

Accelerating European deep tech

— new pathways from ideas to impact

How can Europe succeed in utilising deep tech research and innovations to gain technological sovereignty and establish an innovative, resilient, and competitive industry?

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Disclaimer: This report is a product of the Swedish presidency conference entitled “Deep tech entrepreneurship for an innovative, resilient, and competitive internal market”. The views expressed in this report are those of authors and contributed authors, and they should be treated as interpretations and compilations of the outcome from keynote presentations, panel discussions and workshops. They do not necessarily reflect the opinion of the Swedish Presidency nor the European Commission.

Preface

Deep tech holds the promise to contribute to some of our biggest societal and environmental challenges. The conference, “Deep Tech Entrepreneurship for an Innovative, Resilient, and Competitive Internal Market,” clearly showcased our collective commitment to driving deep tech innovations in Europe.

The conference also emphasized that we possess much of the required knowledge; we have excellent research institutions, some of the world’s most attractive innovation ecosystems, and strong industries. Continued investments are nevertheless essential. We have a wealth of talent, albeit parts of it remains untapped. And there are also other areas as pointed out in the report that need to be addressed for Europe to be competitive in a global landscape in flux. What we lack is time; we cannot negotiate with planetary boundaries and time is ticking. Consequently, we all share a sense of urgency to take action. We have come to understand that deep tech innovations hold existential importance for us, and it is imperative that we foster a risk-sharing partnership between the public and private sectors and commit to long-term perspectives in our initiatives and investments. Furthermore, an inclusive and diverse ecosystem is paramount, as this is where untapped talent can be found. Strong collaborations across Europe, driven by a win-win, pay-it-forward mindset, will enable us to harness our collective knowledge and resources to their fullest extent.

This report captures and contextualises these trends, opportunities, commitments and challenges we face in pursuing the promises of deep tech in Europe. Its



Darja Isaksson, General Director, Vinnova.

content in an important step in the dissemination and utilisation of the compelling conference contributions made in excellent speeches, vivid interactions and engaging discussions.

From the Swedish perspective, we will use this report as an opportunity to invite the deep tech community and ecosystem to engage in discussions on how to move forward as a nation. . We will also ask ourselves, as an Innovation Agency, what steps we can take to address the issues identified in this conference. Additionally, we will urge the European Commission, member states, and associated countries to actively collaborate on the recommended initiatives outlined in this report. These actions align with the recommendations made by experts within the system, emphasizing the importance of immediate action.

**Darja Isaksson, Director General,
the Swedish Innovation Agency – Vinnova**

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Massimo Portincaso, Chairman of the Advisory Board at Hello Tomorrow

Foreword

In this defining moment of history, Europe stands in front of a fundamental and complex challenge, and at the cusp of monumental change. After centuries in which it played a dominant role on the world stage, and in which it was home to the industrial revolution that transformed the world, it has now to face the double challenge of being on the verge of becoming an irrelevant player in a US–China polarized world, and to have, at the same time, to deal with the environmental consequences of the very industrial revolution it started. Because of that it needs to put an incommensurate effort to re-do its economic and industrial tissue in a last attempt to maintain its position on the world stage, and, contemporarily, save our civilization both in terms of sustainability and prosperity.

Furthermore, through deep tech, humanity is just about to undergo a similar transition to the one that happened 10.000 years ago, when we moved from being hunter-gatherers to becoming farmers. We are now in the process, and in the necessity, of moving from being hunter-gatherers of resources to becoming farmers at the atomic level. And while the previous transition took centuries, this one will have to happen in 20 years.

Becoming atomic farmers has profound implications for business, but also for the health of the planet. It disrupts every industry, from semiconductor to agriculture and consumer goods, to construction and pharmaceuticals. It has the potential to create a new economic model that is intrinsically more sustainable and allows for faster, leaner innovation. Underlying this new economic model is the shift from an exploitative

(from big to small) to a generative (from small to big) paradigm, where instead of being extracted, resources and energy are generated. Abundance, and not scarcity, become the dominant mindset.

This shift is the foundation for a Generative Industrial Revolution, which is in the make and that will unlock fundamentally different competitive dynamics, by creating new value pools, by rethinking value chains, and by enabling a different kind of industrialization.

Here lies the opportunity for Europe, yet here also lies the paradox.

Europe does have everything it needs to succeed in being the cradle of this new Generative Industrial Revolution, powered by deep tech, but it is not in a position to do so, yet. As sad (and frustrating) as it might sound, despite relying on some of best scientific institutions in the world, some great talent, and a solid industrial backbone, Europe today is not equipped to “compete-to-win”, even if some delusional institutional wishful-thinking may lead to assume this is the case. Europe is equipped, at best, to “compete-not-to-lose”.

Yet, our heritage and history, steeped in culture, art, and innovation, are still alive with an opportunity to usher in a new age of discovery and invention, as the Industrial Revolution was, and as the Generative Industrial Revolution can be. The heart of this new era beats with the cadence of deep tech – a vibrant symphony of matter, energy, cognition, computation, sensing, and actuation. But to truly resonate with this rhythm, Europe

must not only harness its historic strengths, bridge existing gaps, and orchestrate a symphony of collective endeavor. It must also learn to “compete-to-win”. This report captures well the ambition to do exactly that.

In the heart of the June 2023 deep tech conference “Deep tech entrepreneurship for an innovative, resilient, and competitive internal market”, we witnessed an invigorating fusion of minds, energies, and visions. The event did more than just highlight Europe’s position in the world of deep tech; it unveiled the systemic nature of the challenges before us. Through candid conversations and deep insights, the conference deftly pinpointed the leverage points that hold the potential to shift paradigms and reconfigure trajectories. This report is a crystallization of those pivotal discussions, insights, and roadmaps.

Understanding the systemic nature of the challenges ahead of us is a core, often neglected, step toward enabling the transition to a generative paradigm, powered by deep tech. And, even more neglected, mindset represents the biggest leverage point in the system, according to the late Donella Meadows.

It’s time for Europe to radically shift its mindset, to embrace risk, and to be “unreasonably” ambitious. As one founder once lamented, “the system, as it is, does beat out of you any drop of ambition you might have.” This sentiment has long echoed through the ecosystem and our industries. We must transform this narrative, challenging the status quo and fostering an environment where audacious goals, even unreasonable ones, are not just encouraged, but celebrated. And we need to translate this into a regulatory environment that supports it, instead of strangulating it.

The upcoming Generative Industrial Revolution is not a distant dream; it’s an imminent transformation that will redefine our economic and industrial fabric. This revolution promises not just technological marvels but also demands radical shifts in our societal, economic, and philosophical bearings. We need to wake up from our explicit and implicit complacency and transform it into a mobilizing urgency. As this revolution begins to reshape our horizons, Europe is poised at a pivotal crossroads. The imperative to reweave our economic and industrial canvas becomes an existential necessity. Our future – the very essence of our global competitiveness, sustainability, and shared prosperity – hinges on our urgency, adaptability, and foresight in this transformative era.

With its storied history, Europe has been the cradle of countless world-altering revelations. From the erudition of the Renaissance to the industrial revolutions, we have been the harbingers of change. But not only we have

lost that role in the world, in this new age, wielding our inherent power necessitates more than just innovation. It requires audacious risk-taking, reflected in a supporting regulatory environment. The shadows of untapped potential, missed opportunities, and systemic barriers loom large, challenging our every stride.

Yet, in the face of these adversities, Europe can still find its most profound inspirations. Our legacy is not necessarily one of unity and reinvention. Where fragmentation exists, we must find unity. Where there’s an investment chasm, we must champion collaboration. And most crucially, where there’s risk, we must find the courage to leap. This new era demands not just a technological prowess, which we have, but a boldness in approach, that we don’t have.

We must cultivate environments that view risks not as insurmountable threats, but as doorways to unparalleled achievements.

Central to this is an unwavering belief in our collective potential. Europe’s deep tech solutions are not just tools; they are the lifelines connecting our rich history to a future teeming with promise. Harnessing these solutions requires an unyielding commitment, collaboration, and a renewed spirit of ambition. The journey before us is transformative, one that will redefine our industrial tissue and reimagine our economic narratives.

In other words, we need to move from a mindset of scarcity and playing a zero-sum-game to a mindset of abundance and playing a positive-sum-game.

As you embark on this exploration through this report, take a moment to visualize a Europe where deep tech and our scientific genius effortlessly transforms into impactful, real-world solutions; where risks are embraced with zeal, and where we lead the vanguard into the Generative Industrial Revolution. This vision of Europe is within reach, but it requires trust, risk-taking, unrelenting ambition, an unwavering faith in our shared destiny, and an urgency to act. I do hope that this report will be more than just a guide. Let it be a beacon, illuminating the path toward a radiant European future, challenging us to push boundaries, take risks, and redefine the possible. In its pages, you’ll find not just strategies, policies, and concrete recommendations, rather a commitment to Europe’s indefatigable spirit of innovation and discovery.

The era of deep tech beckons. The alternative is a steady slide into oblivion. It is our choice.

Massimo Portincaso,
Chairman of the Advisory Board at Hello Tomorrow

Executive summary

Deep tech promises new ways to tackle some of our biggest societal and environmental challenges. It also offers European industries novel ways to renew themselves and thereby create a foundation for radical improvements in competitiveness and growth. Because of this potential, deep tech has become a focal point for innovation policy developments in the EU, as highlighted in the New European Innovation Agenda (NEIA) and the Action Plan on Intellectual Property (APIP).

On 1st–2nd June 2023, the Swedish presidency organized a conference entitled “[Deep tech entrepreneurship for an innovative, resilient, and competitive internal market](#)” with the objective to complement, strengthen and provide related policy efforts already initiated within the EU. Hence, the conference was meant to kick-start knowledge exchange and mobilisation of key ecosystem actors to collectively address deep tech-related challenges of Europe.

At the heart of achieving an innovative, resilient, and competitive deep tech market in Europe lies the engagement of researchers, entrepreneurs, corporates, investors, and governments. Jointly their efforts can transform knowledge and technologies into vibrant, competitive, and sustainable solutions to our most pressing societal challenges. The main message of the conference was that Europe needs to apply a systemic perspective in improving its deep tech ecosystem thereby paving the way for European sovereignty, competitiveness, and growth.

Key messages

The conference presented several key messages and challenges that Europe is facing in its endeavour to lead the deep tech innovation wave. Among the most important were:

- **Deep tech solutions rely on a deeply interconnected ecosystem of actors** with aligned incentives to coordinate and support innovation from research to industrialisation. Europe is still too fragmented to meet this need.
- **Deep tech is critical for corporate growth in Europe**, but the investment gap in corporate R&D is widening with respect to the US.
- **Even though Europe is a scientific superpower, it is falling behind in many key technology areas** since it is unable to translate its academic strengths into commercial and industrial success to the same extent as the US.
- **Europe’s capital market is not adapted to provide the huge capital requirements needed by deep tech ventures in order to scale and industrialise**, and the capital supply structures are not sufficiently well

adapted to the long and systemic innovation journeys deep tech ventures face.

- **Intellectual assets are not regarded as business and financial assets to the extent that they should be**, even though strategies and operations for capturing, claiming, controlling, and managing intellectual assets are key to deep tech ventures.

Key approaches

In implementing the proposed actions presented in this report, the report provides two key approaches that the EU and its member states should adhere to (which are elaborated on further in chapter 7):

- **Europe needs to embrace and promote an “ambition-to-compete-and-win”-mentality.** Ecosystem actors in Europe – including policy makers – must have the courage to act. It is easy to play it safe in times of uncertainty or when the risks are high, so that you do not lose what you have. But if Europe is to succeed in exploiting deep tech and the 4th wave of innovation, it needs an “ambition-to-compete-and-win”-mentality while embracing unpredictability and potential failures. And if failure occurs, European actors need to be confident that the lessons learnt will make the next effort more successful.



