# *ekip* Policy Lab

## Reimagining deep tech: What creatives make possible

Scoping Note

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This project has received funding from the European Union's Horizon (2021-2027) Research and Innovation programme under grant agreement No. 101112111

# Table of Contents


***EKIP* POLICY LAB** ..... **1**

**1 INTRODUCTION** ..... **1**

**2 DEFINING DEEP TECH AND ITS RELEVANCE FOR THE CCIS** ..... **1**

DEFINITION ..... 1
DEEP TECH AND THE RELEVANCE FOR CCIS ..... 4

**3 CURRENT EU POLICY AND PROGRAMMES** ..... **9**

3.1 DEEP TECH & CCI IN EU RESEARCH AND INNOVATION POLICY ..... 9
3.2 EU PROGRAMMES ..... 13
3.3 NATIONAL PROGRAMMES ..... 15

**4 POLICY VISION** ..... **16**

4.1 DIRECTION 1: INTEGRATING CCIS IN THE EARLY STAGES OF A TECHNOLOGICAL TRAJECTORY AS A COMPETITIVE STRATEGY ..... 17
4.2 DIRECTION 2: EMBEDDING CCI IN THE DEVELOPMENT OF DEEP TECH INTO HUMAN-CENTERED PROPOSITIONS ..... 19
4.3 DIRECTION 3: CCIS AS ENABLERS OF DEEP TECH DIFFUSION ACROSS SECTORS AND SOCIETY ..... 21

**ANNEX – WORKSHOP SCENARIOS** ..... **25**

# 1 Introduction

European policy has discovered investment in the realm of 'deep tech' as one of the cures for a perceived lack of innovation and competitiveness and has placed the concept at the centre of many of the future programmes for the post-2028 period[1]. With this scoping note, *ekip*, the European cultural and creative industries innovation policy platform, aims to offer a unique perspective about the intersection of innovation in the cultural and creative industries (CCI) and the deep tech agenda. The objective of the scoping note is to inform the discussion at an *ekip* Policy Lab centred on the role of CCIs in shaping deep tech development to address specific societal challenges[2], ultimately leading to the formulation of EU-level policy recommendations. Our intention is to bring about policy suggestions in two dimensions, which are deeply rooted in the catalytic role of CCIs as motors of innovation and technology diffusion across other sectors of the economy. The first dimension recognises how CCIs can shape the development of emerging technologies at their early stage, ensuring that novel solutions provide economic and societal value in the future. The second dimension concerns the diffusion of deep tech solutions already on the market and their impact on and interplay with CCIs.

To do so, this scoping document is structured as follows. Chapter 2 presents definitions of the term 'deep tech' and a background discussion of the interrelation between CCI and deep tech. Chapter 3 presents an overview of EU policy in the deep tech arena so far, as well as existing programmes and other support measures. Chapter 4 presents a summary of the underlying research about the possible directions of CCI-deep tech interaction which serve as foundations for the *ekip* Policy Lab on 6 May 2026 in Brussels.

# 2 Defining deep tech and its relevance for the CCIs

## Definition

Working with the term "deep tech" presents an inherent challenge due to the broad meaning and scope of the concept. This section provides a short discussion and contextualization of the concept of "deep technology", based on a synthesis of several existing definitions of the term (see Table 1). Breaking down to the core principles, **deep tech represents more than technical specifications, encompassing a technological and innovation approach,** often attributed to individual companies ("deep techs")**.** It lies at the intersection between tech development, fundamental problems, and the capacity for innovating around these problems[3,4,5,6,7]. Such an approach is characterised by pushing technological advancement in post of addressing societal challenges, affecting some of the most pressing areas of global interest (healthcare, public safety, energy transition, etc.) and by of offering significant improvements over technologies and services currently in use. In practical usage, the term deep tech has pivoted more towards the distinction of the technologies themselves rather than the companies behind them.

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1 See COM(2025) 30 final. https://commission.europa.eu/document/download/10017eb1-4722-4333-add2-e0ed18105a34_en?filename=Communication_1.pdf

2 To be held on 6 May 2026 in Brussels, Belgium.

3 United Nations Development Programme – UNDP (2020) https://www.undp.org/policy-centre/singapore/deep-tech-and-innovations; UNDP (2025) https://www.undp.org/sites/g/files/zskgke326/files/2025-06/undp-global-deep-tech-ecosystems.pdf

4 European Innovation Council – EIC (2021): https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2021/wp_horizon-eic-2021_en.pdf

5 Hello Tomorrow / Boston Consulting Group – BCG (2021) https://hello-tomorrow.org/wp-content/uploads/2021/01/BCG_Hello_Tomorrow_Great-Wave.pdf

6 European Institute of Innovation & Technology – EIT (2023): https://www.eitdeeptechtalent.eu/wp-content/uploads/gb/2023/02/deeptech-definitions.pdf

7 McKinsey Business Building (2025): https://www.mckinsey.com/capabilities/business-building/our-insights/europes-deep-tech-engine-could-spur-1-trillion-in-economic-growth

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*Table 1 Examples of deep tech definitions*

| Institution | Definition |
|---|---|
| **United Nations Development Programme – UNDP**[8] 2020 | *"At their core, deep tech companies are propelled by **intensive research and development (R&D), thriving within an ecosystem** comprising public funding, private innovation, and academia research. Rather than isolating their focus on the technology itself, most deep tech ventures **adopt a problem-centric approach.** They consider pressing challenges and unmet needs in both business and the broader economy that these cutting-edge technologies have the potential to resolve."* |
| **European Innovation Council – EIC**[9] 2021 | *"Deep tech is technology that is based on **cutting edge scientific advances and discoveries** and is characterized by the need to stay at the technological forefront by **constant interaction with new ideas and results** from the lab."* |
| **Hello Tomorrow / Boston Consulting Group – BCG**[10] 2021 | *"Deep tech ventures are characterized by four main attributes. **They are problem-oriented,** not technology-driven. They situate themselves, instead, at the **convergence of technologies.** Building on the advancements stemming from the digital revolution, deep tech has shifted innovation away from the digital world towards the physical one, **developing mainly physical products, rather than software.** Lastly, deep tech ventures **rely on a deeply interconnected ecosystem of actors, without which it cannot thrive."*** |
| **European Institute of Innovation & Technology – EIT**[11] 2023 | *"Deep-tech is a classification of an institution, an organisation or a start-up company, with the expressed objective of **providing advanced and emerging technology solutions to deep societal challenges.** They present scientific or engineering challenges requiring lengthy research and development, and large capital investment before successful commercialization. Moreover, **the solutions provided by deep technology and applications are critical for solving the complex global challenges** that humanity faces, including climate change, sustainable energy or health."* |
| **McKinsey Business Building**[12] 2025 | *"We define deep-tech companies as those that **turn technological breakthroughs into scalable, value-generating businesses to solve societal problems.** [...] To be classified as deep tech, companies must also have other specific characteristics, such as intensive R&D activity and high funding needs."* |

*Source: authors' compilation*

Several of the definitions shown in Table 1 point to different application and technology areas. The EIT Deep Tech Talent Initiative identifies a total of 15 different deep tech fields.[13] Similarly, there are institutions and organisations that work at the intersection of CCIs and deep techs, which take a closer look at how these two domains relate to each other. For instance, Digital Catapult (a deep tech innovation organisation) coined the term ``creative deep tech" to illustrate the convergence between creative industries, creative technologies, and deep tech capabilities[14]. Based on these considerations and for the purpose of this scoping document and the *ekip* Policy Lab, we understand "deep tech" as:

> *the intentional application of frontier science and engineering to drive purposeful societal progress, by constant interaction within a coordinated ecosystem of actors in order to deliver breakthrough innovation.*

[8] https://www.undp.org/policy-centre/singapore/deep-tech-and-innovations

[9] https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2021/wp_horizon-eic-2021_en.pdf

[10] https://hello-tomorrow.org/wp-content/uploads/2021/01/BCG_Hello_Tomorrow_Great-Wave.pdf

[11] https://www.eitdeeptechtalent.eu/wp-content/uploads/gb/2023/02/deeptech-definitions.pdf

[12] https://www.mckinsey.com/capabilities/business-building/our-insights/europes-deep-tech-engine-could-spur-1-trillion-in-economic-growth

13 These fields are 1) Advanced computing/quantum computing, 2) advanced manufacturing, 3) Advanced materials, 4) Aerospace, automotive, and remote sensing, 5) AI and machine learning, including big data, 6) Biotechnology and life sciences, 7) Communications and networks, including 5G, 8) Cybersecutity and Data Protection, 9) Electronics and Photonics, 10) Internet of Things, W3C, Semantic Web, 11) Robotics, 12) Semiconductors (microchips), 13) Sustainable energy and clean technologies, 14) Virtual reality, augmented reality, metaverse, and 15), Web 3.0, including blockchain, distributed ledgers, NFTs. See https://www.eitdeeptechtalent.eu/the-initiative/what-is-deep-tech/; https://www.eitdeeptechtalent.eu/wp-content/uploads/gb/2023/02/deeptech-definitions.pdf

14 https://www.digicatapult.org.uk/wp-content/uploads/2026/01/1850_Digital-Catapult_Creative-Deep-Tech-Report-2025_Chapter-1_FINAL.pdf

Generally, we adopt a technology-agnostic understanding of deep tech. However, for the purposes of illustrating examples of CCI-deep tech linkages, the next chapters of the scoping document will also contain references and examples of specific deep tech fields identified by *ekip* as being of special relevance to CCIs.

As mentioned in the definitions above, **deep tech innovation is an ecosystem-level effort,** driven by their capacity to provide innovative disruption by means of coordinated collaboration. Thriving through constant interaction between academia, external funding, and private innovation, different actors come into play to move discoveries from the lab into the physical world. We thus encounter a landscape where innovation serves as the primary vehicle for achieving societal impact, and where stakeholders cluster within ecosystems to support each other's activities. What is more, this next wave of innovation led by deep-tech is expected to involve a greater convergence of actors, where the exchange of information and knowledge becomes the catalyst for transforming current markets and industries[15].

