need risk-absorption support to support digitalisation. The banks stated that the types of support that could help provide funding for digital projects include First Loss Piece guarantees and risk sharing arrangements.

Target companies: Digital natives and digital adopters.

Brief description: A European initiative to develop a dedicated guarantee scheme for digital projects, linked to the recently announced Pan-European Guarantee fund, which is part of the financial support package implemented in response to the coronavirus pandemic.

Key design principle: The dedicated guarantee scheme should include simplified eligibility criteria and could be combined with training and skills development programmes for banks, offered by the digital innovation hubs. This should improve banks' understanding of the business models of digital initiatives and how to assess credit risks associated with digital transformation. It should also familiarise banks with different technologies and applications. This initiative could build on the experience of the European Investment Fund (EIF) digitalisation pilot. The new COSME<sup>100</sup> pilot offers a 70% guarantee of coverage (versus the standard 50%) to intermediaries for financing the digital projects of eligible small and medium-sized enterprises, and it provides a new, simplified mechanism to evaluate eligibility. In this scenario, digitalisation transactions would become eligible for support upon the provision of a standardised signed declaration by the firm, without requiring any further checks by a financial intermediary. Further details are provided in the case study below.

Promotion: The initiative should be promoted via an online and offline promotional campaign at the European level. At the local level, this awareness can be accelerated by using digital innovation hubs, small and medium-sized enterprise clusters, industry associations, etc.

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<sup>100</sup> This is an EU programme running from 2014 to 2020 with a planned budget of €2.3 billion.

### Case Study: EIF digitalisation pilot under COSME

#### Overview

- Free-of-charge capped (counter-) guarantee under COSME to be made available to financial intermediaries for risk coverage on financing provided to eligible small and medium-sized enterprises for digitalisation
- Standard EIF Capped Guarantees Terms would apply, with a fully delegated model and quarterly reporting to the EIF
- Pilot instrument to prove and consolidate the value of financial instruments in digitalisation in preparation for InvestEU/next Multiannual Financial Framework
- Expected availability as of Spring 2020.

#### Simplified eligibility mechanism

- New, simplified eligibility mechanism, whereby the digitalisation transactions would be eligible against the provision of a standardised signed declaration by the firm. No further checks would need to be conducted by the financial intermediary;
- Standard COSME eligibility criteria would still apply

#### Financial characteristics

- 70% guarantee coverage at the transaction level instead of 50% as under COSME
- Up to 20% overall guarantee cap rate at the portfolio level
- Up to €150 000 principal amount, versus €3 million under COSME
- Ten years maximum maturity and 20% minimum exposure to the portfolio must be retained by the financial intermediary

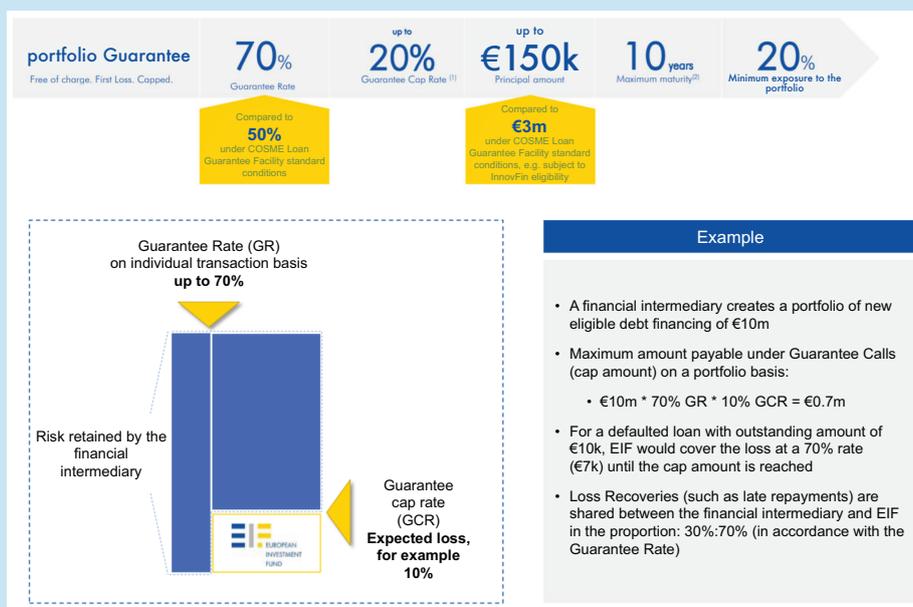


Figure 64. Key terms and an illustrative financing mechanism<sup>101</sup>

<sup>101</sup> Source: EIF

#### **4.6 Recommendation 6: Consider developing dedicated equity instruments and/or higher risk-absorption debt products for growth capital to support disruptive digital technologies.**

**This study recommends further exploration of dedicated equity instruments and/or higher risk-absorption debt products for growth capital (which could take the form of an investment platform) to address Europe’s underinvestment in transformative and high potential digital technologies such as artificial intelligence.**

Main objective: Address underinvestment and market gaps in highly strategic and transformative digital technologies, such as artificial intelligence. Our study shows that Europe only accounts for 8% of the total amount of global investment in artificial intelligence start-ups versus 36% in China and almost two-thirds in the USA.