“ There are two ways to compete. Compete-to-win and compete-not-to-lose. Europe needs to start competing-to-win. One important measure is to unleash the patient capital of Europe’s pension funds, foundations and family offices. This could be done as an integral part of creating the European Tech Sovereignty Fund.

Lars Frølund, Lecturer at Massachusetts Institute of Technology (MIT) and EIC Board member

- **Policy in the EU and in its member states need to embrace trust, risk, and bravery in developing and supporting deep tech opportunities.**

Trust, risk, and bravery are important, not only in pursuing individual deep tech innovation journeys, but also in setting-up the governmental game play within the EU. This means daring to re-assess state-aid rules, experimenting with regulatory sandboxes and opening up new ways to stimulate innovation procurements to drive transformative changes in societies and markets.

Main proposed action points

This report contains lists of prioritised policy actions for systemically addressing the deep tech challenges in Europe. The actions are divided according to the three themes of the conference: improving the ecosystem (chapter 4), improving the financing of deep tech ventures (chapter 5) and improving management and use of intellectual assets (chapter 6). These systemic changes and actions, which aim to unleash the scientific strength of Europe and utilise the new opportunities offered by deep tech, are summarised below:

- 1. Align incentives for key ecosystem players to ensure coordinated support for the industrialisation of deep tech ventures.**

Scaling up deep tech solutions from their scientific origins to industrialisation and growth is amongst the toughest of challenges in developing deep tech ventures. This requires coordination between many different ecosystem players: *investors* with sufficient capital; human talent with relevant skills and experience; *corporations* with R&D-resources, innovation infrastructures, business needs and sales channels to international markets; *governments* with relevant funding offerings and adapted policies; and *academia* with their research infrastructure and capacities. These actions are covered in chapter 4.

- 2. Encourage and incentivise corporations to collaborate with deep tech ventures.**

Collaboration between large corporations and emerging deep tech ventures is necessary but constitutes a difficult symbiosis. The combination of technical and market risks of deep tech coupled with the high financial costs and long development lead-times put constraints on such collaboration. Furthermore, it is not easy to ensure the necessary trust between parties and win-win arrangements over time for intermediate and final outcomes. Public bodies, for their part, need to investigate specific policy measures that could target corporate–deep tech collaborations and harness the power of private demand – e.g. tax



“ If we want to help our innovative businesses attract investments and commercialize their innovations – and at the same time create an even stronger competitive position for them and our EU countries – strategic use of intellectual property rights and assets is crucial.

Ebba Busch, Deputy Prime Minister of Sweden

incentives, staged subsidies and regulatory mandates. The ambition should be to make it financially and commercially attractive for lead customers (large firms) and start-ups to collaborate on developing “first of a kind” deep tech solutions. These actions are covered in chapter 4.

- 3. Increase and adapt Europe’s growth-capital supply system by creating a 100-billion-euro European Tech Sovereignty Fund.**

Scaling up deep tech ventures often requires venture funds to be able to deploy tickets of 50+ million euro. To be able to do that, European fund sizes would need to be at least 1 billion euro. In comparison, US has 10–15 times more funds and investment capacity than Europe, while 97% of EU-based venture capital funds are less than 300 million euro. Hence, European venture investors are not able to defend or extend their shareholdings in promising deep tech scale ups.

Policy actions that are needed include the creation of a 100-billion-euro European Tech Sovereignty Fund that – in cooperation with public, institutional investors – will have private, patient capital from Europe’s family offices, pension funds, and foundations as key investors. Such a fund would represent a new ‘Alliance for European Tech Sovereignty’ between private and public capital providers and importantly have the financial muscles to deploy direct growth-stage investments and be able to make indirect investments in private European VC-funds that target growth and scaling up of deep tech ventures. These funds also need to be adapted to the nature of deep tech ventures and the European market, i.e. having fund lifetimes of at least 15 years or use an “evergreen funding-model” in order to offer the long-term support needed. A complementary action for smaller early-stage funds is to stimulate and promote investment and shareholder agreements where early-stage investors can make their shareholdings liquid when growth capital later is obtained. This action is covered in chapter 5.

4. Make Europe an attractive exit market for investors in order to keep promising and successful European deep tech ventures in Europe.

Without an attractive European exit market, there is a huge risk that successful deep tech ventures will move to the US or Asia due to better return on investment opportunities. The risk is irrespective of how much venture capital Europe can mobilise. Hence, Europe needs to establish lucrative exit opportunities in order to retain upscaling companies. This involves ensuring an attractive IPO-market for deep tech ventures and having European corporations acquire and incorporate promising/successful deep tech ventures. This action is covered in chapter 5.

5. Drive corporate and public demand for deep tech solutions in order to strengthen the commercialisation of solutions developed by startups and scaleups.

Most policies are traditionally focused on increasing the supply of technologies and innovations. Yet it is demand, not supply, that limits innovation. Hence it is essential to use private and public procurement to drive demand for solutions that address the green and digital transformation. At the conference there were at least two proposals for doing this: (i) innovations procurement – including both public and joint public-private procurements, and (ii) extending corporate venturing initiatives to corporations that are becoming venture clients, either individually or in

collaboration (called venture squads, see chapter 3). This action is covered in chapter 4 and 5.

6. Improve and adapt the incubation support system to effectively mature deep tech ventures and attract dilutive capital at the right time to the right valuation levels.

Deep tech ventures are often already capital intensive during their incubation period.¹ Attracting venture capital requires incorporation of the venture. At this stage, however, they have not yet achieved the necessary technical and commercial maturity to be able to offer investors a reasonable valuation. Hence, they either fail in obtaining the necessary capital or become too diluted before they have had a chance to establish an initial team, mature the technological foundations, and develop a competitive value proposition. Maturing deep tech ventures through incubation support also means access to potential customers and partners, to infrastructures and expertise. To be able to address these challenges, deep tech ventures need to obtain EU-wide access to highly qualified coaches, mentors, collaborations with corporations and relevant seed funding for incubation. This action is covered in chapter 4 and 5.

7. Increase the availability of innovation infrastructure to lower deep tech ventures’ investment needs and support a seamless transition from lab to industrialisation.

Deep tech ventures often require access to costly innovation infrastructures. Suitable infrastructures exist in Europe: in academia, research institutes and corporates. They are, however, not easily accessible to ventures since their existence is usually unknown to most ventures; and even if ventures are aware of suitable infrastructures, their high access fees/costs, terms and conditions to use them, and limitation in their technical interfaces make it difficult to utilise them in supporting development of deep tech ventures. Europe needs to establish open public-private partnerships for opening up such infrastructure at reasonable prices and conditions adapted to deep tech ventures, thereby creating outcomes akin to the impact of cloud computing had on traditional tech start-ups.

The action involves public-private investment in new infrastructure and incentivising the development of open technical and commercial interfaces for existing infrastructure. It also involves establishing funding for supporting access to infrastructure, e.g., through voucher schemes that give deep tech

¹ The incubation period denotes the early-stage development phases of a venture when they are in need of different support services helping them with coaching, mentorship, funding, access to partners, customers and talent etc. The incubation period usually covers problem/solution-fit and product/market-fit.

ventures financial support to buy access. This action is covered in chapter 4 and 5.

8. Improve the ability of European ecosystem players to strategically manage and use their intellectual assets to strengthen Europe's technical sovereignty and its foundation for value creation.

Awareness of the role intellectual assets play in industrialising and growing deep tech ventures is essential for European success. Hence, increased efforts to make relevant expertise available to deep tech ventures through support structures like Technology Transfer Offices (TTOs), incubators, science parks, clusters etc, are key to improving the strategic management and use of intellectual assets. These efforts should be complemented with regulatory and financial incentives that make researchers, venture teams, and funding bodies consider and treat intellectual assets as strategic business and financial assets. Examples of actions are: (i) create skills

development programmes that target venture teams; (ii) make assessments of strategies, processes, and routines for managing intellectual assets a part of assessing funding requests, (iii) introduce voucher schemes to fund development and deployment of intellectual asset management strategies etc. This action is covered in chapter 6.

9. Open up regulatory sandboxes for the development of deep tech solutions.

Some deep tech areas e.g., food tech, autonomous vehicles, use of biomaterials constitute application areas where current regulations, or lack of regulations, hinder or create severe obstacles for development, production, and/or deployment of deep tech solutions. Ventures operating in these areas need to be able to experiment with regulation under controlled circumstances in what are known as regulatory sandboxes or policy labs. This action is covered in chapter 7.

Introduction

This report summarises the findings from the conference “Deep tech entrepreneurship for an innovative, resilient, and competitive internal market”, which was held in Stockholm, Sweden, 1–2 of June 2023.

The conference attracted more than 500 delegates including researchers, entrepreneurs, corporations, investors, and policy makers from the EU, its member states and associated countries.

The focus was on how to overcome challenges and realise deep tech's potential. Three thematic areas of importance for deep tech ventures were discussed at the conference:

- **Ecosystems** – How can the EU and its member states establish and maintain a world class ecosystem for deep tech ventures?

“ For innovative SMEs the European unitary patent system means two things, much lower costs, and much higher legal certainty, and by bringing more coherence and therefore clarity it will attract more foreign direct investment.

Kerstin Jorna, Director-General – Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs

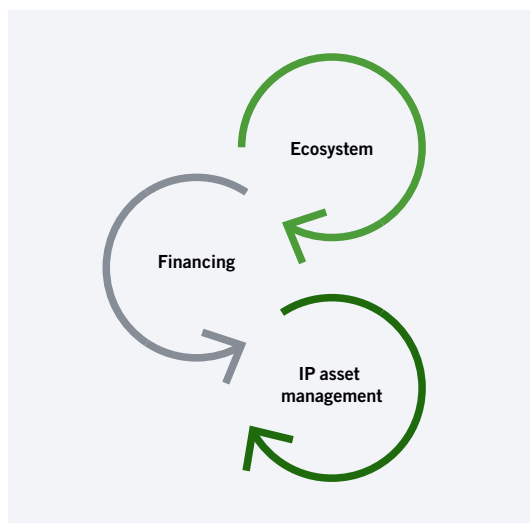


“ IP protection and registration must now be seen as the starting point.

Mr. Daren Tang, Director General at World Intellectual Property Organization (WIPO)

- **Financing** – How can the EU and its member states establish and maintain a world class funding system for deep tech ventures? One that stimulates new ventures to emerge from the excellent research we produce, provides such ventures with the conditions to succeed and scale up with Europe as a base, and makes Europe an attractive market to invest in.
- **Intellectual assets** – How can IP strategies be a foundation for a competitive deep tech ecosystem, and support Europe’s green and digital transformation?

The conference’s content mirrored the challenges above through preparatory actions using scoping papers on each theme, plenary sessions with experts and policy makers giving their view on these topics, and lastly, through workshops where participants were given an opportunity to contribute.



Background

In several European strategies, documents and initiatives over recent years, deep tech innovations have been identified as a key priority due to their potential to offer new ways of tackling some of our biggest societal and environmental challenges. Furthermore, deep tech offers existing European industries novel ways of renewing themselves and thereby creating a foundation for radical improvements in Europe’s competitiveness and growth.

The importance of deep tech for Europe has been highlighted in two key strategy documents that the conference had as reference points:

- [New European Innovation Agenda](#)², (NEIA) adopted on 5 July 2022, which aims to position Europe at the forefront of the new innovation opportunities deep tech offers and help Europe to develop innovations that address the most pressing societal challenges, and to bring them to the market.
- [Action Plan on Intellectual Property](#)³ (APIP), which aims to secure that companies, especially small and medium-sized companies (SMEs), can make the most of their inventions and creations to ensure they benefit our economy and society. Intellectual property (IP) is a key driver for economic growth as it helps companies to valorise their intangible assets.