Following this line, the European Commission[16] has pointed out how new technologies will have a deep effect on the CCIs, societies and the entire economy:

> *[Deep tech] raises the question of how best to prepare the CCIs to take full advantage of cutting-edge technologies, and how to develop a human-centric approach to new technologies, where the creators of those technologies can still understand, predict, and reliably control the developments that they have triggered.*

For *ekip*, this represents a critical intervention point. It is an opportunity to reposition CCIs not merely as facilitators or late-stage adopters of deep-tech, but as **active shapers of purposive innovation**. Unlike conventional production, **CCI-led innovation is deeply rooted in societal progress;** it prioritises not only *what* is being developed, but *how* it will impact the human experience. In this context, the cultural and humanistic layer provided by CCIs is not decorative, but foundational). CCIs possess the potential to make technology more intentional, transforming deep-tech from a system that dictates human behaviour into one that is purposefully shaped by it. As the "need for reimagination"[17] emerges as a primary challenge for deep-tech ventures, the vision of creative CCI professionals becomes vital in the pursuit of truly human-centric alternatives. By merging advanced technologies with societal-driven approaches, deep-tech innovators can deliver genuine and tangible impacts[18]. We therefore propose strengthening these capabilities from the following two angles during the *ekip* Policy Lab, each addressing a specific technological context:

- **A more short-term perspective on already impacting technologies.** Understanding the role of CCIs as innovative explorers for current technologies, evidencing that they both benefit each other. How can CCIs play a role in shaping powerful technology, driving adoption and innovation in deep tech fields?
- **A more long-term perspective on technologies at an emerging stage**. Here, we think about the impact of the creative CCI mindset when contributing during the early stages of deep tech development. How can it be used for tuning a desirable future? How can it inspire innovation that

15 Hello Tomorrow / Boston Consulting Group – BCG (2021). https://hello-tomorrow.org/wp-content/uploads/2021/01/BCG_Hello_Tomorrow_Great-Wave.pdf

16 Unleashing the Potential of the Cultural and Creative Industries (2025): https://op.europa.eu/en/publication-detail/-/publication/372efc5e-7e43-11f0-9af8-01aa75ed71a1/language-en

17 Hello Tomorrow / Boston Consulting Group – BCG (2021) https://hello-tomorrow.org/wp-content/uploads/2021/01/BCG_Hello_Tomorrow_Great-Wave.pdf

18 The EIT Deep Tech Talent Initiative - DTTI (2025) https://eit-culture-creativity.eu/latest-news/2025-03-14-eit-deep-tech-talent-call-training-proposals-2025-open-0

positions Europe at the global forefront, while pushing forward the human-centric factor as a major requirement?[19]

## Deep tech and the relevance for CCIs

**Technological innovation has radically changed the way CCIs structure and deliver their work.** Across deep tech areas, digital technologies and digitalisation are probably having the most imminent impacts on CCIs at the moment[20]; content development has undergone a structural transformation in the production landscape, marked by a surge in new resources, mediums, and capabilities, resulting in more material produced. Reports[21] note how **the distinction between audiences and users has become increasingly blurred:** citizens are no longer mere consumers; they are also practitioners, actively shaping cultural but especially creative outcomes. We can also appreciate the **constant adoption of emerging tech applications in cultural and creative sectors**. For instance, Virtual Reality (VR) and Augmented Reality (AR) have provided an innovative way to deliver immersive experiences in the field of cultural heritage, such as in museums and exhibitions, improving the way values and traditions are transmitted[22].

***ekip* social listening results**

**Where tech meets art**: Online discussions address how advanced technologies are becoming embedded in the everyday practices of CCI actors, including artists, designers, and architects. These conversations point to a practice-led relationship with deep tech, where technology opens up new possibilities for expression and innovation. Creative practitioners, for example, increasingly engage with deep tech as a generative medium, using it as a space for experimentation and creation, particularly in fields such as gaming & IT, and the visual arts.

Furthermore, Generative Artificial Intelligence (GenAI) and Machine Learning (ML) are expanding and transforming creative sector[23], offering tools that exponentially enhance the creation of content and concepts[24] but also creating risks related to the livelihood of creatives and the future of creative work at large. This is particularly prominent in industries connected to audiovisual production, music, writing, visual arts, textile design, and architecture[25]. As such, CCIs represent a significant component of the generative AI ecosystem. For example, in 2023, the media and entertainment sector accounted for an estimated 40% of total generative AI market investment – approximately €1.3 billion out of €3.21 billion[26]. By 2028, the image, video, and music/audio GenAI segments are projected to experience the highest growth (after code generation tools), with compound annual growth rates of,

[19] Hello Tomorrow / Boston Consulting Group – BCG (2021) https://hello-tomorrow.org/wp-content/uploads/2021/01/BCG_Hello_Tomorrow_Great-Wave.pdf

20 Sacco, P. L., Ferilli, G., & Tavano Blessi, G. (2018). From Culture 1.0 to Culture 3.0: Three Socio-Technical Regimes of Social and Economic Value Creation through Culture, and Their Impact on European Cohesion Policies. *Sustainability*, *10*(11), 3923. https://doi.org/10.3390/su10113923

21 Sacco, P. L., Ferilli, G., & Tavano Blessi, G. (2018). From Culture 1.0 to Culture 3.0: Three Socio-Technical Regimes of Social and Economic Value Creation through Culture, and Their Impact on European Cohesion Policies. *Sustainability*, *10*(11), 3923. https://doi.org/10.3390/su10113923

22 The Rise of Immersive Exhibitions – Medium (2025): https://medium.com/@danaycc/the-rise-of-immersive-exhibition-28b473982d0d

[23] World Economic Forum. (2025, 21 January). The impact of GenAI on the creative industries and the ethics and governance we must put in place. https://www.weforum.org/stories/2025/01/the-impact-of-genai-on-the-creative-industries/.

24 https://planetix.co/transmission/deep-tech/

[25] Alabi, M. (2024). Generative AI and its applications in creative industries.

[26] Goldmedia. AI and Music. Market development of AI in the music sector and impact on music authors and creators in Germany and France. Commissioned by SACEM & GEMA. https://www.gema.de/documents/d/guest/gema-sacem-goldmedia-ai-and-music-pdf

respectively, 65.8%, 61.2%, and 59.8% between 2023 and 2028[27]. While these numbers appear impressive, there is a risk of overlooking and underfunding the potential of creative firms at the intersection of technology. A UK study, for example, found that 10% of UK firms with high growth potential stem from creative industries, and that two-thirds of those "operate in application software, with significant numbers working in Marketing, Branding and Advertising, Films and TV and Video games", while suffering from a lack of equity and debt financing options.[28]

### The intersection between deep tech and the cultural and creative industries

CCIs and deep techs share innovation as a core element in their respective domains. While tech initiatives require innovative solutions to solve global challenges and scaling their own business models, creative industries approach innovation as a means to differentiate and improve content production.

At the intersection of these realities lies creative deep techs, a concept popularised by Digital Catapult[29] to describe the convergence of the creative industries with pioneering deep technological innovation. We are facing a critical period where the democratisation of powerful, accessible tools and digital platforms is redefining the sector's transformative capabilities. Beyond mere adoption, the creative industries are becoming essential to the creation, operation, and consumption of next-generation content, capable of generating global impact especially when aligned with deep-tech infrastructure. This potential is already being realised in countries like the UK or the Netherlands, where the creative sector has grown significantly faster than the national business average, contributing over 5% to both national GDPs[30,31]. Indeed, advanced technical capabilities can significantly accelerate CCI activity by enabling them to deliver their innovative purpose more effectively[32].

**ekip social listening results**

**Human-centred tech**: This trend centres on the normative and societal dimensions of deep tech, including issues such as responsible innovation, algorithmic transparency, and value-driven governance. Practitioners are increasingly exploring how technology can be shaped in line with human and cultural values, alongside growing civic expectations that AI should be developed in collaboration with people. In this context, the cultural perspective that CCIs provide is seen as a foundational layer for deep tech. This creates an opportunity for CCIs to make technological development more intentional by placing greater emphasis on the human dimension.

[27] Goldmedia. AI and Music. Market development of AI in the music sector and impact on music authors and creators in Germany and France. Commissioned by SACEM & GEMA. https://www.gema.de/documents/d/guest/gema-sacem-goldmedia-ai-and-music-pdf

[28] https://pec.ac.uk/research_report_entr/high-growth-potential-firms-in-the-uks-creative-industries/

29 https://www.digicatapult.org.uk/wp-content/uploads/2026/01/1850_Digital-Catapult_Creative-Deep-Tech-Report-2025_Chapter-1_FINAL.pdf

[30] https://www.wearecreative.uk/champion/statistics/

31 https://test-www.welcome-to-nl.nl/work-in-nl/creative-industries

32 Hsu et al. (2023) - Crafting digital business ecosystems for cultural and creative industries: https://www.researchgate.net/publication/376636188_Crafting_digital_business_ecosystems_for_cultural_and_creative_industries

While these interactions require collaboration, skills and equipment that is spread across different sectors and industries, and have the potential to foster different types of innovations, there may also be frictions arising from the different logics. For example, commercial exploitation interest can clash with artistic work and modes of exploration, as they "are all very different spaces from the art world, meaning that they present opportunities for engagement and collaboration, but also the potential for divergence and dissonance."[33] The lessons learnt from European programmes such as STARTS also highlight these frictions. A reflection on the the MUSAE Factory Model, for instance, acknowledges this problem while finding that "creative tensions foster innovation. Interdisciplinary teams often face divergent perspectives and interests, yet these frictions sparked fresh ways of addressing complex challenges."[34]

While global investment trends increasingly favour deep-techs[35], the success of these innovative-led models may require a vision where creative initiatives drive the technological power. Europe lies in the middle of this paradigm, possessing a unique foundation of talent, research, and capital[36,37]; by adopting strategies supporting initiatives rooted in creative deep techs, the EU could position itself at the forefront of modern tech innovation.

This notion connects with our initial discussion about the capabilities of the CCIs for pushing innovation with regards to deep tech ventures, especially for those that are already available on the market but still hold great potential (e.g., immersive media, new materials, AI generation, etc.). Across the *ekip* journey, we have grasped the importance of advanced materials for industrial innovation, as it is the case for the fashion and textile ecosystems of Europe[38,39]. Fabric innovation is leading the fashion industry[40], where creative sectors have explored new alternatives either for material production (e.g., smart and bio-based fabrics) or systemic models (e.g., implementation of the Digital Product Passport).

