

Deep tech innovation in smart connected technologies

A comparative analysis of SMEs in Europe and the United States | April 2022
Key findings



Purpose of the study

In recent years, the Fourth Industrial Revolution (4IR) has massively accelerated the process of digital transformation. Technologies such as the Internet of Things (IoT), cloud computing, 5G and artificial intelligence (AI) are already altering the way we live, work and interact. By paving the way for a data-driven economy, they are disrupting many European industries. As one of the six headline priorities of the EU Commission's 2020 Work Programme, its digital strategy is designed to keep Europe on a par with the rapid pace of 4IR innovation observed in the US and Asia. By enabling "a vibrant community of innovative and fast-growing start-ups and small businesses to access finance and to expand", it specifically aims to foster the emergence of new European players in the global race to digital transformation.

Key findings

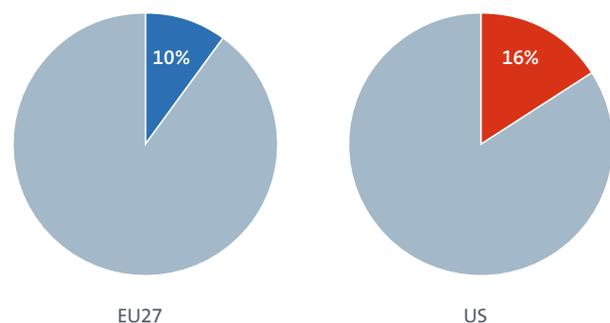
US SMEs make a higher contribution to innovation in 4IR technologies than SMEs in the EU, adding to the overall leadership of the US in advanced digital technologies.

There are twice as many SMEs with an international portfolio of 4IR patents in the US than in the EU27. EU SMEs contributed 10% of international patent families (IPFs) in 4IR technologies invented in the EU, while US SMEs accounted for 16% of their country's contribution.

Over 90% of the EU's 4IR SMEs have already implemented their 4IR technologies in applications spanning the healthcare, transport and cleantech sectors, as well as data analytics. 4IR SMEs are more likely (44%) to be involved in manufacturing hardware products than other SMEs.

With this report, the European Patent Office (EPO) and the European Investment Bank (EIB) are teaming up to guide policymakers, industry and the public in this endeavour. The report provides a comprehensive inventory and analysis of small and medium-sized enterprises (SMEs) that have been developing 4IR technologies over the past decade.¹ In particular, it focuses on deep tech SMEs that have actively patented 4IR technologies, as opposed to the larger population of small businesses that are simply implementing and making use of such technologies. By benchmarking these companies against their counterparts in the US and other European countries, the study provides insight into the specific challenges of growing deep tech businesses in Europe for decision-makers in the public and private sectors, as well as investors.

Share of 4IR IPFs contributed by SMEs (average of years 2010-2018)



Source: Crunchbase and Orbis, authors' calculation.

¹ See EPO, "Patents and the Fourth Industrial Revolution: The global technology trends enabling the data-driven economy", December 2020. epo.org/trends-4IR.

EU 4IR SMEs show a higher investment intensity than other EU SMEs.

Around 80% of EU 4IR SMEs have 50 employees or less and almost 60% have already been operating for more than ten years, in line with the long development cycles typically observed in deep tech.

EU 4IR SMEs received significantly higher funding than other EU SMEs and show a higher investment intensity, with up to 70% of total investment targeted at 4IR innovations among young 4IR SMEs.

More than every second 4IR SME in the EU sees its future primary market in Europe.

Although 32% of EU SMEs are still focused primarily on operations in their home country, the majority, 52%, see their future primary market in Europe, as also reflected in the geographical scope of their patent portfolios.

A quarter of European 4IR SMEs regard the US as their future primary market (24% of EU27). This proportion rises to 38% among European 4IR SMEs that are dominant players in their market.

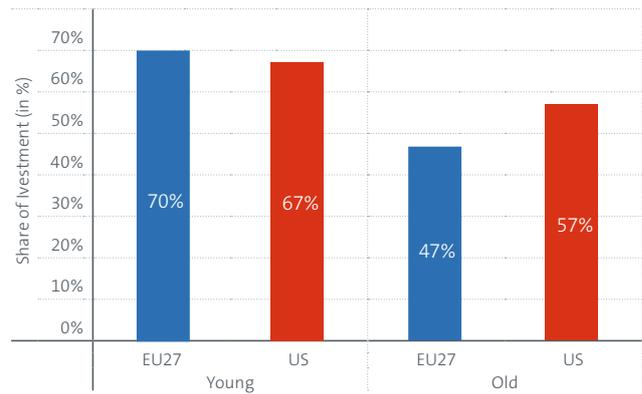
Availability of finance is key to support the growth of 4IR SMEs.

Over 30% of 4IR SMEs in both the EU and the US cite the availability of finance as a major business barrier, even before the availability of staff with the required technical skills.

The availability of finance is cited by 54% of the youngest and smallest firms as the main type of policy support needed to encourage them to further introduce or develop 4IR technologies.

Almost half of all 4IR SMEs (49%) consider patents as very important to secure financing and a large majority (80%) report that IP strategy was of relevance to their investors.

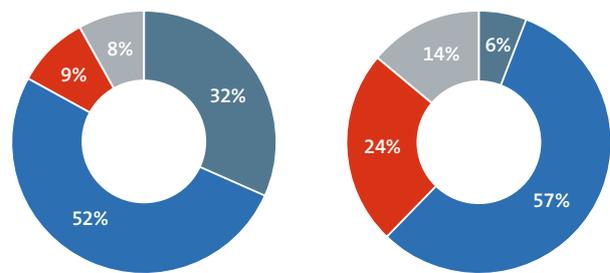
Share of investment related to 4IR technologies (in %)



Source: 4IR survey.
Base: Firms that invested in innovation (excluding don't know / refused responses).

Geographical markets of 4IR SMEs in EU27

Current primary market Future primary market

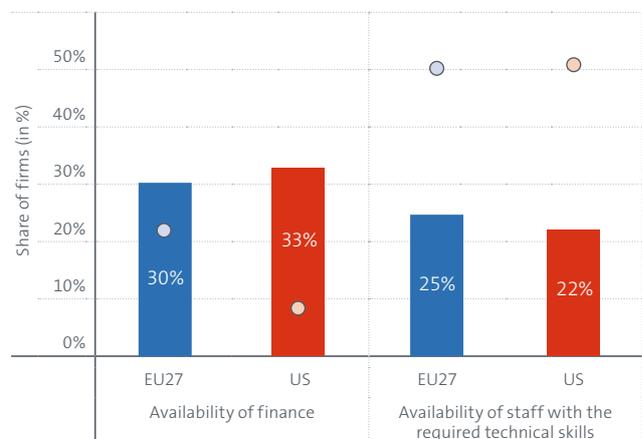


● Home country ● Europe ● US ● Other

Source: 4IR survey.

Base: 4IR innovators in 4IR survey (excluding don't know / refused / no obstacle responses). Note: Europe is defined as all EPC member states, including the EU27, the UK, Switzerland, Norway and other countries.

Major obstacles of 4IR SMEs



● Major EU ● Major US ○ Major EIBIS EU ○ Major EIBIS US

Source: 4IR survey, EIBIS (2021).

Base: 4IR innovators in 4IR survey, SMEs in EIBIS (excluding don't know / refused / no obstacle responses).

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