Moreover, there are a number of NEIA-related policy activities underway in the EU, e.g. the tax initiatives DEBRA (debt-equity bias reduction allowance), the new action plan for the European Innovation Council (EIC), the working group on the Employee Stock Option schemes, and the Regional Innovation Valleys.

“ Ladies and gentlemen, there will be no European industrial leadership without deep tech.

Kerstin Jorna, Director-General –
Directorate-General for Internal Market,
Industry, Entrepreneurship and SMEs

The “Deep tech entrepreneurship for an innovative, resilient, and competitive internal market” conference aimed to complement, strengthen, and provide a foundation for the continuation of these policy efforts within the EU. Hence, the objective of the conference was to provide a forum for exchanging knowledge and mobilising key ecosystem actors to collectively find ways to address Europe’s deep tech challenges.

Chapter 1

Setting the European deep tech scene



1.1 What is deep tech all about?

Deep tech is not only about promising technologies and their development. Rather, it is also about using scientific discoveries and advanced engineering to address fundamental challenges in the economy and society in radically

new ways. Hence, most deep tech solutions use several different technologies, often coming from different scientific domains such as biotech, computer science, chemistry, material sciences, sensor technologies etc.

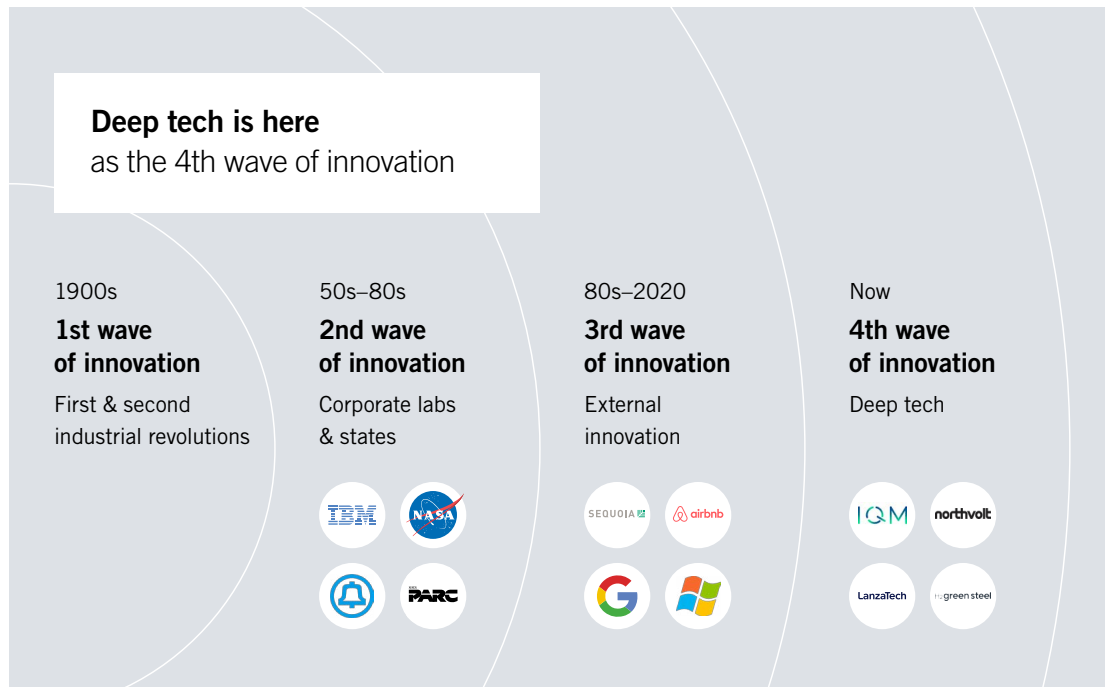
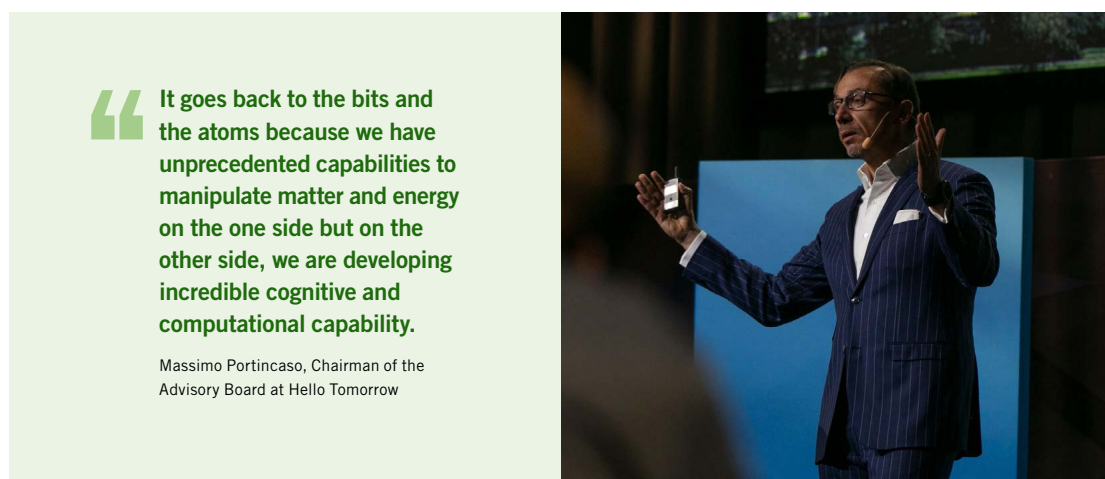


Figure 1: The 1st wave of innovation paved the way for the Industrial Revolution. The 2nd wave of innovation was driven by corporate R&D labs paving the way for science and technology-based innovations. In the 3rd wave, entrepreneurial driven ventures backed up. The 4th wave complements and extends previous waves by paving the way for new digital-physical solutions.

Source: Massimo Portincaso & BCG_Hello_Tomorrow_Great-Wave.pdf (hello-tomorrow.org)

According to Massimo Portincaso, in his keynote at the conference, deep tech represents the 4th wave of innovation (see figure 1). It complements and extends previous waves of innovation by paving the way for a

new digital-physical solution based on a convergence of approaches (design, engineering, advanced science) and the convergence of technologies (matter and energy, computation and cognition, sensing and actuation).



Based on scientific discoveries and advanced engineering, deep tech ventures rely on unique knowledge and intellectual assets. Strategies and operations for capturing, claiming, controlling, and managing intellectual assets are therefore the key for deep tech ventures. This offers them the necessary time advantage to make the journey from idea to the market and to develop a strong competitive advantage that makes them attractive to customers, governments, and investors.

Most fundamental problems or challenges addressed by deep tech solutions are unlikely to be solved by single ventures. Disruptive or game-changing innovations need new or adapted ecosystems – i.e. ecosystem innovations⁴. Thus, exploiting deep tech-based inventions and opportunities requires systemic approaches based on coordination and collaboration between capital suppliers, knowledge suppliers, entrepreneurs, corporations, and policy makers (see figure 2).



“ We need to include IP people at the table already at the start of a discussion about moving into another territory or trying to sell a new technology.

Martin Kern, Director at the European Institute of Innovation and Technology (EIT)

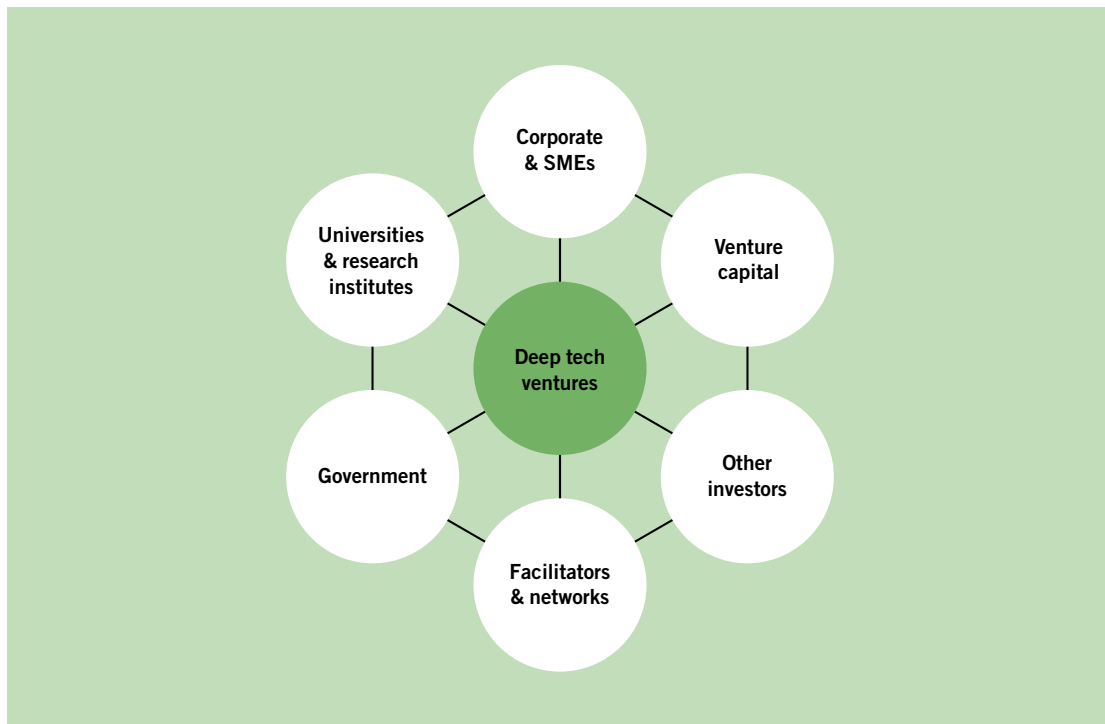


Figure 2: Deep tech-based inventions requires a systemic play based on coordination and collaboration between capital suppliers, knowledge suppliers, entrepreneurs, corporations and policy makers.

Source: Massimo Portincaso & BCG_Hello_Tomorrow_Great-Wave.pdf (hello-tomorrow.org)

Moreover, most deep tech solutions are characterised by high commercial risks and high technical/engineering risks, thereby having a different risk profile than most ICT/digital-based and biotech solutions. Their implemen-

tation and dissemination sometimes imply the need for regulatory changes (including addressing non-existing regulations) or regulatory adaptations, which further accentuates their high-risk profile.

⁴ Ecosystem innovations denotes innovative ways to deliver value creating solutions that utilise relationships between new organisations, collaborative co-creation processes that do not already exist, new infrastructure investments that cross organisational borders, regulatory and policy adaptations to new market conditions etc.