These examples reflect the positive impact CCIs may deliver when combined with tech sectors, particularly when creative industries participate. Still, several challenges hinder steady collaborations, as we will acknowledge in the corresponding section. Policy intervention will be pivotal for leveraging these intersections, not only for aligning the creative and deep tech industries for product innovation but also for informing a competitive policy system that supports their sustainable growth in the long run.

***ekip* social listening results**

**Co-creative opportunities**: Online discussion focuses on the types of productive alignments emerging at the intersection of deep tech and CCIs. However, these conversations also highlight a fragmented landscape, marked by the absence of a shared agenda or common institutional infrastructure. As a result, many initiatives remain isolated rather than forming a coherent ecosystem.

[33] https://d37zoqglehb907.cloudfront.net/uploads/2020/07/Future-Art-Ecosystems-1-Art-and-Advanced-Technologies_July_2020.pdf

[34] https://starts.eu/wp-content/uploads/STARTS_Lessons-Learned-from-a-Decade-of-Transdisciplinary-Innovation.pdf

35 https://content.dealroom.co/uploaded/2023/01/Dealroom-deep-tech-report-2023-europe.pdf

36 https://www.tno.nl/en/collaboration/

37 https://commission.europa.eu/topics/competitiveness/draghi-report_en

38 https://ekipengine.eu/policies/fashion-transition-eco-design-for-circularity/

39 https://ekipengine.eu/beyond-fast-fashion-how-digital-passports-could-stitch-a-greener-future-for-europes-textile-industry/ https://ekipengine.eu/beyond-fast-fashion-how-digital-passports-could-stitch-a-greener-future-for-europes-textile-industry/

40 https://heuritech.com/articles/fashion-fabric-innovations/

## Creative intervention for policy framing

Navigating policy intervention with direct impact for technological sectors presents a complex crossroad. It is no longer just a matter of the technical expertise required to develop effective measures, but also the inherent nature of the policymaking process; the time and coordination required for effective formulation often clash with the rapid and changing pace of the industry.

With the entrance of emerging deep technologies, how can we prepare and act accordingly? How can we foster competitive development in these *winner-takes-all* markets while simultaneously monitoring and respecting the socio-ethical impact of such innovations? A defining characteristic of this dilemma is that we are dealing with the potential **consequences and scenarios of the (near) future.** While potential benefits are on the radar (e.g., improvement in healthcare, security, AI), a lack of public understanding often leads to technology being viewed primarily through the lens of threats (e.g., the fear of quantum computers breaking public-key encryption). As Groenland[41] remarks in his work on making quantum technology accessible, discussing the future "comes with mountains of uncertainty," which often triggers scepticism and reluctance. This is where the role of CCIs can make a decisive difference. Consequently, a sustainable strategy must go beyond addressing current impacts[42] to predict the future situations we may encounter and acting now in anticipation of them[43].

This notion demands a **feedback loop between development and policymaking:** technology must align within regulatory objectives to avoid friction or stagnation, while legislation must remain flexible and adapt to new socio-technological circumstances, allowing for controlled yet competitive sectoral growth. This remains a critical challenge because, as evidenced by the report from the World Economic Forum (WEF) on creative disruption, which argues that *"rapid development makes future-oriented thinking more important, yet harder to accomplish"*. The WEF[44] stressed this reality and delivered an insightful analysis on strategic policy formulation;

> *Countries that anticipate change, rather than merely reacting to it, typically gain a competitive edge. In fact, the most competitive economies are those that prepare for multiple scenarios in their national planning processes to tackle the moving target of technological and social transformation. That's why a new generation of policy-makers around the world are turning to strategic foresight – the practice of anticipating future trends and disruptions – to design policies that are agile, data-driven and resilient. It can transform policy-making from a reactive to a proactive exercise, allowing nations to future-proof their economies, nurture innovation and drive long-term resilience.*
>
> *Coupled with intelligent systems, strategic foresight-driven policy helps anticipate disruption rather than merely responding to it. It enables policy-makers to design strategies in which data, trends and imagination come together to shape the future.*

In light of this, CCIs can pivot toward a proactive role, supporting the formulation of policies that enable long-term **deep-tech development in accordance with regulatory frameworks, through an informed process of foresight and future visioning.** This means building resilience and making better-informed choices today to secure a positive impact on the future, as CCIs are in the position to contribute to the demystification of these technologies by steering these impacts toward positive outcomes. This is particularly relevant for design and art-related sectors, as they may be key players on supporting the acceptance and surge of emerging technologies thanks to the exploratory vision and methodologies that they train and apply in their domains.

41 https://introtoquantum.org/

42 the EU confronting the unethical use of AI in social media https://www.europarl.europa.eu/news/en/agenda/plenary-news/2026-01-19/8/tackling-ai-deepfakes-and-sexual-exploitation-on-social-media

43 Future-Proofing the Quantum Europe Strategy for 2040 - EPRS | European Parliamentary Research Service (2025): https://espas.secure.europarl.europa.eu/orbis/system/files/generated/document/en/Future-proofing_the_Quantum_Europe_Strategy_for_2040_FINAL.pdf

44 https://www.weforum.org/stories/2025/10/strategic-foresight-policy-economies-competitive/

As experts note, many disruptive technologies are characterised[45] by a notable gap between academic research and industry applications. This often means that understanding their potential implications can only be considered by professionals from these tech sectors, therefore limiting adoption. By breaking down complex principles through the exploratory and experimental approaches often used within CCIs, creatives may facilitate understanding, dissemination, and recognition of technologies for addressing societal challenges. For instance, experts can develop future scenarios to disseminate knowledge of emerging technologies tailored to assist policymakers in developing actionable frameworks, providing a way to anticipate and avoid costly mistakes by identifying potential harms early. Simultaneously, similar efforts can attract new stakeholders to invest in these sectors, contributing to the competitive development of the industry..

In Box 1 we present a case study about navigating policymaking for quantum tech by following a future visioning strategy. It illustrates the benefits of applying design-based methodologies for strategic foresighting and policy intervention.

*Box 1: Case study: Quantum Futures & Quantum Applications card games (TU Delft & Quantum Delta NL)*

**Interactive tools for joining the quantum debate**

By turning a complex subject into an interactive and accessible experience, The Quantum Futures Game and The Quantum Applications Game help organisations, policymakers, and professionals imagine the future (together). They help spark conversations, inspiring strategies, and prepare for what is next. The tools were developed in collaboration between the Technical University of Delft and the Quantum Delta NL foundation, led by Deborah Nas and Juwe van Vliet.

- **TU Delft:** is a globally ranked institution at the forefront of engineering, design, and applied sciences. It serves as a critical research hub, blending scientific inquiry with a multidisciplinary approach to solve complex societal challenges and design the strategic tools of tomorrow.
- **Quantum Delta NL:** is the national foundation dedicated to accelerating the Netherlands' quantum technology ecosystem. Its mission is to position the Netherlands as a global leader in quantum innovation while ensuring these advancements are governed ethically and integrated effectively into society.

**The Quantum Futures Game** seeks to make quantum discourse more accessible by letting you step into the shoes of different stakeholders—from governments and corporations to NGOs, citizens, and even Planet Earth. It sparks debate and reflection by envisioning potential scenarios for 2050. Players face technological, societal, and geopolitical shifts across three decades, choosing which values matter most and pitching their vision for the future.

The Quantum Applications Card Game enables you to explore quantum functions and policy instruments through an interactive format. For many unfamiliar with quantum technologies, it is unclear how they will translate into real-world scenarios. This engaging tool captures more than 100 potential applications of quantum technologies in an accessible and playful format. No prior knowledge of quantum physics is needed to join the game.

**Addressing quantum governance through strategic policy foresight**

45 https://repository.tudelft.nl/record/uuid:39f1a30c-d54e-4cf0-8ac8-96e1f2966ac9

The global technological landscape is shifting rapidly, while geopolitical balances are being redrawn. Quantum technology governance presents a significant challenge for policymakers due to its rapid advancement, interdisciplinary complexity, and systemic implications. In such a world, scenario thinking is more important than ever. It allows us to explore multiple possible futures, challenge our assumptions, and prepare for unexpected turns.

*Source for text and pictures: Quantum for Good[46,47], TU Delft[48].*

Cross-sectoral collaboration is essential for coordinating the ecosystem of actors responsible for this change, ranging from technologists to policymakers. CCIs, by bridging all these disparate groups in between, contribute to and participate in this shift. Creative industries, **particularly design and art-related sectors,** are experts in navigating explorative and speculative future scenarios, making them crucial allies in co-leading this endeavour. This presents a critical opportunity to direct Europe's future toward a technologically competitive society with a human-centred approach, ensuring governance is conceived with social alignment and responsible impact in mind.

# 3 Current EU policy and programmes

This chapter provides a review of EU agendas, programmes, and strategies related to deep tech innovation, outlining how and to what extent CCIs are reflected within these policy frameworks. The analysis shows that Europe's deep tech agenda claims human-centric innovation as its competitive differentiator. Yet, as the results show, CCIs are largely absent from the process every stage of the technological trajectory, from early framing to development to societal diffusion.

## 3.1 Deep tech & CCI in EU research and innovation policy

This section encompasses an overview of the European research and innovation policy landscape at the intersection of deep tech and cultural and creative industries. Besides summarising the policy context for deep techs, we ultimately aim to understand the extent to which creative industries are integrated into European strategic documents.

Overall, the analysis reveals a strong commitment to boost European macroeconomic activity[49,50,51] in order to cope with leading powers, a race in which Europe is currently lagging behind[52]. Here, technology is the most stressed sector, with emerging and digital techs dominating the discussion. Therefore, accelerating deep-tech practices stands as a top priority, due to their great socio-economic impact and competitive potential. Exploring the innovative value that CCIs can introduce to this field is likely the key strategic asset at *ekip*'s disposal for capturing the pan-European attention.