Target companies: Small and medium-sized enterprises with projects in transformative technologies, mainly digital natives.

Brief description: Further investigate the design of a dedicated investment platform with the aim of supporting key strategic digital technologies and high-tech digital start-ups in Europe through equity and/or higher-absorption debt products for growth capital. This potential investment platform could benefit from a first-loss piece contribution from the European Commission and leverage public and private investments from different sources, including but not limited to the EIB Group and national promotional banks.

Key design principle: Co-investment approaches bringing together private and public investors. The dedicated equity instrument could be considered for InvestEU and build on the experience with the upcoming artificial intelligence/blockchain pilot under the InnovFin equity window managed by the European Investment Fund. This pilot aims to raise €100 million in investment funds by leveraging €45 million in contributions from the European Commission’s Horizon 2020 programme. The investment fund will be accompanied by an EU investment support programme.

##### **Case Study: Artificial intelligence/blockchain equity pilot**

The artificial intelligence/blockchain equity pilot aims to raise €100 million in investment funds by leveraging a €45 million European Commission contribution from Horizon 2020.

##### Brief overview of the Artificial Intelligence/Blockchain Fund

**Target:** Small and medium-sized enterprises and start-ups focused on cutting-edge technological development as well as applications adopting and scaling up artificial intelligence/blockchain technologies.

**Stage:** Early stage and growth stage

**Instrument:** Existing instrument programme managed by the EIF (InnovFin Equity Facility – European Fund for Strategic Investments’ small and medium-sized enterprise window)

**Total leverage effect:** €300 million leverage effect of EU investments through financial intermediaries (funds invested in artificial intelligence and blockchain).

##### EU INVESTMENT SUPPORT PROGRAMME

The investment fund will be accompanied by an **EU investment support programme**, including:

- **Rapid market assessment/Market consultations:** Identify key investment gaps and geographic priorities;

- **Awareness raising and community-building** by connecting innovators with investors;
- **Knowledge sharing** through a *Massive Open Online Course* on digital innovations;
- **Matchmaking** between artificial intelligence/blockchain start-ups and finance community;
- **Portfolio development** of investment-ready projects;
- **Investment portal** virtual marketplace for artificial intelligence/blockchain innovators, researchers, the venture capital community and investors.



### DEDICATED INITIATIVE FOR THE CESEE REGION

#### **4.7 Recommendation 7: Further investigate opportunities for dedicated financial instruments and dedicated advisory services for the CESEE region.**

**It is recommended to further investigate opportunities for dedicated financial instruments and dedicated advisory services to reduce the digitalisation gap between the CESEE region and the rest of Europe (which is expected to only widen as a result of the economic and financial crisis caused by the coronavirus pandemic).**

Main objective: Address underinvestment and market gaps in digital technologies and transformation in the CESEE region. In the areas of innovation and digital transformation, CESEE countries lag behind the rest of the world even more significantly than other countries in the EU. This trend applies to private and public investments and is thought to arise from a combination of factors: 1) lack of access to finance; 2) suboptimal investment allocations; 3) low public research and development investment (1.2% of gross domestic product, compared to the EU average of 2%) and 4) a generally small corporate research and development ecosystem.

Target companies: Small and medium-sized enterprises in the CESEE region, mainly early-stage small and medium-sized enterprises, and the scale-up of innovative start-ups and deep tech small and medium-sized enterprises (digital natives).

Brief description: Further investigate the design and development of potential funding structures and support mechanisms (including advisory services) to leverage resources from the EU, international financial institutions, national promotional banks and the private sector. These resources could be used to support highly innovative start-ups and small and medium-sized enterprises with higher risk profiles in the CESEE region.

Key design principle: Co-investment approaches bringing together private and public investors. This could evolve into a series of initiatives to accomplish the following objectives: 1) enhance financing and access to advisory services for the early stage and scale-up of innovative start-ups with high growth potential; 2) provide advisory support to innovators; 3) connect innovators and investors; and 4) enhance the visibility of digital champions. It is also important to offer technical assistance to public agencies to strengthen their capacity to design, develop and implement digital innovation programmes, strengthen strategic investments in the enabling environment for digital innovations and connect digital innovation ecosystems across the region.

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# Financing the digitalisation of small and medium-sized enterprises

The enabling role  
of digital innovation hubs



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