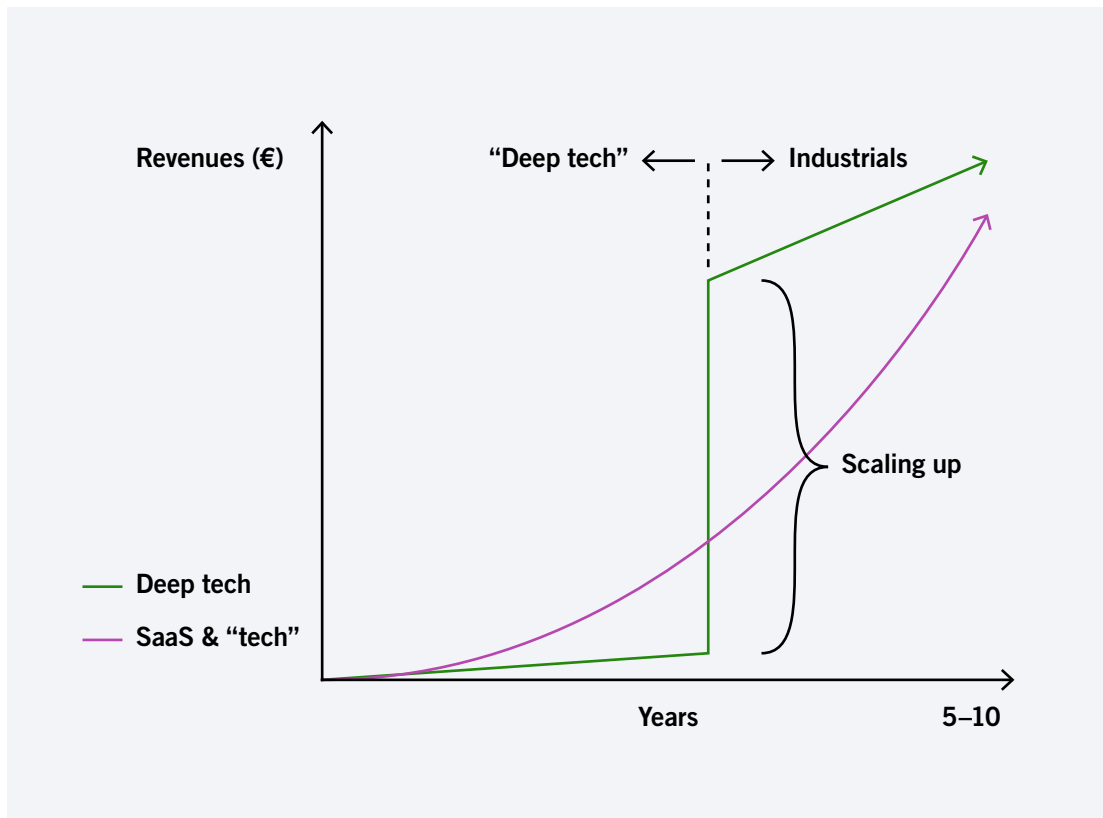


Figure 3: Scaling up represents the toughest challenge for deep tech ventures since it requires very large investment at a stage when the risk is still high, and the value of the company is still very low.

Source: Massimo Portincaso

Additionally, compared to traditional tech ventures, deep tech ventures are usually more capital intensive throughout their much longer and more complex journey from idea to market introduction and scaling. Setting up the first production line, and especially scaling up to meet the needs of the first industrial customers, represent the toughest challenge. It requires very large investments at a stage when the risks are still high, and the value of the company is still very low, (see figure 3). Hence, scaling up, production and sales requires incentives to stimulate collaborative and coordinated efforts between investors and corporations to provide the necessary capital and infrastructure. It also requires the necessary ecosystem for deep tech solutions to be established. These characteristics of deep tech ventures create challenging barriers in the commercialisation and valorisation⁵ processes. Having a balance between approaches for driving supply of capital and generating

cash flow through initiatives that support the birth, scaling up, and industrialisation of European deep tech solutions has great potential but is also very challenging.

“ The scale up challenge for deep tech is a much, much bigger fundamental challenge. You are a deep tech company for a long time and then you have to jump into industrial. It requires different measures that are not in the capital stack today.

Massimo Portincaso, Chairman of the Advisory Board at Hello Tomorrow

⁵ Valorisation is in this context about creating and adding value to knowledge and technological assets in such a way that the value created is higher than the cost of producing that value. Valorisation thereby complements (i) commercialisation which is about creating revenues and (ii) innovation which is about the novelty and attractiveness of value created.

“The 2022 EU Industrial R&D Investment Scoreboard”, European Commission (<https://iri.jrc.ec.europa.eu/scoreboard/2022-eu-industrial-rd-investment-scoreboard>)

1.2 The technology scene

According to the EU Industrial R&D Investment Scoreboard, deep tech is critical for corporate growth in Europe. Unfortunately, Europe’s investment gap in corporate R&D has been widening over the past years with respect to the US⁶ (see figure below).

This gap is translated into gaps in both growth and return on investments. According to a study by McKinsey⁷, 60% of the gap is driven by deep tech.

Share of global R&D investment by region 2012–2022

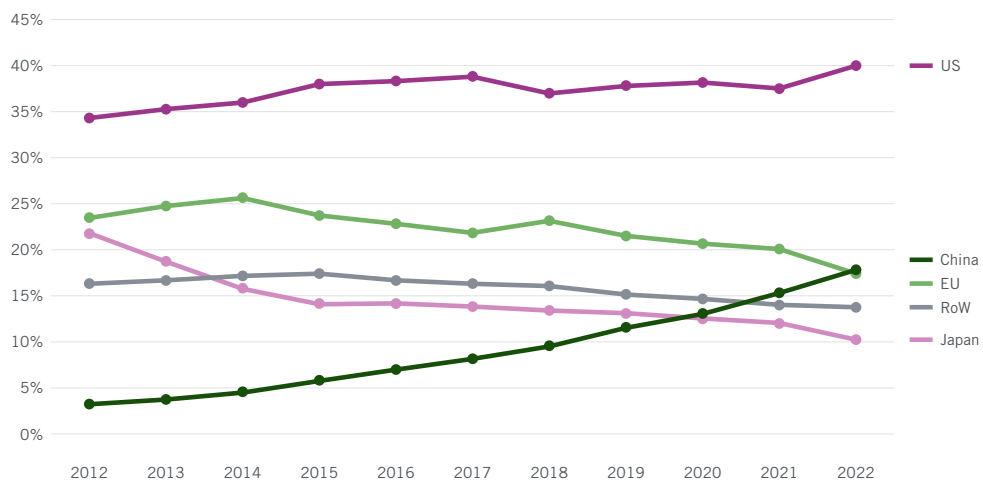


Figure 4: Europe’s investment gap in corporate R&D has been widening over the past years with respect to the US. According to a study by McKinsey, 60% of this gap is driven by deep tech.

Moreover, according to the same study, the EU is well positioned in only two out of the top ten general purpose technologies, namely ‘cleantech’ and in ‘next generation materials’ (see figure 5). For the remaining eight key technologies, in four of them (‘next-level automatization’, ‘future connectivity’, ‘bio-revolution’ and ‘next-generation

computing’) the battle is not lost, but Europe is falling behind. However, the last four (‘applied AI’, trust architecture, distributed infrastructure’ and ‘future of programming’) Europe’s gap with respect to the top players is considerable.



“Ambition is at the core of whether Europe regains competitiveness and drives growth in the future.”

Tomas Naucler,
Senior partner at McKinsey

6 “The 2022 EU Industrial R&D Investment Scoreboard”, European Commission (<https://iri.jrc.ec.europa.eu/scoreboard/2022-eu-industrial-rd-investment-scoreboard>)

7 Securing Europe’s competitiveness: Addressing its technology gap. McKinsey Global institute, September 22, 2022



Figure 5: The EU is well positioned in only two out of the ten deep tech technology areas.

Source: Tomas Naucler, McKinsey

Finally, looking at the performance of academia in the EU, the region is well positioned as a scientific powerhouse measured in terms of scientific publications and

patents filed. However, the EU faces the dilemma that this strong academic position in research and innovation is not sufficiently translated into viable business ventures.

1.3 The financing scene

The European financing and investment scene has been dominated by R&D funding and early-stage funding of tech ventures. Hence, growth investments beyond series C-rounds are dominated by US and Asia. Moreover, the venture capital (VC) model applied in the European market is a copy-cat of the Silicon Valley model with 10 years as the typical lifetime of a venture capital fund, not considering the fragmentation of Europe with many small domestic markets. Considering the large capital investments often needed to scale up deep tech solutions and the long and complex journeys to industrialisation, there is a strong argument that VC funds investing in deep tech should have at least a 15-year lifetime or be structured as evergreens. This has significant implications on the value proposition of general partners and a shift in the culture of limited partners. Many traditional VCs have no incentive to make this shift into greater risk and longer funding cycles. Hence, the European deep tech scene needs to engage new types of investors that are prepared to contribute with patient capital.

Pension funds, foundations, and family offices – who have strategic ambitions to contribute to the strength of their countries and the EU – need to be engaged in deep tech investments. Established industries and

their Corporate Venture Capital (CVC) arms also need to be incentivised to engage in deep tech investments, not only to provide capital, but also to bring their knowledge and understanding of production intensive industrialisation.



“ We need more patient capital in Europe. ”

Jean-Christophe Laloux, Director General,
Head of Lending and Advisory Operations at the
European Investment Bank (EIB)

The situation for Europe is unsustainable, as an example, it was pointed out at the conference that US pension funds account for about 15% of the capital in German VC funds. In contrast, German pension funds account for less than 1% of the investor base⁸. Thus, German pensioners are hardly benefiting from the growth of new innovative companies in Germany.



“ Although Europe is rich, capital flows go to other areas than financing risk-laden deep tech ventures. This is a paradox, since we would be better off and have a better chance of solving societal challenges, if we can find ways to channel the necessary private capital to this area of the economy.

Ebba Busch, Deputy Prime Minister of Sweden

Looking at the European VC market from a deep tech perspective reveals a need for much larger VC-funds to support deep tech solutions. The US has 10–15 times more funds with a size of more than 1 billion euro, which is needed to be able to deploy tickets of 50+ million euro supporting deep tech scaling/growth. Today 97% of EU-based VC-funds have less than 300 million euro under management, hence they are not able to follow or support the scaling up of deep tech companies.

As highlighted at the conference, and mentioned by Margrethe Vestager during her opening speech, this important challenge can be addressed by creating a new ‘Alliance for European Tech Sovereignty’ between public and private capital providers with the aim of creating a European Tech Sovereignty Fund. Such a fund should have the financial muscles to deploy direct growth-stage investments and be able to make indirect investments in private European VC-funds that target growth and scaling up of deep tech ventures. In short, a fund that would be Europe’s strategic investor with the objective of building technological capacity for Europe, in Europe.



“ What we need is functioning financial markets, we need ambition, we need trust, we need the opening up of universities, and we need money.

Marjut Falkstedt, Chief Executive at European Investment Fund



“ The whole issue of sovereignty has become far more urgent than it was anytime in the past 30 years. So, we have to recreate since we have lost a lot. We have to recreate an economy that truly can be sovereign and not dependant on others.

Michiel Scheffer, President of EIC Board

Lastly, without a strong European exit market, there is a significant risk that successful deep tech ventures will relocate to the US or Asia due to the business model of venture capitalists which sees a maximising of return on investment. This will happen regardless of how much venture capital Europe is able to mobilise. Hence, policy-makers need to address the question of making Europe an attractive exit market in order to offer scaled-up companies a competitive alternative to the US or Asia. This encompasses both attractive IPO-possibilities as well as incentives for increased acquisition activities on behalf of European corporations.

8 <https://www.redstone.vc/research/new-researches>

“ It’s really been flourishing for seed funding also for deep tech companies, but when these companies need you know a billion until they have profitability that’s the gap that need to be plugged and that’s when we need to collaborate.

Niklas Zennström, CEO Atomico



Moreover, Europe is urged to activate untapped resources and develop a more inclusive investment climate. Today only 5% of European VC-investments are made in mixed teams and only 2% in female teams.

In conclusion, there is an urgent need to establish a new investment paradigm/model and investment culture in the EU. This involves new fund structures, engaging more strategic and patient capital, developing a more inclusive investment climate and ensuring an attractive exit market for investors.



“ There’s no lack of women among the top researchers, the top innovators of the World. That has produced the society that we appreciate today. But the unfortunate thing is that very often a shadow was cast over them as history was written by men.