**Broader landscape**

**The European Union is undertaking a thorough strategic endeavour to enhance its global**

46 https://quantumforgood.eu/the-quantum-futures-game/

47 https://quantumforgood.eu/the-quantum-applications-card-game/

48 https://repository.tudelft.nl/record/uuid:39f1a30c-d54e-4cf0-8ac8-96e1f2966ac9

49 The Draghi report on EU competitiveness: https://commission.europa.eu/topics/competitiveness/draghi-report_en

50 Political Guidelines for the Next European Commission (2024–2029)

https://commission.europa.eu/document/download/e6cd4328-673c-4e7a-8683-f63ffb2cf648_en?filename=Political%20Guidelines%202024-2029_EN.pdf

51 Horizon Europe strategic plan 2025-2027

https://op.europa.eu/en/web/eu-law-and-publications/publication-detail/-/publication/6abcc8e7-e685-11ee-8b2b-01aa75ed71a1

52 https://nos.nl/nieuwsuur/artikel/2585550-europa-ontwaakt-in-de-ai-race-maar-druppel-op-gloeiende-plaat

**competitiveness** with several high-level documents being published during the current decade, such as the Future of European Competitiveness[53], The Antwerp Declaration for a European Industrial Deal[54], and A Competitiveness Compass for the EU[55], among others. This overarching ambition is central to the EU's agenda, aiming to reduce dependencies on non-EU players and to safeguard individual rights and societal values within the rapidly evolving global technological and digital landscape[56].Within these frameworks, deep-techs emerge as a critical enabler, vital for addressing some of the most pressing global challenges[57]. Nevertheless, Europe often faces a persistent gap between deep-tech research and its effective transformation into competitive, market-ready solutions, falling short in commercialising and generating profit around the sector[58]. While the region boasts strong talent and funding in certain areas, it lags behind global competitors like the U.S. and China in terms such as risk-taking against failure fright, corporate engagement, or cultural acceptance.

**These efforts involve allocating larger budgets and generating more financing capabilities** to accelerate the development and market launch of new solutions. On one hand, this is led by articulating new strategies and funding[59] programmes aimed at boosting the research, innovation, and deployment of frontier technologies through targeted public support and regulatory frameworks. On the other hand, it also requires investing in the European infrastructure[60] by means of suitable facilities and interconnected industries, making possible a fast incorporation into the market.

Complementing this venture are the **cultural and creative Industries, recognised as robust engines of economic development and societal transformation**[61]. CCIs contribute not only significantly to growth, employment, and innovation across Europe, but also play a unique and indispensable role in shaping collective identities, seeking social cohesion, or exploring alternatives to current standards[62]. The EU's strategic documents in underscore that this is not just about production but about the very future of its socio-economic models[63]. Aligning the pivotal role of deep-techs in fostering global solutions with the rooted impact of CCIs in our community is therefore a promising opportunity for the future of EU competitiveness and prosperity.

## Specific tech strategies at the EU-level

We can find two main categories addressed within the technological sector. One angle corresponds to digital technologies (including AI), whereas the other concerns the activity of emerging and deep technologies.

For digital technologies, the EU has formulated strategies aimed at both expanding and regulating the deployment of systems and infrastructure. This is because Europe seeks to remain at the market's forefront while safeguarding ethical boundaries. Consequently, initiatives are deployed in parallel: the EU

53 https://commission.europa.eu/document/download/97e481fd-2dc3-412d-be4c-f152a8232961_en

54 https://antwerp-declaration.eu/

55 https://commission.europa.eu/document/download/10017eb1-4722-4333-add2-e0ed18105a34_en

56 https://www.ceps.eu/ceps-events/digital-sovereignty-and-standardisation-europe-between-innovation-security-and-competitiveness/

57 https://www.eitdeeptechtalent.eu/the-initiative/what-is-deep-tech/

58 https://resources.stryber.com/blog/deep-tech-commercialization-in-europe

59 https://commission.europa.eu/publications/european-competitiveness-fund_en

60 https://cinea.ec.europa.eu/programmes/connecting-europe-facility_en

61 https://unesdoc.unesco.org/ark:/48223/pf0000377863

62 https://www.oecd.org/en/topics/culture-creative-industries-and-sports.html

63 https://commission.europa.eu/document/download/10017eb1-4722-4333-add2-e0ed18105a34_en

plan for leveraging AI Factories focuses on global leadership in innovation[64], while the AI Act responsibly addresses the regulatory agency these technologies demand[65]. Furthermore, even when the strategic importance of generative AI is increasingly recognised, European companies face challenges in scaling their global influence. To strengthen competitiveness, policy efforts are underway to support European organisations[66], such as the AI Continent Action Plan which establishes conditions for innovation, supported by complementary mechanisms:

- The Data Union Strategy: focusing on reinforcing the EU's data ecosystem through increased interoperability and data availability.[67]
- The Apply AI Strategy: aiming to enhance competitiveness across ten key industries by outlining sector-specific measures and flagship initiatives to encourage adoption.[68] [69].

This technological landscape deeply concerns the CCI sectors, where the impact of digitalisation is a subject of ongoing debate. The Apply AI Strategy specifically highlights AI's potential in areas such as video production, content personalisation, and cultural heritage preservation. Similarly, central to this discussion is the challenge of Intellectual Property (IP), with high-level documents reacting to the specific challenges AI presents to the cultural sector by demanding greater fairness and protection for creators[70, 71, 72].

However, even when there is strong interest in boosting the activity of startups and SMEs (typical CCI models), the focus leans heavily toward technology R&D and market-ready opportunities. Consequently, only a small portion of cultural and creative production has visibility (e.g., Audiovisual, Gaming & IT). In this context, **innovation remains a key objective, but it is primarily viewed through a research and development lens, meaning CCIs and the angle of socio-cultural change are often under-addressed.** As examples, we can find initiatives aimed at exploring techno-creative possibilities, such as the Sony Computer Science Laboratories[73] in Rome, which explores new technologies and sustainable opportunities for the common social good. Other documents claim for more investment[74] in media infrastructure. As a result, indirect contributions from the cultural and creative industries are formulated solely to emphasise innovative directions from a technical standpoint. This approach sidelines other equally important technological repercussions, where CCIs possess expertise such as social impact and ethical implications.

Referring to the other category mentioned—emerging and deep technologies—**policy indications follow a strong commitment at closing the global gap by means of stressing the development and market articulation of innovative tech solutions**. After leading documents pointed out the lack of growth in European-based innovative ventures (such as the Draghi report), several technologies are being pushed with great expectations and investment. For instance, we can see how the biotech sector[75] and the

64 https://digital-strategy.ec.europa.eu/en/policies/ai-factories

65 https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-ai

66 European Commission. (2025, June 13). Generative AI set to transform EU economy but requires further policy action. https://digital-strategy.ec.europa.eu/en/news/generative-ai-set-transform-eu-economy-requires-further-policy-action.

67 European Commission. European Data Union Strategy. https://digital-strategy.ec.europa.eu/en/policies/data-union.

68 Communication from the Commission to the European Parliament and the Council. Apply AI Strategy. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52025DC0723

69 European Commission. Apply AI Strategy. https://digital-strategy.ec.europa.eu/en/policies/apply-ai

70 https://eit-culture-creativity.eu/sites/default/files/2025-12/EIT-Culture-Creativity_Strategic-Agenda-2024-2027.pdf

71 https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022G1207(01)

72 https://culturalfoundation.eu/stories/cdeu-culture-the-compass-for-europes-future-report/

73 Sony Computer Science Laboratories: https://csl.sony.it/

74 https://culture.ec.europa.eu/policies/culture-compass

75 https://www.europarl.europa.eu/RegData/etudes/BRIE/2025/772866/EPRS_BRI(2025)772866_EN.pdf

advanced material sector[76] are expected to be propelled during 2026, with dedicated plans for reactivating their activity. In the same line, quantum technology[77,78] is currently one of the most anticipated sources of innovation, yet it is still in the early stages of development. The Commission has deployed several funding[79] and strategic[80] plans to turn Europe into a quantum powerhouse by mobilising competitive ecosystems; fostering breakthrough innovation and scaling-up high-risk, high-impact companies, in particular SMEs and start-ups. In addition, Europe is adopting new, long-term strategies[81] tuned for coordinating a supportive ecosystem ranging from frontier research to validation and deployment. However, as mentioned in previous *ekip* analyses, these environments are typically shaped by technology and business-led logics. As a result, access for CCIs is often limited, and there are few spaces where creative practices, technological development and entrepreneurial support genuinely intersect.

Stakeholder groups such as Creative FED have identified several recommendations to support creative innovation and competitiveness, including investment in transversal, creative skills (especially around arts and technology) and investment in creative innovation. As they write, "CCS should be recognised not only as beneficiaries of innovation policy but as drivers of future-oriented, cross-sectoral R&D, particularly in areas such as AI in the arts, immersive storytelling, sustainable design, and cultural infrastructure.", ultimately aiding Europe in reclaiming "leadership in cultural technology development".[82] There are also calls for a stronger involvement of CCIs in mission-driven innovation programmes.[83] In a similar vein, and dedicated to artificial intelligence, Culture Action Europe and the Michael Culture Association have released recommendations on the upcoming EU AI Strategy, urging for European R&D funding into digital technologies and an AI and technology partnerships in the cultural and creative industries (e.g., supported by EIT, ECF, EDIHs), again highlight the need for collaborative, cross-disciplinary initiatives which

***ekip* mission**

Deep-tech does not have an isolated impact within the boundaries of technological applications but across other leading domains that rely on them, such as the industrial, healthcare or the security sector. This makes the CCIs powerful allies to drive innovation while ensuring the human-centered values Europe is characterised for. Such a mission is even more relevant when considering technologies that are not fully shaped, where CCIs may offer meaningful progress rooted in societal impact. However, key documents like the Draghi[84] or Letta[85] reports still do not mention them. When addressed, the creative focus seems reserved for boosting the activity of these macro-economic goals, which may result in only pushing CCI activities that are aligned with these interests, potentially risking the rich and varied tapestry of cultural and creative initiatives in Europe. Hence, *ekip* advocates for a more proactive and prominent role for CCIs across the EU policy framework, moving beyond merely supporting technological growth to actively driving a model of meaningful societal advancement. This requires a fundamental shift in policymaking dynamics toward a bolder, less conservative stance, reflecting a sector that is already defying traditional constraints. This approach may do more than just enhance the competitiveness of the technology sector;

76 https://research-and-innovation.ec.europa.eu/research-area/industrial-research-and-innovation/chemicals-and-advanced-materials/towards-advanced-materials-act_en#:~:text=Latest-,What%20the%20Commission%20is%20doing,accelerate%20their%20uptake%20in%20Europe.