Margrethe Vestager, Executive Vice President of the European Commission

1.4 The ecosystem scene

Scaling up scientific origins to industrialisation and growth, requires a coordinated interplay between sources of capital and competence; the corporate sector and its R&D resources, infrastructure and channels to markets; governments with funding and adapted

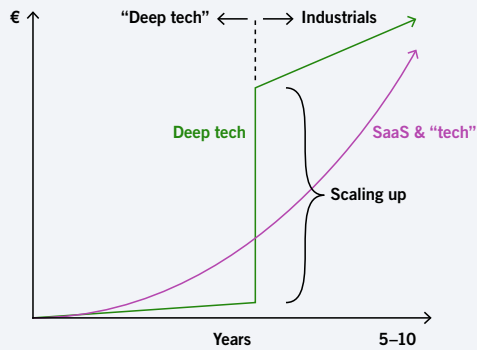
policies; and academia with their research infrastructure and capacities (see figure 6). Hence, Europe needs to establish a competitive and effective deep tech ecosystem with aligned incentives among the key ecosystem players.



“ Make it more attractive for corporates to engage in the whole play because nothing is better for a start-up than actually to get an early customer from industry.

Jan Goetz, CEO IQM and former EIC Board member (Finland)

Three **indirect** leverage points requiring aligned incentives



1. Investors/LPs

- Family offices
- Pension funds
- Corporations as LPs

2. Corporate

- Collaboration among corporates
- Cross-European Incentives
- Exit market
- Purchase agreements

3. Infrastructure

- Creation of new asset classes
- Derisking of ramp up

Figure 6: Scaling up scientific origins to industrialisation and growth, requires a coordinated interplay between sources of capital and competence; the corporate sector and its R&D resources, infrastructure and channels to markets; governments with funding and adapted policies; and academia with their research infrastructure and capacities.

Source: Massimo Portincaso

Traditional strong industrial ecosystems are undergoing a massive transformation because of the green and digital transition, and deep tech is enabling this transformation. This implies a restructuring of ecosystems where new and existing players establish new collaborative relationships that exploit innovation areas that drive the transformation of industry. Hence, developing strong positions in essential innovation areas is crucial for the success of this transformation. This requires securing

the necessary skills and collaboration between key ecosystem players.

Tomas Naucler exemplified these challenges by showing how deep tech restructures the automotive sector (see figure 7). Automotives were previously an assembly of mechanical components driven by the automotive sector. The value chains and value networks needed for the transformation of the automotive industry are very different from its historical ecosystems.

“ National governments and incubators are everyone doing their little things, but it’s not adding up to one system. So if we want to achieve that, then we have to start looking at it in a more holistic way. We shouldn’t make regulations that kill innovation, we should make regulations that protect the consumer but also that collect the innovations – and that’s not happening at the moment.

R.H. Prince Constantijn Van Oranje-Nassau,
Envoy at Techleap.nl



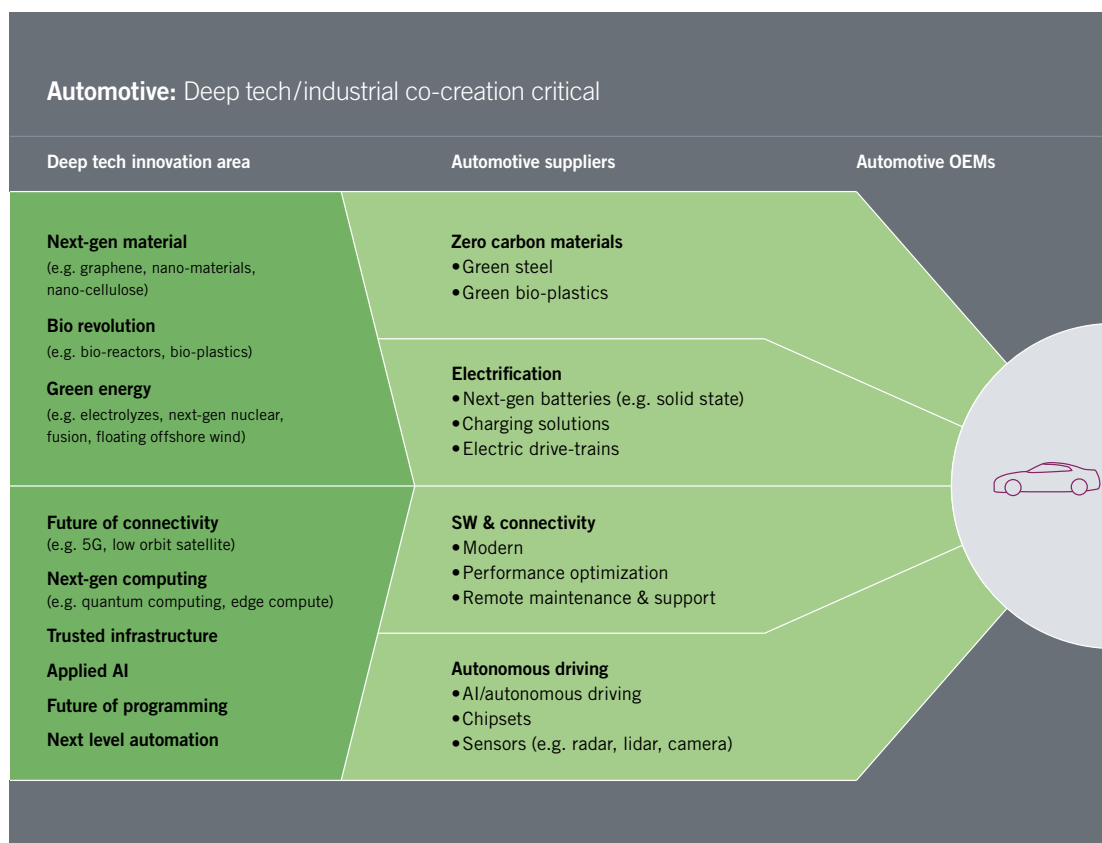


Figure 7: The challenges of developing essential innovation areas is exemplified by the automotive sector. The value chains and value networks needed for the transformation are very different from its historical ecosystems. The innovations that drive the evolution of autonomous, electrified and connected cars are enabled by new deep tech actors.

Source: Tomas Naucler, McKinsey.

The innovations that drive the evolution of autonomous, electrified and connected cars are enabled by new deep tech actors. Together with battery suppliers, connectivity suppliers, zero-emission material suppliers, software/AI suppliers etc, such deep tech actors provide car manufacturers with the components needed to be competitive in the automotive market. If Europe fails in developing new ecosystems to support the transformation of the automotive industry, there is a risk that it will eventually disappear. A similar evolution can also be observed in other industries.

Securing the development of new ecosystems is however a shared responsibility, where the industrial clusters need to take an active role in securing their long-term competitiveness. The need for corporations to engage in collaborative efforts with deep tech ventures was emphasised during the conference. They must increasingly engage in deep tech solutions – as venture clients, infrastructure providers, R&D partners, channels to production facilities and markets, etc. Deep tech ventures, in turn, can provide corporations with renewal of businesses and technologies, by providing

an experimentally driven test environment for new, riskier businesses, and injecting entrepreneurial ways of working into the corporate culture.

As Josemaria Siota pointed out during his keynote presentation, corporate venturing does not have to be limited to venture investment alone – there are many other ways of interacting and collaborating with ventures. In fact, he argues that venture client initiatives are five times cheaper and three times faster than corporate incubation initiatives. Moreover, joint efforts among corporations to interact and collaborate with ventures seem to be an efficient risk reduction strategy for a corporation (denoted “corporate venturing squads” by Josemaria Siota).

However, the combination of deep tech’s technical and market risks coupled with the high financial costs and long development lead-times, puts constraints on such collaboration. Furthermore, it is not easy to ensure the necessary trust between parties and win-win arrangements over time for intermediate and final outcomes.

Thus, the types of collaboration required to unleash corporate–deep tech potential go well beyond established forms of inter-firm linkages such as pre-competitive and competitive R&D collaborations or commercially based customer–client relationships. Policy initiatives promoting innovation collaborations need to understand adapt

and incentivise the new emerging patterns of (open) innovation collaborations e.g a move from contractually driven consortia to collaboration in dynamic open innovation communities, or collaboration in different forms of venture–client initiatives.



“ Although in 2019 corporate incubators was the most active mechanism in Europe. We found that the venture client, that almost no one was knowing what that mechanism was, achieved between 3–5 times efficiencies of cost and speed in this process.

Josemaria Siota, Executive Director of Entrepreneurship and Innovation Center at IESE Business School

1.5 The intellectual property scene

Several speakers agreed on the importance of strategic use and management of intellectual assets if Europe is to succeed in translating scientific discoveries and research-based inventions into successful deep tech solutions. A big step towards a stronger foundation for intellectual property in Europe is the unitary patent system that was launched during the conference. It stands out as the single most important reform in the history of the European patent system since its creation in 1973.

However, the European intellectual property scene has some significant challenges: As highlighted by Daren Tang during his opening speech, intellectual property is not seen as a business and financial asset to the extent that it should be – rectifying this is especially challenging for smaller players. Only 9% of the SMEs in the EU use IP as a strategic asset in their business, but generate 68% more revenue per employee⁹. Deep tech and digital solutions are driving IP submissions, making deep tech a key factor in the IP landscape. But key intellectual assets are not only produced by corporations with large R&D budgets. Today, compared to in the past, more innovations originate in start-ups, SMEs, and academia, often in different types of collaborative set ups. This implies the need for a more inclusive IP landscape and ecosystem.



“ Try not to come late to the party.

Danielle Lewensohn, Director IPR Management
RaySearch Laboratories

Europe is doing well in terms of patenting and the patenting levels in many member states are comparable or even higher than in the US in terms of patents per capita.

However, even though the EU is strong in patenting and a global scientific superpower (home of 6% of the world’s population but with 20% of the most cited scientific publications according to Daren Tang), it is not as successful as the US for example, in translating its IPs into successful value creation.

⁹ https://euipo.europa.eu/tunnel-web/secure/webdav/guest/document_library/observatory/documents/reports/IPContributionStudy/IPR_firm_performance_in_EU/2021_IP_Rights_and_firm_performance_in_the_EU_en.pdf



“ It is really, really important to understand the IP landscape and have a strategy for dealing with it.

Mark Ferguson, Co-founder of Amadeus Capital Partners and Chairman of the EIC Board



“ This is not really rocket science but it needs to be done.

Sonja London, General Counsel and Licensing Executive at TactoTek

The reason for this is hard to determine, but there are a few observations that might explain the situation:

- EU's strong focus on protection via patenting rather than having a broader view on intellectual assets as the foundation for value creation.
- EU's strong focus on making patents a research output (treated as equal to publications), rather than an output of a professional commercialisation process thereby having patenting as one of several strategic options to control an intellectual asset. Hence, as Mark Ferguson and others pointed out, there is a need for academia to develop new incentive systems to support entrepreneurial action and have

the competence to master more options in valorising research results other than publishing or patenting.

- A low level of knowledge among entrepreneurs, researchers, and support service providers on the strategic use of intellectual assets as a source of value creation, competitiveness, and strategic development of business operations.

Lastly, globalisation, the new geopolitical tensions, and the increased requirement to collaborate internationally in order to address our most pressing societal challenges, also create a new challenging landscape for the strategic use of IP.

Chapter 2

The ecosystem



2.1 Framing the challenge

The text in this section is a summary of the scoping paper for the ecosystem workshop, which was sent out to delegates prior to the conference (for the full version see appendix).