77 https://www.weforum.org/stories/2024/07/explainer-what-is-quantum-technology/

78 https://www.mckinsey.com/capabilities/tech-and-ai/our-insights/the-year-of-quantum-from-concept-to-reality-in-2025

79 https://commission.europa.eu/publications/european-competitiveness-fund_en

80 https://digital-strategy.ec.europa.eu/en/library/quantum-europe-strategy

81 https://research-and-innovation.ec.europa.eu/strategy/strategy-research-and-innovation/our-digital-future/european-strategy-research-and-technology-infrastructures_en

82 https://www.creativefed.eu/files/DOC_White%20Paper_SCECE2025_20250903.pdf

83 https://www.creativefed.eu/files/DOC_White%20Paper_SCECE2025_20250903.pdf

84 https://commission.europa.eu/document/download/97e481fd-2dc3-412d-be4c-f152a8232961_en

85 https://european-research-area.ec.europa.eu/documents/letta-report-much-more-market-april-2024

it seeks a distinct strategic advantage over global competitors by anchoring market transformation in a truly human-centric mission.

## 3.2 EU programmes

Despite an overall lack of connection at the strategic level, there continue to be punctual interventions and measures that address specific deep tech areas and their interplay with the CCIs. Within EU funding programmes, notably Horizon 2020 and Horizon Europe, support projects at the intersection of CCIs and deep tech across a wide range of domains.

The EU has historically provided funding for broader programmes at the intersection of CCIs and deep tech. Among these, the **S+T+ARTS** (*Science + Technology + Arts*) initiative was launched under Horizon 2020 to support innovation at the intersection of science, technology, and arts, and to foster collaboration between scientists, artists, engineers, and researchers.[86] Specific activities that have been funded by the initiative include prizes, residencies, "Lighthouse" programmes, and policy experimentation.[87] A 2026 publication[88] reviewing the initiative highlights that it has supported hundreds of collaborations, resulting in both technological prototypes and artistic works that challenge dominant technological narratives and explore new possibilities. At the same time, the report notes that the level of industry engagement has been uneven, pointing to an area for further development. S+T+ARTS positions itself as both a programme and a broader ecosystem, connecting research labs, CCI actors, universities, start-ups, and regional centres, and generating methodological insights on interdisciplinary collaboration between art and technology.

When it comes to specific projects, **Horizon 2020**, saw several actions funded at the intersection of deep tech and CCIs:

- **Film265** (Innovation Action) aimed to support the creative Video-on-Demand sector by leveraging new technologies in video distribution, focusing on moving innovations from early research stages to commercially viable solutions. It also sought to develop APIs enabling all key industry stakeholders to access and use the technologies created.[89]
- **MATUROLIFE** (Innovation Action) aimed to reimagine assistive technology for the elderly by developing smart textiles that integrate conductive nanomaterials directly into fabrics. It is relevant to CCIs as designers were involved early on to ensure the solutions are not only functional but also comfortable, wearable, and appealing to users.[90]
- **TILES** (SME-2 - SME instrument phase 2) aimed to enhance the video and advertising sector by developing a digital platform that streamlined the creation, management, and distribution of video content. It applied advanced data-driven and automation technologies to make video production and delivery more efficient and accessible for industry stakeholders.[91]

Under **Horizon Europe**, this intersection continues across different domains, including projects focused on advanced digital infrastructures and advanced materials:

- **DAFNE+** aimed to improve data sharing and rights management in the CCIs by developing a blockchain-based infrastructure for digital assets. It uses technologies such as distributed ledger technology (blockchain), smart contracts, and decentralised data storage to enable secure

86 S+T+ARTS. About. https://starts.eu/about/

87 STARTS (2026). Science, technology, arts: Lessons learned from a decade of European transdisciplinary innovation. https://starts.eu/wp-content/uploads/STARTS_Lessons-Learned-from-a-Decade-of-Transdisciplinary-Innovation.pdf

88 STARTS (2026). Science, technology, arts: Lessons learned from a decade of European transdisciplinary innovation. https://starts.eu/wp-content/uploads/STARTS_Lessons-Learned-from-a-Decade-of-Transdisciplinary-Innovation.pdf

89 https://cordis.europa.eu/project/id/645500

90 https://cordis.europa.eu/project/id/760789

91 https://cordis.europa.eu/project/id/698662

registration of ownership, tracking of usage rights, and automated licensing and payments for creative works.[92]

- A project running until the end of 2027, **ELLIE,** aims to support CCIs by developing a universal platform that integrates technologies such as AI, digital twins, Internet of Senses, and immersive virtual environments. It enables CCIs to create new user experiences, better understand audience needs, and streamline the design, development, and delivery of creative products and services through more automated and integrated workflows.[93]
- The **Colour4CRAFTS** project, projected to end June 2026, aims to develop sustainable textile dyeing by combining craft knowledge with technologies such as bio-based colourants and waterless dyeing. It is relevant to CCIs as it links heritage and design with new material innovations.[94]

Beyond Horizon projects, ecosystem support instruments such as EIT Culture & Creativity and EU-level partnerships provide a more structured framework for organising innovation at sector level. **EIT Culture & Creativity** complements these initiatives by supporting the scaling and market uptake of such innovations. It supports innovation in CCIs by funding and scaling projects that combine CCIs with a range of other domains, including deep tech. Through its programmes for innovators, it provides grants, mentoring, investor access, and IP support to help move projects from prototype stages (around TRL 7) to market-ready solutions, in areas such as AI-driven content, VR/AR experiences for cultural heritage, AI-driven game development tools, and ethical AI frameworks for cultural content.[95]

While European R&I partnerships are not only targeting CCIs, the two case studies below illustrate such the extent of CCI integration within the textile R&I ecosystem and the immersive media/virtual reality arena.

**Case study: CCI ecosystem and textiles**

The EU has positioned textiles as a key sector for the twin green and digital transition, combining industrial policy, regulation, and research funding to drive innovation. Central to this effort is the **European Partnership Textiles of the Future**, launched under Horizon Europe in collaboration with Textile ETP.[96] The partnership is aligned with the Transition Pathway for the Textile Ecosystem (2023), which outlines concrete actions to support sustainable competitiveness, innovation, skills, and regulatory coherence.[97] Together with instruments such as Horizon Europe, Digital Europe, LIFE, and the Single Market Programme, the EU supports the uptake of sustainable and technologically advanced practices across the textile value chain.

The partnership's **Strategic Research and Innovation Agenda** (SRIA)[98] defines three priority areas: sustainable materials and clean processes, digital supply chains and new business models, and advanced manufacturing and high-performance textiles. With at least €60 million allocated for 2025–2027, the focus is on higher Technology Readiness Levels (TRLs), supporting demonstration, pilot lines, and early market deployment. This reflects a clear policy objective to accelerate the translation of advanced materials and manufacturing innovations into industrial-scale applications.

The involvement of CCIs in these policy initiatives is not central. CCIs contribute mainly through design, product development, and new business models, particularly in areas such as sustainable fashion and circular consumption. While the policy framework acknowledges the importance of creativity, user-

92 https://cordis.europa.eu/project/id/101061548

93 https://cordis.europa.eu/project/id/101178099

94 https://cordis.europa.eu/project/id/101094809

95 EIT Culture & Creativity. Programmes for innovators. https://eit-culture-creativity.eu/what-we-do/innovation/programmes-innovators

96 https://ec.europa.eu/commission/presscorner/detail/en/ip_25_841

97 Publications Office of the European Union (2023). Transition pathways for the textiles ecosystem. https://op.europa.eu/en/publication-detail/-/publication/6392f189-0416-11ee-87ec-01aa75ed71a1

98 Textiles of the Future. SRIA. https://www.textile-platform.eu/textiles-of-the-future/#sria

centred design, and market uptake, CCIs primarily act as enablers of adoption rather than drivers of technological development, which remains led by industry and research actors.

**Case study: CCI ecosystem and immersive and virtual worlds**

The EU supports immersive technologies and virtual worlds through various means. Namely, in 2025, the European Commission launched the **European Partnership on Virtual Worlds** to strengthen collaboration between industry, research, and public actors, with the aim of advancing innovation, skills, and ecosystem development. [99] This builds on earlier investments under Horizon 2020 and Horizon Europe, as well as Creative Europe and Digital Europe, which support the development of market-ready immersive solutions, talent development, and cross-sector collaboration. The partnership's Strategic Research and Innovation Agenda identifies seven key application sectors for virtual worlds, with media and entertainment, and arts and culture being directly linked to CCIs. [100] These sectors are key areas for the deployment of immersive technologies

More broadly, EU policy frames immersive technologies as a core component of the transition towards Web 4.0, where technologies such as AI, blockchain, and edge computing enable persistent, interactive, and interconnected digital environments. The partnership also aims to address fragmentation in the sector, pool public and private investment, and strengthen Europe's position in the development of virtual worlds.

In this context, CCIs play a central role as both users and drivers of innovation. They are directly involved in content creation, experience design, and the development of new formats in media, gaming, and cultural heritage. EU initiatives, including calls under Horizon 2020 on next-generation media and interactive technologies, as well as more recent actions supported by EIT Culture & Creativity, emphasise the importance of creative skills, entrepreneurship, and cross-sector collaboration. Compared to other domains, CCIs are therefore more structurally embedded in the development and uptake of immersive technologies, contributing not only to adoption but also to shaping the direction of innovation.

## 3.3 National programmes

Several European countries have adopted programmes or strategies to harness the opportunities emerging at the intersection of deep tech and the CCIs. These initiatives are implemented at different governance levels, often combining national funding schemes with ecosystem-building approaches and cross-sector collaboration mechanisms.