- **Delay the incorporation of deep tech ventures:** Deep tech ventures often become incorporated prematurely, without taking the required time to establish teams, mature the technology or develop value propositions and establish the basis of business competitiveness. Early incorporation triggers state-aid regulations, leading to limited public funding and dilutive private capital. A potential solution involves housing ventures within publicly funded not-for-profit incubators until they are ready.
- **Establishing incubation support:** Having a background in academia means that deep tech ventures often lack business expertise and networks. Early-stage ventures struggle to generate revenue, making it difficult to afford necessary support services. These ventures are distinct from established companies and require unique entrepreneurial support services. Europe must choose between fostering a robust privately driven entrepreneurial market or government intervention to support these ventures.
- **Access to innovation infrastructure:** Deep tech ventures require costly innovation infrastructure. Much of this exists in academia and the corporate sector but is not accessible to start-ups due to limited interfaces and high costs. Europe needs to

establish open public-private partnerships for this infrastructure, akin to the impact of cloud computing on traditional tech start-ups.

- **Enhancing collaborations:** Europe's successful track record in promoting R&D collaborations needs to be extended to collaborations centred on deep tech ventures. Public organisations and corporations should drive demand for deep tech solutions, promoting innovation. Ensuring deep tech companies establish their initial customer base in Europe increases the likelihood of having Europe as their base for long-term growth.
- **Balancing collaboration and competition:** The pursuit of transformative deep tech innovations necessitates a balance between collaboration and competition. Developing innovation and deep tech commons can allow competition while preventing fragmentation. Such innovation commons¹⁰ comprise and facilitate knowledge sharing, interoperability, distributed development, and sharing of data.
- **Linking knowledge valorisation to the New European Innovation Agenda:** Europe's focus on deep tech innovation requires a shift in innovation policy towards entrepreneurship. Traditional reliance on "research and innovation" must incorporate entrepreneurial discovery as a crucial mechanism for knowledge-based value creation. The new knowledge valorisation guidelines for the EU highlight entrepreneurship's role in this context.

2.2 Proposed policy actions

1. **Align incentives for key ecosystem players to ensure a coordinated and collaborative effort to support the scaling up and industrialisation of deep tech ventures.** Scaling up deep tech solutions from their scientific origins to industrialisation and growth is amongst the toughest challenges in developing deep tech ventures. It requires a coordinated interplay between many ecosystem players: investors with sufficient capital; human capital/talent with relevant skills and experience; corporations will contribute their R&D-resources, business needs and sales channels to international markets; availability of innovation infrastructure; governments with funding and adapted policies; and academia with their research infrastructure and capacities.
2. **Promote and incentivise corporations to collaborate with deep tech ventures.** Collaboration between large corporations and emerging deep tech ventures is necessary but constitutes a difficult symbiosis. The combination of technical and market risks of deep tech coupled with the high financial costs and long development lead-times put constraints on such collaboration. Furthermore, it is not easy to ensure the necessary trust between parties and win-win arrangements over time for intermediate and final outcomes. Public bodies, for their part, need to investigate the grounds for specific policy measures

¹⁰ Innovation commons denote the pooling, sharing and governance of common information and development resources used to make entrepreneurial discovery of opportunities more effective e.g. by providing access to necessary knowledge and intellectual assets needed to pursue an opportunity, by providing foundations for interoperability and distributed development needed to collaboratively develop system innovations

that target corporate-deep tech collaboration such as actions aimed at harnessing the power of private demand – e.g. tax incentives, staged subsidies and regulatory mandates to make it financially and commercially attractive for lead customers (large firms) and start-ups to collaborate on developing what are known as “first of a kind” deep tech solutions.

3. **Stimulate public-private demand for deep tech solutions through** (i) venture client and venture squad initiatives, and (ii) public-private innovation procurement initiatives that address the digital and green transformation of EU member states. These initiatives are related to the above and need to have a sufficient long-term perspective on funding, procurement, and venture development processes.
4. **Adapt state aid regulation to meet the needs of incubation support targeting deep tech ventures.** Deep tech ventures need to mature both technically and commercially before they are incorporated. This includes government support through non-dilutive funding e.g. by raising ceilings for article 22 and allowing member state initiatives to have selected incubators host ventures. Such initiatives should channel non-dilutive public funding to deep tech projects without become subject to state-aid themselves, even though they receive public funding (and thus utilise the concept of indirect advantage to hosted non-incorporated and incorporated ventures).
5. **Establish an EU-based incubation support structure adapted to deep tech.** This involves EU-wide access to highly qualified coaches and mentors, collaborations with corporations and access to relevant seed funding for incubation.
6. **Improve access to innovation infrastructure.** This action involves public-private investment in new infrastructure, as well as incentivising the development of open technical and commercial interfaces to new and existing infrastructure. These interfaces should have terms and conditions that give deep tech ventures access to the infrastructures at a reasonable cost. Finally, relevant funding instruments need to be established that give deep tech ventures access to the infrastructures e.g. through adapted voucher schemes.
7. **Promote and stimulate the development of innovation commons to be shared among ecosystem players.** That is, establish regulatory and governance institutions that facilitate ecosystem players to cooperate under uncertainty, utilising distributed knowledge to develop a common pool of shared resources that facilitate entrepreneurial discovery of deep tech solutions to societal challenges.
8. **Market and incentivise the implementation of the new knowledge valorisation guidelines in all key ecosystem players.** This involves support of improvements in skills, processes and tools for intellectual asset management and entrepreneurial approaches to deep tech solutions.
9. **Stimulate an inclusive ecosystem.** Make sure that ecosystems for deep tech embrace all talent regardless of race, gender, ethnicity, age, disability, religious beliefs, sexual orientation, education or national origin.

Chapter 3

Financing



3.1 Framing the challenge

The text in this section is a summary of the scoping paper for the financing workshop, which was sent out to delegates prior to the conference (for full version see appendix).

The scoping paper discusses the challenges and implications of traditional exit-driven venture capital (VC) for European deep tech ventures. The VC model aims to make investments liquid through IPOs or trade sales within the fund's lifetime. However, this approach faces difficulties in retaining promising deep tech ventures in Europe and ensuring their growth due to the lack of strong exit markets. This challenge is more pronounced when considering the substantial growth and funding from outside Europe, particularly in the US and China.

Most VC funds in Europe follow a 10-year investment cycle, which can be inadequate for deep tech ventures that have longer development timelines. Deep tech ventures are capital-intensive and have a higher risk profile due to their technological complexity and market uncertainties. As a result, investing in them within the traditional VC framework could be seen as too risky. The need for a revised approach to deep tech funding in Europe is discussed. This includes the development of attractive exit markets for deep tech ventures and the establishment of structures and initiatives to support the industrialisation of these ventures. To achieve this, a new funding framework is required, including the following key points:

- **Extended investment time horizon:** Deep tech ventures require more time to go from scientific discovery to product-market fit. The standard 10-year investment cycle might not be sufficient, and an investment period of 15 years or longer is recommended.
- **Scale and duration:** Deep tech's transformative impact takes time and requires patience and persistence from both founders and related stakeholders. Fragmentation in the European market adds to scale up challenges.

- **Capital intensity already in early development stages:** Deep tech incubation often needs more initial capital, around 2–3 million-euro, due to their complex nature. EU-level support might be necessary in the early stages, as state-aid rules can limit member states' ability to provide capital in pre-seed stages.
- **Ecosystem innovation:** The successful exploitation and scaling up of deep tech solutions require that they become embedded in new interconnections and collaborations between ecosystem players. Hence, new collaborations between academia, innovation support systems, investors and corporate entities are often crucial in solving the financial, technical, and commercial challenges associated with developing and scaling up deep tech solutions.
- **Exit market and industrialisation:** Besides focusing on venture capital, Europe should foster an attractive exit market for VC funds. This involves creating an entrepreneurial economy with strong industrial ecosystems and Europe-based scalable firms.
- **Debt instruments:** Tailored debt instruments should be developed to support deep tech ventures throughout their journey, considering intangible assets and collateral requirements.
- **Access to infrastructure:** Deep tech start-ups require expensive innovation infrastructure, which should be made accessible to lower early-stage investment needs. Collaboration between academia and start-ups is crucial in this context.
- **System solutions and demand:** Focus should shift from merely strengthening the supply side to driving demand through innovative procurement approaches. Large-scale public-private innovation procurement initiatives could stimulate market solutions driven by public needs.
- **Business collaboration:** Encouraging collaboration between established firms and deep tech start-ups is essential. This collaboration can drive demand and provide commercial pathways to the market.

3.2 Proposed policy actions

1. Improve access to non-dilutive funding in the very early phases of deep tech venture development.

These funding tickets need to be able to provide deep tech ventures with an accumulated volume of up to at least 2–3 million-euro.

2. Increase and adapt the growth-capital supply system in Europe by creating a 100-billion-euro European Tech Sovereignty Fund.

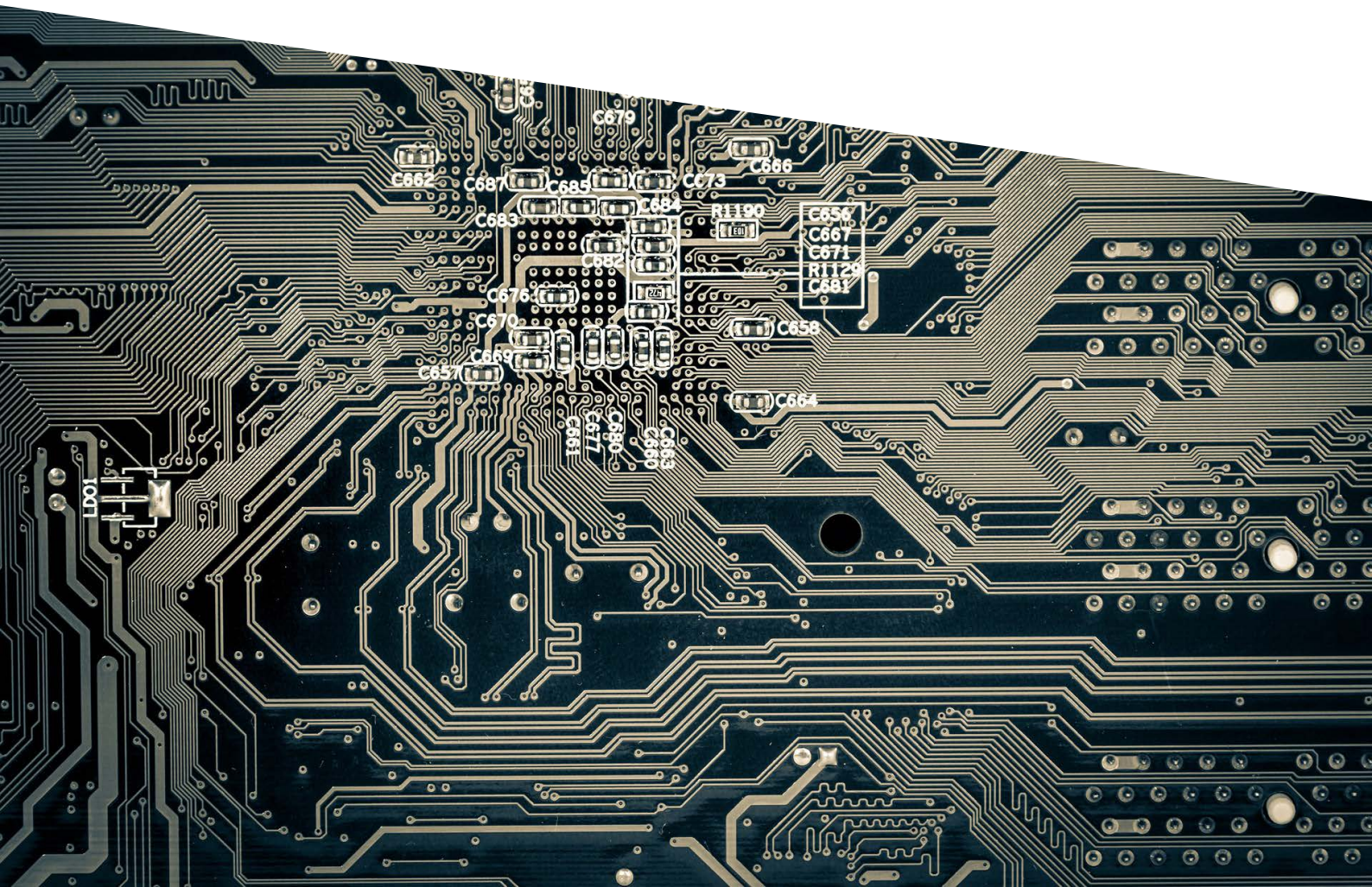
Scaling up of deep tech ventures often requires venture funds to be able to deploy tickets of 50+ million euro. To be able to do

that, European fund sizes would need to be at least one billion euro. Policy actions such as the creation of a 100-billion-euro European Tech Sovereignty Fund that – in cooperation with public, institutional investors – will have private, patient capital from Europe's family offices, pension funds, and foundations as key investors. Such a fund would represent a new 'Alliance for European Tech Sovereignty' between private and public capital providers and importantly have the financial muscles to deploy direct growth-stage investments, and be able to make indirect investments in private European VC-funds that target growth and scaling up of deep tech ventures. These VC-funds also need to be adapted to the nature of deep tech ventures and the European market, hence, having fund lifetimes of at least 15 years or use an "evergreen funding-model".