In the **UK**, the **Digital Catapult** is an innovation agency focused on accelerating the application of deep tech by connecting industry, academia, startups, and government.[101] It acts as an intermediary that helps translate emerging technologies such as AI, immersive media, and advanced networks into real-world applications, supporting businesses to move from experimentation to market-ready solutions. In relation to the CCIs, Digital Catapult plays a role in enabling the adoption of deep tech within creative practice and production. It delivers accelerator programmes, collaborative R&D projects, and testbed environments that allow creative companies to experiment with technologies such as XR, AI, and 5G, often through

99 European Commission (2025). European Commission launches European Partnership for Virtual Worlds. https://digital-strategy.ec.europa.eu/en/news/european-commission-launches-european-partnership-virtual-worlds

100 Virtual Worlds Association (2025). Strategic Research & Innovation Agenda. https://www.virtualworldsassociation.eu/actions/strategic-research-innovation-agenda-virtual-worlds-eu#

101 Digital Catapult. https://www.digicatapult.org.uk/

funded calls and challenge-led initiatives like MyWorld[102] or CreativeXR.[103] These programmes provide a mix of technical support, mentorship, access to facilities, and investment pathways, while also fostering cross-sector collaboration between creatives, technologists, and researchers. The organisation also supports the development of new content formats and audience experiences, for example by exploring the convergence of AI and immersive technologies, and works to ensure that adoption is responsible and aligned with sector needs.[104]

In **France**, through the France 2030 plan (a flagship initiative to boost innovation), to support projects at the intersection of CCIs and deep tech. For instance, a 2024 **call on immersive culture and the metaverse** focused on advancing the development and dissemination of immersive experiences, with the broader aim of fostering cultural democratisation and expanding access to cultural content for wider audiences.[105]

Business Finland, the **Finnish** government agency for trade and investment promotion, ran a programme in 2025 titled "**Creative Immersive Experiences**", aimed at strengthening collaboration between the creative industries and XR technology developers. The programme focused on building cross-sector ecosystems that bring together actors from different fields. In practice, it offered a combination of funding, events and workshops, networking opportunities, and peer support to encourage cooperation.[106]

**In the Netherlands**, **Topsector Creative industries** consists of a programme in which nine key industries are chosen by the Dutch government to drive innovation, sustainable growth, and global competitiveness. They represent the areas where the Netherlands aims to be a global leader, and the Creative Industry is one of the strategic sectors appointed for achieving such purpose. This decision is expected to help drive cross-sectoral solutions, throughout a collaborative effort where industry, science, and government join forces to address societal challenges. Their proposed Knowledge and Innovation Agenda (KIA) is split into three lines[107], committed to developing a strong, valid knowledge base for the creative industry: Design for Change (behavioral influence), The Human Touch (individual experience/meaning), and Value Creation (new roles/responsibilities for creatives). Supporting this programme is CLICKNL[108], acting as the knowledge and innovation network in order to help bringing businesses, knowledge institutions and governments together, with the goal of accelerating the research, training and scaling-up of national creative initiatives.

# 4 Policy vision

The present chapter aims at drafting a policy vision for the interplay between deep tech and creative industries. *ekip* has previously explored the relationship between the CCIs and several technologies usually considered to fall under the umbrella of "deep tech". Specifically, we have conducted analyses addressing the opportunities and challenges regarding the use of AI[109] and immersive technologies[110] across Europe's creative and cultural sectors. These efforts represent a strategic response to how these technologies are revolutionising the way we create, distribute, and experience content. The need for adaptation was a recurrent theme in both cases, highlighting the urgency to cope with this evolving

102 Digital Catapult. Creative technology programme project: MyWorld. https://www.digicatapult.org.uk/programmes/programme/myworld/

103 Digital Catapult. Creative XR. https://www.digicatapult.org.uk/case-studies/study/creativexr/

104 Digital Catapult. Creative industries. https://www.digicatapult.org.uk/clients/creative-industries/

105 Bpifrance (2024). Appel à projets: "Culture immersive et métavers". https://www.bpifrance.fr/nos-appels-a-projets-concours/appel-a-projets-culture-immersive-et-metavers

106 Business Finland. Creative Immersive Experiences. https://www.businessfinland.fi/en/services/Programs-and-ecosystems/Programs/Creative-Immersive-Experiences/

107 https://assets.ctfassets.net/h0msiyds6poj/4vQf0pe51SnpcXRzyVkywZ/7be33d9ff59237c40fd52da88fefc276/CLICKNL_KIA_2018-2021-2_EN.pdf

108 https://www.clicknl.nl/en/top-sector-creative-industry/

109 https://ekipengine.eu/policies/ai-and-cultural-and-creative-industries/

110 https://ekipengine.eu/policies/immersive-tecnologies-in-the-ccis/

system in order to remain relevant. Here, *ekip's* recommendations aimed at demonstrating how policy framing can help prepare and transition toward that shift. However, they focused primarily on how CCIs react to these already deployed deep techs, which are currently disrupting the market landscape.

We have considered these two contexts to study complementary alignments between deep techs and the CCIs, both to be stressed during the corresponding *ekip* Policy Lab. The first one will serve to understand the potential of driving innovation rooted in creative thinking and societal impact, and how a supportive policy framework could enable this approach. At the same time, creative and cultural practitioners need to cope with the advanced technologies that will steer the content production of tomorrow, what should spark interest in the systemic models that support this to happen. The second lens encompasses the central part of this Policy Area, as it envisions the intervention of CCIs to actively help forging a future yet to be shaped. As the first steps are crucial when grounding foundational values, it is now the time to intervene and motivate the formation of a competitive yet responsible progress. **This direction not only pursues making Europe more technologically capable by means of tech innovation; innovation policy will be equally critical** when outlining the frameworks that will allow deep techs to effectively flourish, resulting in a long-term prosperity while preserving the strong values that define our community.

**From concepts to lab design**

We propose three directions that position CCIs not as peripheral supporters of deep tech, but as actors whose involvement is essential for Europe to deliver on its own promise. Each direction targets a different stage of the deep tech trajectory. Direction 1 challenges *who sets the agenda* for emerging technologies. Direction 2 challenges *how breakthroughs become propositions* that work for people. Direction 3 challenges *how technologies spread* beyond specialised enclaves into sectors and society. Each direction is illustrated by a case study which highlights a potential future between deep tech ventures and CCI capabilities (Box 2/3/4) among the three different directions, highlighting the value of such propositions. Together, they provide the *ekip* Policy Lab with a structured framework for developing concrete recommendations across the full innovation pipeline. The workshop scenarios stemming from the three directions illustrated in this section are further detailed in the Annex.

## 4.1 Direction 1: Integrating CCIs in the early stages of a technological trajectory as a competitive strategy

Europe's deep tech competitiveness strategy rests on a contradiction. It claims human-centric innovation as its differentiator. Yet, the moments when emerging technologies are given direction (in EU mission calls, national strategy roadmaps, and research agenda-setting) are shaped almost exclusively by technology- and market-driven logics. CCI companies based in the EU who could give shape to a more human-centric trajectory for emerging technologies are not structurally involved in strategic conversations. Even within corporate R&D and startup teams that claim to be problem-oriented, the experts specialised in understanding human problems and lived experiences are rarely present at the critical stage of problem definition.

Examples for such type of interaction exist across many sectors. Case studies compiled by the British Council cover quantum technology, space, biodiversity, generative AI and many other sectors. As they acknowledge, "innovation led by artists, cultural organisations, and creative industries pushes technologies forward" and, importantly, "reorients technologies towards people, resists bias, prioritises sustainability, creates public engagement, and decentralises the tools that are transforming our world".[111] Dedicated projects have also studied the technological innovation trajectories of film companies,[112] news

[111] https://www.britishcouncil.org/sites/default/files/why-technology-needs-artists-40-international-perspectives.pdf

[112] https://smit.research.vub.be/en/policy-brief-87-small-film-markets-policy-toolkits-and-supporting-competitiveness

organisations[113], as well as cinemas,[114] in particular in digital areas. The impact of artistic practice on technological trajectories has also been studied in the context of artificial intelligence, finding that artistic practice shapes the "development of AI tools and techniques, legal and economic infrastructure, and socio-technical engagement with critical ethical questions associated with the technology".[115]

This direction argues that **CCI professionals should be integrated into the earliest stages of technological trajectories, when emerging technologies are still being framed and their purpose and mission are still open**. At this stage, CCI practitioners (especially those navigating creative disciplines) bring four distinctive capabilities:

- **Envisioning societal futures:** The disciplined practice of imagining alternative futures, creating scenarios that reveal the societal implications of a technology when it can still be redirected.
- **Starting from societal relevance:** Deep tech typically asks *"what can this technology do?"*, while CCI practitioners ask *"what should this technology be for?"*, starting from human experience and well-being rather than from technical capability.
- **Giving form to the not-yet-existing:** Emerging technologies are abstract. CCI practitioners give them provisional form through prototypes, visualisations, and experiences, making their potential and consequences graspable for policymakers and business actors since the early stages.
- **Creating the tools for deliberation:** Scenarios, speculative prototypes, and design provocations are the instruments through which a society can discuss, contest, and shape a technological trajectory before it hardens into infrastructures and definite features.

**ekip social listening results**

**The friction layer**: A more critical strand of discussion, highlighting concerns that cultural and human perspectives are not sufficiently integrated into the development of deep tech. As a result, there is a risk that innovations may become highly sophisticated from a technical standpoint without meaningfully addressing real-world needs or challenges.

Box 2 below presents one example of how strategic foresight – a tool used by CCIs professionals to envision societal futures - is being applied to address the way emerging deep techs such as quantum technology may disrupt the public domain. By aligning policymaking with a human-centered future visioning, Europe could allow for proper tech development while safeguarding societal wellness.

*Box 2: Case study. A possible future for quantum-safe architecture (Geneva Centre for Security Policy, The World Economic Forum)*

**Harnessing Europe's quantum-safe architecture**

- **Geneva Centre for Security Policy:** The GCSP is an international foundation that provides executive education and diplomatic dialogue to promote global peace and stability.
- **The World Economic Forum:** The WEF is an international non-profit organisation that brings together top political, business, and cultural leaders to shape global, regional, and industry agendas.

The impact of the next-generation digital technologies and tools (AI, quantum) is currently disrupting conventional infrastructures and creating societal uncertainty. This mismatch demands a system capable of addressing not only the potential, but also the threats posed by this new wave of content

[113] https://smit.research.vub.be/en/policy-brief-75-innovation-through-collaboration-in-the-flemish-news-sector-ambitious-start-mixed

[114] https://www.crescine.eu/blockchain-ai

[115] Andrews H and Hawcroft A (2024) Articulating arts-led AI: artists and technological development in cultural policy. Eur. J. Cult. Manag. Polic. 14:12820. doi: 10.3389/ejcmp.2024.12820

generated, produced, and disseminated globally. Information veracity, ownership and trust will be on friction, making it vital to safeguard the value and truth of human legacy.