3. **Increase the availability of debt instruments for deep tech ventures.** Tailored debt instruments – both soft and hard – that taking into consideration intellectual assets as collateral. These should be complemented with tailored governmental loss guarantees in order to incentivise banks and other issuers of debt instruments should be developed to support deep tech ventures throughout their innovation journey.
4. **Strengthen Europe's fund-of-funds ability and financial muscles in order to trigger the establishment of a sufficient number of European VC-funds that target growth and scaling up of deep tech ventures.** These funds need to be sufficiently large enough to provide funding ticket of 50+ million-euro to promising deep tech scale ups.
5. **Develop an action plan and agenda to improve Europe's exit market for deep tech scaleups.** This should include incentives to enhance European trade sales, actions to attract patient capital (e.g. pension funds) and industrialisation capital (e.g. by family offices and foundations) to deep tech developments, and finally improve the attractiveness of European stock markets.
6. **Make a predefined share of public procurements directed to deep tech solutions.** The directive for procurement initiatives should emphasise the responsibility of the procuring organisation to consider the possibility of triggering the orchestration of associated ecosystems, attraction of growth capital and the ability of the venture teams and shareholders to accelerate growth through the procurement contract.

Chapter 4

IP strategy, intellectual assets



4.1 Framing the challenge

The text in this section is a summary of the scoping paper for the IP strategy workshop, which was sent out to delegates prior to the conference (for full version see appendix)

As stated in the Action Plan, intellectual property is a key driver for economic growth as it helps companies to valorise their intellectual assets. The Action Plan aims at enabling creative and innovative industries to remain global leaders while speeding up Europe's green and digital transitions. Small and medium size enterprises need to grow and develop new technology.

In the context of geopolitical tensions and open trade, safeguarding intellectual assets becomes crucial. Companies need to strengthen their ability to use intellectual assets strategically to ensure competitiveness, value creation and new investments. This way, they can contribute both to the green and digital transitions and a stronger European economy.

Key aspects for increased value creation and competitiveness in deep tech companies include:

- **Role of intellectual assets:** Intellectual property intensive industries account for a significant portion of GDP and exports. Globally, submissions for intellectual property rights are on the rise and are increasingly important in the global race for technological leadership. But in today's knowledge economy it is important to capture and manage all intellectual assets strategically. The focus should extend beyond technical inventions and patents and

shift from portfolio building to strategic utilisation portfolios.

- **Business aligned IP strategies:** Modern innovation often requires collaboration and partnerships and even building ecosystems to support the development of emerging technologies. The complexity of today's business environment, rapid shifts in competitiveness, and digital transitions necessitate continuous consideration of a company's intellectual assets, and thereby creating and maintaining an agile and business aligned IP strategy.
- **Competitive advantage:** Companies that incorporate IP strategy for all intellectual assets, including internal information like know-how and trade secrets, gain a competitive edge. Successful IP strategy is based on and supports business strategy goals. IP asset portfolio and IP strategy will be strategic enablers for successful business strategy.
- **Awareness and knowledge:** General awareness and knowledge regarding intellectual assets, intellectual property and especially their strategic use, is low within companies, financiers, and actors in the ecosystem.

The text underscores the need for increased understanding of intellectual assets and their necessary integration into broader business strategies. It also advocates for increased awareness, support, and collaboration across different stakeholders to maximize the potential of intellectual assets for innovation, growth, and competitiveness.

4.2 Proposed policy actions

The following section is a summary of the main findings from the keynote presentations, panel debates and workshops.

The overall challenge and policy actions are to address the structural IP gap in the ecosystem. Successful management and use of intellectual assets requires combining skills of different areas: business development, business law, business funding/economy, business strategy, R&D and IP. Few venture teams and SMEs can articulate their needs in a way that covers all these areas, while at the same time conveying the integration of these aspects in a cohesive strategy and plan. This challenge is accentuated by the way the consultancy market is structured where each of these areas are separate consultancy silos. This leads to ecosystem gaps: Patent consultancy firms focus on helping firms patent and create IPR-foundations for protecting R&D investments. Law firms focus

of negotiating and structuring contracts and agreements. Business developers focus on attracting customers and designing business plans and so on. This leaves the firm in a difficult and fragmented situation. This market structure is also mirrored in many academic research organisations where business support, law and IP support are often separate entities with different objectives. It is proposed that the structural IP gap is addressed through the following actions:

1. **Raise awareness, skills and competences regarding the strategic management and use of intellectual assets among ecosystem actors.** This is one of the most important factors in improving European IP strategies and practices. It involves four areas:
 - a. Strengthen the education system. Include strategic management of intellectual assets, both as a

mandatory subject and as an optional advanced course in education and training programmes for researchers, engineers, lawyers, economists, entrepreneurship, and business administration.

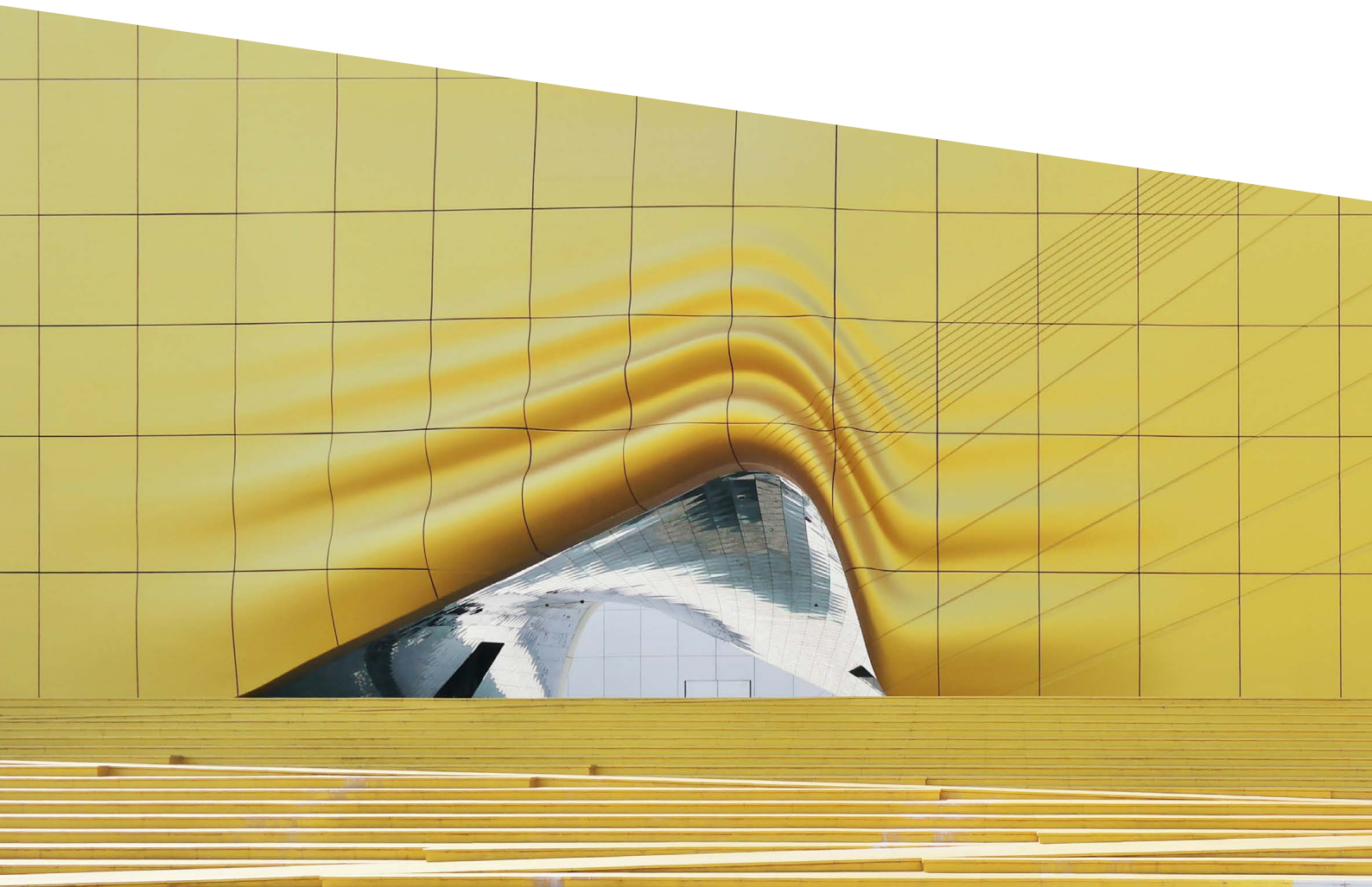
- b. Improve competence of venture teams. Raise awareness, knowledge, and practices of deep tech venture teams in strategic management of intellectual assets.
 - c. Mobilise policy makers and resource providers. Raise awareness and knowledge among policy makers and resource providers such as funding agencies, regulators, ministries, universities, and research institutes/public research organisations. Focus must shift from a dominant belief that IP is solely about protection and patent portfolios to the understanding that the strategic use of intellectual assets can be used to drive collaborations, attract resources, get insights in R&I trends and the competitive landscape (even for universities), and strengthen the potential to create value for stakeholders.
 - d. Raise awareness and promote consultancy firms to develop a broader set of integrated business and IP services or establish joint efforts among specialists to address SMEs need to improve strategic management and use of intellectual assets and IP.
2. **Make intellectual assets a key consideration in R&D and innovation initiatives.** This involves the following actions:
- a. Adapt the regulatory and evaluation framework to support and incentivise the development and control of intellectual assets in academia. This means that patenting is not seen as a research output, but as a control mechanism in a professionally managed intellectual asset portfolio. This also means that incentive structures and research organisations are assessed based on the processes and operations they implement for managing and using intellectual assets rather than having simple output measures like spin-offs, patents, and publications only.
 - b. Provide financial instruments that incentivise and support the development of IP strategies. Moving from an informed awareness of intellectual asset management (IAM) to applying these insights in venture development is challenging for an inexperienced venture team. Hence, governments need to provide financial support to allow venture teams to procure/hire the right expertise, as well as to get support services guiding them through the whole IAM-process from inventory activities to the development and application of IP strategy.
 - c. When evaluating applications for public research and innovation funding, it is essential to incorporate an assessment of the strategic value and competitive position of intellectual assets. Understanding the IP landscape in an area to be funded by public money is essential from a valorisation viewpoint. This information is also essential for making informed decisions regarding venture development strategies and tactics. Hence, including requests and support for information on the competitive landscape and the strategies to tackle IP challenges should be made a mandatory aspect of public R&I funding.

Chapter 5

The next steps

– taking the conference’s messages and actions further

This chapter summarises recommendations for taking the conference’s messages and actions further. The recommendations are supposed to complement the main messages and proposed actions presented earlier in the report and are targeting the European Commission, the member states and the coming EU presidencies.



5.1 Recommendation for improving the cultural context for deep tech actions

1. Promote and support an “ambition-to-win” mentality.

The future of the EU’s competitiveness relies on several different techno-economic pillars, such as access to adequate public and private funding, the degree R&D knowledge, the ability to translate knowledge assets into successful businesses, access to state-of-the-art infrastructure, and the existence of a supportive ecosystem. One aspect often forgotten and possibly underestimated, which is related to risk, is the courage to change in times of uncertainty. It is much safer to play the competitive game one is used to and not risk too much. This leads to an incremental improvement culture that does not encourage big bets and risky endeavours. A “at-least-we-do-not-risk-losing-what-we-have”-mentality prevails in such a culture. If Europe is to succeed in exploiting the 4th wave of innovation, it needs an “ambition-to-compete-and-win”-mentality, which embraces uncertainty and potential failures, and if failure happens, being confident that the lessons learned will make the next effort more successful. This implies support for value creation driven iterative development processes where investments are adapted and staged based on the lessons learned in a fast “design-build-test-learn”-cycle. Hence, Europe would benefit from a larger base of actors with a pronounced “winning mentality”, being self-confident that they are able to push their ventures successfully ahead of global competition. Such “ambition to win” is not limited to single actors – it requires cooperation and collaboration of peers who think similarly. Assessing and harnessing winning mentalities of deep tech initiatives is essential for putting the recommendations in this report into successful action.

2. Embrace and apply trust, risk, and bravery in exploiting support for developing deep tech opportunities.

One important message regarding the basic values Europe needs to embrace in pursuing the deep tech innovation wave is trust, risk and bravery. This is important to apply, not only in pursuing individual deep tech innovation journeys, but also in the set-up

of governmental game play within the EU. One implication of the latter is to dare to re-assess current regulations in the light of deep tech challenges. If member states should have incentives and means to support deep tech ventures and not rely completely on a monopoly of the European Commission on funding deep tech solutions and ventures, then the EU needs to re-assess the state-aid rules. The state-aid rules are designed to avoid distortion of competition in the internal market due to the fear that member states are favouring selectively firms, thereby distorting the competition within the EU. But this focus on internal competition hampers member state initiatives e.g. supporting the incubation phase and non-dilutive funding that is above the ceiling of article 22. Another area is incentivising and supporting the development of innovation commons¹¹ by member state actors that are subject of state aid rules. Thirdly, competition from the US and Asia, especially in deep tech areas, should be the EU’s focus instead of focusing on regulating based on fear of having a distorted competition by member states on the internal market. The latter does not convey trust.

An additional aspect is the opening up of regulatory sandboxes and policy labs in member states to test and play with regulations that hamper innovation efforts or experiment with regulations that are needed to protect society and the planet without creating too many obstacles for desired innovation efforts.

A third area is the need to apply risk, trust and bravery to innovation procurement. Innovation procurement goes beyond pre-commercial procurement and traditional R&D-funding. Applied in the right way, innovation procurement can be used to drive demand of novel, scalable and competitive solutions supporting the green and digital transformation of European markets and societies. Thereby complementing R&D-based mission orientation and R&I-funding. However, it requires member states having new lenses when involved in supporting the development of scalable businesses.

5.2 Recommendations on implementing the conference’s results

3. Disseminate and elaborate the conference's results to a broader audience.

The conference contributed to making European deep tech needs, opportunities, and challenges clear to the participants. Even though it attracted approximately

500 invited ecosystem players, it is important to disseminate these findings to a broader audience in the European deep tech ecosystem. This is the first recommended action to the European Commission and the coming EU presidencies. The dissemination should involve active workshops giving participants an

¹¹ See footnote 10.

opportunity to give their view on the needs, opportunities, and challenges, with the ambition to mobilise their efforts to improve the European deep tech ecosystem.

4. Consider and assess the proposed action points for implementation.

The conference also provided proposal for actions to meet needs, exploit opportunities and address challenges. With this as a foundation for further work, it is recommended that the European Commission and the coming EU presidencies consider and assess the proposed action points, and when appropriate, refine and adapt these actions to ongoing and coming policy actions. In doing so, here are some recommendations for implementation efforts and initiatives:

- Focus on pan-European actions without losing the competence and power regions. Member states can offer in the design and implementation of decided actions. After all, it is about people for people – the willingness and incentives to act is key to success – and most people are citizens of member states.
- Focus on systemic actions that incentivise and align key ecosystem stakeholders in jointly improving the innovativeness and competitiveness of the European deep tech ecosystem.



“ I think this is the moment to demonstrate that Europe could be an innovation leader across the world we do need to have a pan-European approach.

Anna Panagopoulou, DG R&I,
Director for European Research Area and Innovation

- Strengthen the research and analytical work on data driven assessments and analysis of deep tech ecosystems in Europe. The creation of a collaborative EU-wide “Deep Tech Institute”- model through which data, methods, and analytical facts are created, disseminated, and continuously improved to support the European Commission and its member states in sharpening European strategies and action plans on deep tech ecosystems and deep tech innovations.

Sara Modig, State Secretary of the Swedish Ministry of Climate and Enterprise; Teresa Riesgo, Secretary General for Innovation at the Spanish Ministry of Science and Innovation and Anna Panagopoulou, Director for European Research Area and Innovation, summarised in a joint discussion on what is needed for building an innovative, resilient, and competitive internal market for deep tech:

“ These are the two words I think are important for you to know when talking about innovation and deep tech. The first word is, if we build cooperation we need trust, this is in Spanish called *confianza*. And the second word is risk, you have to take risks to go ahead, and risk in Spanish is my name, *Riesgo*. So you won't forget that.

Teresa Riesgo, Secretary General for Innovation at the Spanish Ministry of Science and Innovation

“ Could we please add my name into that fraction as well? *Brave*.

Sara Modig, State Secretary of the Swedish Ministry of Climate and Enterprise

“ In the context of collaboration and co-creation we will only succeed in Europe if we collaborate all together and if we are thinking all together.

Anna Panagopoulou, Director for European Research Area and Innovation, DG R&I.

In summary we need to address this challenge with a mindset of Risk, Trust, Bravery and Collaboration to succeed with the mission to secure Europe's deep tech leadership.

Speakers

Anna Panagopoulou,	DG R&I, Director for European Research Area and Innovation		Technology (MIT) and member of the EIC Board
Andras Inotai,	Head of Unit, Innovation Policy and Access to Finance, DG Research & Innovation, European Commission	Lisa Ericsson,	Head of KTH Innovation
Andreas Grape,	Founder Nordic Angels	Magnus Björsne	CEO AstraZeneca BioVentureHub
Arthur Jordão	Executive Director at Europe Startup Nations Alliance (ESNA)	Marc Lemaître,	Directorate-General for Research and Innovation, European Commission
Asier Rufino,	CEO Tecnalia /H2SITE	Margrethe Vestager,	Executive Vice President of the European Commission for A Europe Fit for the Digital Age, and Commissioner for Competition
Bowman Heiden,	Executive Director at The Tusher Center, University of California, Berkeley and Director at Center for Intellectual Property	Marjut Falkstedt,	Chief Executive at European Investment Fund
Catherine Schreiber,	Co-founder of ADVITOS	Mark Ferguson,	Co-founder of Amadeus Capital Partners and Chairman of the European Innovation Council Board
Céline Farcet,	Open Innovation Manager at L'Oréal	Martin Kern,	Director at the European Institute of Innovation and Technology
Christopher Jacklin,	CEO LuceroBio	Martin Svensson,	Co-director AI Sweden
Danielle Lewensohn,	Director IPR Management RaySearch Laboratories	Massimo Portincaso,	Chairman of the Advisory Board at Hello Tomorrow
Daren Tang,	Director General at World Intellectual Property Organization (WIPO)	Maud Vinet,	Co-founder and CEO at SiQuance
Darja Isaksson,	Director General at the Swedish Innovation Agency Vinnova	Michiel Scheffer,	EIC President
David van Weel,	NATO Assistant Secretary General for Emerging Security Challenges	Mikkel Sörensen,	CEO DTU Skylabs
Delphine D'amarzit,	Member of Euronext Managing Board and CEO of Euronext Paris	Nicolas Brien	President of the European Startup network
Ebba Busch	Minister for Energy, Business and Industry and Deputy Prime Minister	Niklas Zennström,	Founding partner and CEO at Atomico
Elvira Shishenina,	President and co-founder Quant X and Quantum Computing lead at BMW Group	Patrice Pellegrino,	Director Brussel Office EPO
Eric Kievit,	COO Qblox Quantum	Paula Laine,	CEO The Finnish Climate Fund
Eva Lundin,	Region Dalarna	Peter Roos,	CEO at Novatron Fusion Group AB
Heike Freund,	COO at Marvel Fusion	Philippe Huberdeau,	Secretary-General of Scale Up Europe
Herman Hauser,	Director and Co-founder of Amadeus Capital Partners and member of the EIC Board	Philippe Notton,	CEO SiPearl
Håkan Jevrell,	State Secretary to Minister for International Development Cooperation and Foreign Trade	Pär Hedberg	CEO STING
Inge Buffolo,	Director of EUIPO's Customer Department	Raycho Raychev,	CEO Endurosat
Inka Mero	Founder & Manging Partner – Voima Ventures	R.H. Prince Constantijn Van Oranje-Nassau,	Envoy at Techleap.nl
Jan Goetz,	CEO & Co-Founder at IQM Quantum Computers	Sabine Hepperle,	Head of the SME Policy department at the German Federal Ministry for Economic Affairs and Climate Action
Jean-Christoph Laloux,	Director General, Head of Lending and Advisory Operations at the European Investment Bank (EIB)	Salla Saastamoinen,	Deputy Director General of the Joint Research Center
Jean-David Malo,	Director of the European Innovation Council and SMEs Executive Agency	Sara Mazur,	Chair of the Board at Wallenberg AI, Autonomous Systems and Software Program (WASP)
Johan Stahre,	Professor, Chair of Production Systems, Head of Division at Chalmers University of Technology	Sara Modig,	State Secretary, Swedish Ministry of Climate and Enterprise
Josemaria Siota,	Executive Director of Entrepreneurship and Innovation Center at IESE Business School	Sonja London,	General Counsel and Licensing Executive at TactoTek
Julia Reinaud,	Senior Director, Europe at Breakthrough Energy	Stina Lantz,	CEO Swedish Incubators & Science Parks (SISP)
Kerstin Jorna,	Director-General – Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs	Teresa Riesgo,	Secretary General for Innovation, Spanish Ministry of Science and Innovation
Lars Frølund,	Lecturer at Massachusetts Institute of	Thomas Kösters,	CEO DEEP Ecosystems
		Thomas Klem Andersen,	Alliance manager at DeepTech Alliance
		Tomas Naucner,	Senior partner at McKinsey
		Viorel Peca,	Head of Unit at European Commission
		Yann Ménière,	Chief Economist, European Patent Office