*"The transition to quantum computing required new cryptographic standards, hardware upgrades and a fundamental rethink of how trust is engineered into systems. Quantum-safe architectures emerged, combining new mathematical algorithms with hardware foundations that ensure secure key generation and distribution." (Geneva Centre for Security Policy)*

**Strategic future visioning**

Several countries and organisations are implementing foresighting and future visioning as part of their policy strategies. Despite breakthrough milestones and advanced technologies not being fully incorporated into the global flow yet, they are about to unleash their potential. Experts are aware of this notion and, rather than investing effort and capital once it has occurred, the competitive lead will come from those who decided to prepare in advance for the inexorable shift.

*"Looking back from the year 2035, what might have occurred in the decade since the United Nations declared 2025 the International Year of Quantum? We believe that the ten years that followed this declaration will have reshaped global security, governance and trust as quantum technologies redefined the digital foundations of international cooperation. Alongside this transformation, early signals and uncertainties about quantum readiness and threat escalation timelines will have likely shaped how governments, industry leaders, and international bodies chose to act." (Geneva Centre for Security Policy)*

**The need for a human-centered focus**

CCIs (especially creative professionals) are experts in navigating complex challenges and discerning viable opportunities. However, a key differentiator from pure tech-oriented innovators is the prioritisation of the human factor and the societal repercussion. They represent a decisive asset for co-leading the exploration of such humanised digital infrastructure, demanding their participation from early stages rather than just as an add-on.

*Source for text: GCSP[116], WEF[117].*

## 4.2 Direction 2: Embedding CCI in the development of deep tech into human-centered propositions

Europe's deep tech development is typically evaluated in terms of scientific novelty, speed to market, and scaling capacity. These matter, but there is an important bottleneck that needs attention. Some deep tech areas, like AI, have reached the market (though often raising ethical concerns) while many others remain stuck as scientific achievements never become concrete propositions for specific users, organisations, or sectors. And even when Europe invests significantly in deep tech research, the capacity to turn that research into human-centered propositions remains underdeveloped. Similarly, deep tech ventures and corporate R&D departments not so well equipped to turn those breakthroughs into societally relevant propositions to be adopted by the public. The development stage is where scientific potential needs to acquire form and a clear relationship to the contexts it will serve.

As the British Council writes in a 2025 report on technology and artistic work, "innovation led by artists, cultural organisations, and creative industries pushes technologies forward." It further explains that "Artist-

116 https://www.gcsp.ch/publications/year-2035-living-quantum-era-possible-future# .

117 https://www.weforum.org/stories/2025/10/strategic-foresight-policy-economies-competitive/

led innovation also reorients technologies towards people, resists bias, prioritises sustainability, creates public engagement, and decentralises the tools that are transforming our world."[118] Thus, CCIs are in the position for steering these technologies toward positive outcomes. Results from the EU-funded STARTS programme also demonstrate how creative approaches can support exploration of industrial and manufacturing challenges.[119] Particularly for design and art related practices, they can break core principles down through their explorative and problem-solving means, facilitating understanding, dissemination, and acceptance.

Other sources also point to trends shaping the CCIs at the intersection with deep tech. For instance, Bayern Innovativ notes that the spread of AI is transforming how creatives work, opening up new possibilities while also calling into question traditional notions of artistic authorship and intellectual property.[120] Moreover, the British Parliamentary Office of Science and Technology highlights that while the capabilities of technologies such as generative AI are advancing rapidly, significant uncertainties remain regarding their use within creative domains. Questions persist around how these tools will be adopted by creative practitioners, as well as how adequate protections for creators can be ensured, particularly in relation to intellectual property.[121]

That is the kind of work CCI professionals do, and European deep techs consistently under-resource it. This direction argues that CCI professionals should be embedded in the development stage, where emerging technologies need to be turned into human-centred propositions. At this stage, CCI practitioners bring three capabilities:

- **Simplifying and translating:** Deep tech propositions are often locked in the language and logic of their scientific/technical foundation. CCI practitioners can translate complex technical potential into understandable formats, making it possible for non-specialist partners, investors, and policymakers to understand what a technology offers and what it requires.
- **Co-creation and orchestrating different perspectives:** A viable deep tech proposition does not emerge from a single discipline. It requires bringing together technical, business, regulatory, and societal perspectives into a shared creative process. CCI practitioners can facilitate this through co-creative methods that enable diverse stakeholders to jointly shape what a technology becomes.
- **Prototyping and iterative experimentation:** Turning a scientific breakthrough into a proposition that works for people and organizations requires iterative cycles of making, testing, and learning. CCI practitioners bring the methods for this: rapid prototyping, experiential testing, and fail-fast learning loops that keep options open and contribute to derisk out-of-the-box directions, rather than funneling prematurely toward a single solution.

Box 3 below presents one example of how breakthrough materials can find market opportunities by means of creative applications, such as in the fashion industry. Biotech developers and designers benefit from this ecosystem resulting in a sustainable collaboration.

*Box 3: Case study. Silk protein yarn debuts in luxury fashion collection (AMSilk & Balenciaga)*

**From Lab to Luxury: AMSilk and Balenciaga prove biotech materials are ready for the runway**

- **AMSilk:** A world leader in industrial biotechnology. German-based company that specialises in "functional silk" biopolymers. The resulting product was a collaborative effort along with the Scandinavian chemistry-focused company Evonik.

[118] https://www.britishcouncil.org/sites/default/files/why-technology-needs-artists-40-international-perspectives.pdf

[119] https://betterfactory.eu/wp-content/uploads/2024/10/Booklet_2024_10_25.pdf

120 Bayern Innovativ. Trends on the radar: cultural and creative industries. https://www.bayern-innovativ.de/en/emagazine/detail/trends-on-the-radar-cultural-and-creative-industries

121 UK Parliament POST (2024). Horizon scanning: Artificial intelligence and new technology in creative industries. https://post.parliament.uk/artificial-intelligence-and-new-technology-in-creative-industries/

- **Balenciaga:** Balenciaga has built a reputation for pushing aesthetic and structural boundaries, counting on expert allies as the Kering's Material Innovation Lab. Known for its high-fashion subversion and quality precision.

The last edition from Balenciaga Spring 2026 featured a milestone for the fashion industry. "*AMSilk's bioengineered silk protein yarns move from development and pilot applications into real world, consumer-facing products. It demonstrates that biotech materials can meet the demanding requirements of high-end fashion, including aesthetic quality, consistency, durability, and compatibility with established manufacturing processes.*" (Amsilk)

**Understanding the current context for advanced material through the fashion industry**

Today's market and society demand actual impact and results over potential benefits, *"the era of proof swiftly took over the era of promise; they wanted evidence. Industrial volumes. Real integration into existing supply chains. Products on shelves; not someday, but now."*

The fashion world has long been enamoured with the promise of biotechnology and new materials.; the idea that we could grow high-performance materials in a lab rather than relying on petrochemicals or intensive animal farming. Textiles are a notoriously difficult industry to disrupt. Fashion faces immense pressure regarding water usage, chemical pollution, and microplastic shedding. On top of that, biotech materials must be more than just "green" to success in this demanding industry; it also has to meet the unforgiving demands of high-end luxury (compatibility, durability quality, etc.).

But in December 2025, that promise officially became a product. With the release of Balenciaga's Spring 2026 Collection, the industry hit a definitive achievement: the commercial debut of AMSilk's bioengineered silk protein yarn. Not a concept, but a viable and commercialised product.

**Competitive collaboration between creative and technical sectors**

This partnership is more than a supply-chain win; it is a blueprint for cross-sector innovation. When deep-tech development aligns with the creative industries, it creates a feedback loop that accelerates progress for both. This alignment ensures that innovation is not just technologically impressive, but culturally relevant and commercially viable.

*Source for text and pictures: AMSilk[122], Kering[123], Illuminem[124].*

## 4.3 Direction 3: CCIs as enablers of deep tech diffusion across sectors and society

Europe excels at deep tech specialisation but struggles with diffusion. It produces world-class research concentrated in specialised clusters, yet consistently fails to spread that knowledge across sectors and into society at the pace and scale needed. Europe has "depth without density": technological excellence in specific niches, but weak connectivity and limited capacity to widen the base of people and organisations who can work with, adopt, and benefit from these technologies. Current policy addresses this primarily through market mechanisms like venture funding, IP protection, and demand-side incentives. But diffusion is not only a market process, but a cultural process: technologies spread when people can understand them, relate to them, see their relevance, and integrate them into their practices.

122 https://www.amsilk.com/amsilks-silk-protein-yarns-debut-in-balenciaga-collection/

123 https://www.kering.com/en/news/balenciaga-unveils-innovative-garments-for-spring-26/

124 https://illuminem.com/illuminemvoices/advanced-materials-in-2025-from-scientific-promise-to-commercial-proof

When that cultural layer is missing, even well-developed propositions encounter resistance, indifference, or adoption limited to a narrow specialist community.

This recognition not only empowers the sector and simplifies governance but also supports the citizens who must navigate these challenges. For instance, the creative industry can develop future scenarios to disseminate knowledge of emerging technologies tailored to assist policymakers in developing actionable frameworks, providing a way to anticipate and avoid costly mistakes by identifying potential harms early. Simultaneously, similar efforts can attract new stakeholders to invest in these sectors, contributing to the competitive development of the industry.[125] This positions CCI not merely as recipients of future deep tech innovations, but as essential collaborators that can act along with deep-tech towards solutions serving broader human and societal goals, fostering innovation across various ecosystems to reinforce a more competitive society and Europe [126].

CCI professionals and actors, whose expertise is to build literacy, create diverse applications, and foster informed societal engagement, could address this. Deep tech ventures and R&D departments build technologies for specialists. Spreading deep tech opportunities across sectors and user groups requires making them graspable, meaningful, and adaptable to contexts that do not share the same technical language. CCI players could bring the capabilities to make that happen, but are rarely part of diffusion strategies. This direction argues that CCI professionals should play a central role in the diffusion of deep tech across sectors and into society. At this stage, CCI practitioners bring three streams:

- **Building literacy and creating meaning:** Many deep technologies remain inaccessible because they are poorly understood, and even when understood, people struggle to see why they matter. CCI professionals/actors can make complex technologies graspable for different audiences - e.g., through visualisations, interactive experiences, (serious) games, exhibitions, and compelling narratives — building both the literacy needed to engage with these technologies and the cultural connection that makes them meaningful to people's values, concerns, and aspirations.
- **Enabling cross-sector application:** CCI professionals/actors can develop diverse applications of deep tech across different sectors and contexts, namely not single solutions but evolving portfolios of uses, adapted to the specific needs and logics of each sector, through rapid piloting and experimentation. This widens the base of sectors and organizations that can work with the technology.
- **Fostering informed societal debate:** Deep tech adoption shapes the future, but too often that shaping happens without public awareness or deliberation. CCI professionals/actors can open up that conversation through speculative design, scenario exercises, and public engagement formats like exhibitions and festivals. This enables citizens, policymakers, and organizations to critically examine what a technology implies for society before its effects become irreversible.

Box 4 below presents one example of how creative professionals and artists have great potential for making complex technologies more digestible. The crypto and blockchain domains become more accessible to the audience thanks to the role of media, music, digital and physical artists when showcasing their capabilities in their respective areas of work.

[125] See e.g. material from UNDP on designing "people-centred testbeds" related to deep tech innovation (https://www.undp.org/policy-centre/singapore/publications/innovation-action-handbook-building-people-centric-testbeds)

126 The EIT Deep Tech Talent Initiative - DTTI (2025) https://eit-culture-creativity.eu/latest-news/2025-03-14-eit-deep-tech-talent-call-training-proposals-2025-open-0#:~:text=%F0%9F%A4%96%20The%20Deep%20Tech%20Talent,creation%2C%20digital%20arts%2C%20and%20storytelling

*Box 4: Case study. Europe's first crypto art festival (Arroz Éstudios)*

**Rare Effect – where physical and digital arts meet**

**Arroz Estúdios:** is a non-profit cultural organisation based Lisbon. Their goal is to offer an environment for artistic growth where cultural events take place, contributing to Lisbon's rapid development in a creative, open and multi-cultural way.

The **Rare Effect festivals** represent Europe's first major crypto-art and NFT-focused cultural events. Primarily led by Arroz Estúdios in Lisbon (but also virtually in the metaverse), the events are designed to bridge the gap between the physical and digital art worlds while educating the public about decentralised technologies.

**A hybrid event to get familiar with the future of the digital-art market**

The festival combines digital art exhibitions with live music, workshops, and panel discussions on Web3, blockchain, and AI. It explores society's relationship with art through the lens of crypto-economics. A key goal is to support grassroots cultural associations and provide a platform for both local and international artists to learn how to use emerging technologies like NFTs and crypto wallets. *"Throughout the exhibition, visitors were able to interact with the art on display, installations and performances through the use of decentralised finance (crypto currencies) and a digital wallet to play around with the crypto-economics concepts of Rare, Fair and Rekkt." (Arroz Estúdios, Rare Effect)*

**Promoting new market exploration and community engagement**

When cultural and creative institutions lead these initiatives, the view on the problem tends to stem from the impact on the community. The resulting approach is often more engaging to the public, as it is based on grounded societal perspectives. *"Idealised, conceived and built from a community of artists, creators and enthusiasts all over the world. We are more than a festival and we've kept the same mission since Rare Effect, Vol. 1 in February 2021. We are the materialisation of the digital, a sandbox for ideas and creation, an event to stimulate experimentation." (Steven MacKay, Cofounder and President at Arroz Studios).*

*Source for text and pictures: Arroz Estúdios[127], Financial IT[128].*

The three directions presented in this chapter serve as the main inputs for the *ekip* Policy Lab on 6 May 2026. To give meaning to each direction and derive policy recommendations, *ekip* has developed three forward-looking scenarios about the intersection of creative industries and deep tech (see Annex). In a structured process, participants will discuss the impacts of these future scenarios, the opportunities and challenges associated with them, and develop the steps needed to make the scenarios a reality by the year 2040 using a 'back casting' method.

## Concluding remarks

Europe's ambition to strengthen its position in deep tech goes beyond just a question of scientific excellence, investment, and technological capacity. It is also a question of what technological development is directed towards, how emerging technologies are translated into propositions that create value for people, and how their benefits can reach different sectors and society more broadly. In this regard, greater involvement of the CCIs could strengthen each of these dimensions. However, current

127 https://www.arrozestudios.pt/about

128 https://financialit.net/news/cryptocurrencies/europes-first-crypto-art-festival-rare-effect-vol3-returns-2022-bigger-and

policy and innovation ecosystems do not yet systematically integrate CCI actors across the technological category.

The three policy dimensions proposed in this note therefore point to complementary opportunities for policy intervention. First, CCIs can contribute to shaping technological trajectories, bringing societal, cultural, and human perspectives into discussions at a stage when technological purposes and pathways remain open. Second, CCI capabilities can be embedded in deep-tech development, particularly through co-creation, translation, design prototyping and experimentation, helping turn technological breakthroughs into propositions that respond to specific contexts and needs. Third, CCIs can contribute to the diffusion of deep tech, making complex technologies more understandable, creating new applications across sectors, and enabling wider societal engagement with their opportunities and implications. The opportunity is therefore to examine what becomes possible when CCI actors participate more actively in determining how deep techs are imagined, developed, and brought into society.

The upcoming *ekip* policy lab will use the three directions and forward-looking scenarios developed in this scoping note as a starting point for that discussion. Through back-casting from possible futures, participants will identify the barriers, enabling conditions, and policy actions needed to strengthen productive interactions between CCIs and deep tech. The objective is ultimately to translate this exploration into concrete policy recommendations for a European deep-tech ecosystem that combines technological capability and competitiveness with societal relevance and human-centred value creation.

## Annex – Workshop scenarios

**Future scenario for Direction 1 - SHAPING: Integrating CCI in the early stages of a technological trajectory as a competitive strategy.**

By 2037, quantum technologies have become central to our national security and economic governance, offering a powerful solution to one of the era's greatest challenges: the preservation of human legacy. As quantum-enhanced AI accelerated the production of synthetic content, Europe launched a program in 2035 to safeguard the veracity of quantum-archives (data storage systems designed to protect long-term information against attacks from quantum computers), the European Central Cultural Vault.

Unlike previous databases, the ECCV wasn't written by coders alone. It was co-developed by a committee of journalists and design thinkers who were integrated into the early stages of the vault's development. They helped design a human verifiable watermarking embedded directly into the quantum fabric of the data. This ensures that when a 20th-century speech is retrieved in 2040, the quantum protocol itself provides a reliable proof of origin that people can intuitively verify, preventing AI from hallucinating details into the gaps of the data.

| | | |
|---|---|---|
| **Tech(s) involved** | | quantum, AI |
| **CCI(s) involved** | | media (journalists), design (theorists, researchers), heritage experts |
| **Value creation** | **Tech industry** | technological adaptability, new market opportunities, mitigation of risks, attracting funding investment |
| | **CCI sectors** | strategic and decisive roles, new working opportunities, legacy and IP protection |
| | **Government & public institutions** | heritage preservation, public trust and stability, proactive regulation, digital sovereignty |
| | **Society** | information trust and reliability, digital rights, cultural and human legacy protection |

**Future scenario for Direction 2 - EMBEDDING: Embedding CCI in the development of deep tech into human-centered propositions.**

By 2040, the global fashion industry completed a radical realignment, evolving from the fragile "take-make-waste" model into a moderate regenerative ecosystem. The severe resource depletion and strict legislative bans on high-emission processes triggered the industry to abandon the linear production in favor of a near-zero carbon footprint, placing bio-based innovation and local resilience at the heart of design and utility alike.

The pinnacle of this transformation is visible in the evolution of the world's fashion capitals. By 2038, Milan transitioned from hosting traditional runway shows to the Milan Bio-Expo, an event where brands no longer compete on aesthetic trends, but on the diversity index of their fabrics. A design firm showcases their new collection using a bio-based fiber grown from ecological bug farming and dyed using bacteria that produce pigment without water. At the end of its life, the garments are not thrown away; they are returned to local municipalities to be dissolved into a nutrient-rich slurry and used to fertilise the city's vertical gardens.

| | | |
|---|---|---|
| **Tech(s) involved** | | Bio-based materials, advanced materials |
| **CCI(s) involved** | | Fashion, design |
| **Value creation** | **Tech industry** | production de-risking, new product opportunities, new network alliances, innovation leadership |
| | **CCI sectors** | novel design opportunities, more funding investment, new service models, research-to-market acceleration |
| | **Government & public institutions** | achievement of climate milestones, sustainable competitiveness, efficient green regulation |
| | **Society** | health and well-being improvement, societal sensitisation and education, natural heritage preservation |

**Future scenario for Direction 3 - DIFFUSING: CCI as enablers of deep tech diffusion across sectors and society.**

In the early 2020s, blockchain was synonymous with volatile JPEGs and financial speculation. However, the focus shifted from trading assets to managing rights as AI began to flood the internet with unverified content, making society face a reality crisis. The "crypto-hype" faded, and the creative industries repositioned blockchain from a reluctant tool into the essential infrastructure that would eventually secure the digital economy. Creative professionals acted as the primary diffusion enablers, turning complex concepts (distributed ledger techs, smart contracts) into intuitive content experiences.

By 2034, musicians, filmmakers, and designers overcame the stigmatised NFT label and popularised other resources such as the Digital Product Passports (DPPs) for media content, using it as an alternative to manage intellectual property rights and automate transparent royalty distribution, including for AI training and content generation. This made the technology relatable; a fan didn't need to understand cryptography to accept that they enjoyed a true piece of their favourite artist's legacy. This cultural onboarding not only democratised remuneration within the creative sector but also built the mass-market tech literacy and density required to sustain Europe's entire digital economy.

| | | |
|---|---|---|
| **Tech(s) involved** | | Blockchain, cryptographic |
| **CCI(s) involved** | | Art and audiovisual sectors, designers |
| **Value creation** | **Tech industry** | new market opportunities, supply chain integrity, reduce transaction frictions, procedure standarisation |
| | **CCI sectors** | financial autonomy, IP agency, market trust and fairness, outreach expansion |
| | **Government & public institutions** | accepted digital infrastructure, supportive regulation, mitigation of grey zones, fair competitiveness |
| | **Society** | accessibility to new markets, consumer protection, investment democratisation, user-friendly complexity |