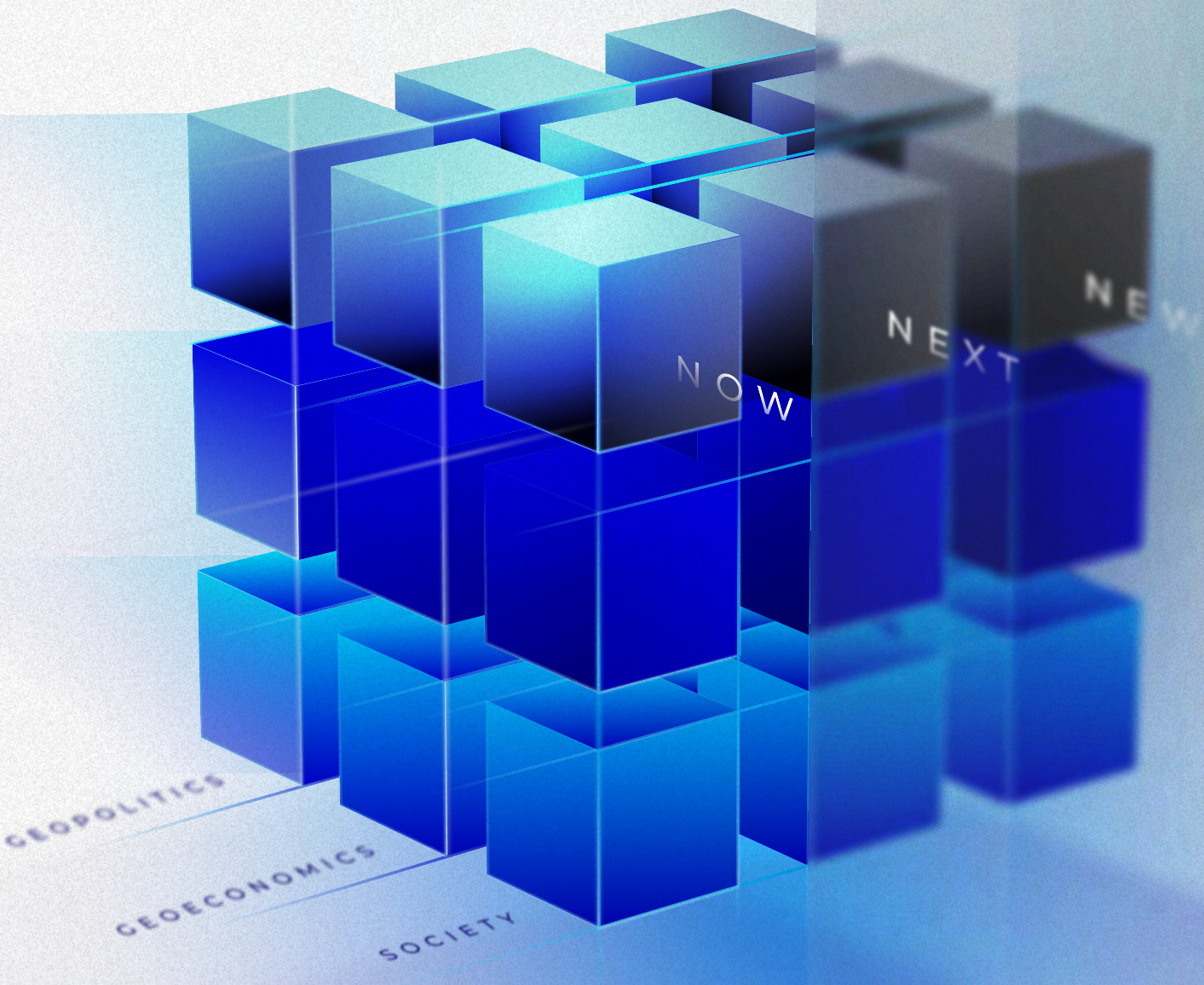
TODAY'S WORLD
DRIVEN BY TOMORROW'S TECH



ie UNIVERSITY
CENTER FOR THE GOVERNANCE OF CHANGE

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INTRODUCTION

This report, "Today's World Driven by Tomorrow's Tech: Now, Next, New," is a strategic foresight study based on the inaugural Tech & Foresight Summit, which took place on November 21, 2024, at IE University, under the leadership of the Center for the Governance of Change (CGC) and in partnership with Meta.

The Summit aspires to become an annual, internationally recognized gathering dedicated to analyzing megatrends, drivers, and vectors of change, systematically exploring the potential futures shaped by technological disruption. This exploration is conducted through the geopolitical, economic-environmental, and social dimensions, all viewed through the lens of general systems theory inspired by Niklas Luhmann.

The Summit epitomizes the core identity of the CGC. As the IE University's center focused on studying the social impact and transformation driven by new technologies, CGC's scientific approach to applied research programs and its high-level executive training offerings for businesses, corporations, and governments are grounded in foresight. Through this methodology, the CGC systematically explores probable futures, enabling proactive anticipation and resilient adaptation to forthcoming changes.

At the CGC, we operate on the premise that we are living in a time of constant and rapid change — an acceleration that is likely to continue, reshaping international organizations, governments, corporations, societies, and individuals. Technologies, particularly emerging and disruptive ones, are altering political power dynamics, influencing the protection and exercise of fundamental rights and freedoms, and redefining the conditions for societal prosperity and planetary sustainability. These technologies are also challenging the very essence of what it means to be human.

Given the velocity of change, as evidenced by the developments in the four months following the Summit, one could argue that the future is already here — or at the very least, that the present as we know it is becoming increasingly ephemeral. This makes the collective effort to co-create desirable futures all the more imperative.

The 2024 Summit was precisely such an exercise — a collective intelligence initiative that, through two thematic panels, brought together high-level speakers and participants from international organizations, governments, businesses, the entrepreneurial sector and academia. Notably, it included a significant representation of IE University students, creators of the Club for the Governance of Change, echoing the CGC's philosophy.

This report builds upon the expert discussions held in the 2024 Summit, adding an additional layer of sophistication to broaden the collective intelligence exercise and make of it a combined collective intelligence assessment. Specifically, the vectors of change identified during the debates — defined as the pathways or directions in which change manifests, as opposed to the more systemic of

megatrends, metatrends, metadisruptions, and drivers of change, which point to the intrinsic causes of change — were subsequently subjected to public opinion testing. This public opinion assessment was based on two material references: relevant publications in thefield and the presence of these change vectors in social media discourse.

Through this combined collective intelligence practice, the report identifies nine vectors of change, structured around a CGC-developed metric aligned with the well-known "Now, Next, New" framework. This metric captures the strength and cadence of public discourse on these issues, underscoring their importance for society's collective attention as they shape the future ahead. "Now" marks a mobilization and high interest in the social conversation; "Next", important but more contained; and "New", though relevant, is scarce in public discourse.

The nine identified vectors — computing divide, future of money, individualized societies; data centers, sustainability and humanization of tech; defense innovation, quantum, generational inequality — should not be interpreted in isolation. As indicated by the earlier reference to general systems theory, any analysis of risks and threats necessarily recognizes the interconnected and causal relationships between these vectors, beyond any notion of single-cause vulnerabilities.

This global dialogue, underpinning the evolution of the nine vectors across present, near-term, and more uncertain futures, brings together perspectives from around the world to set a vision for the pathways of change. It offers a snapshot of the current landscape, structured around two key sections for each vector: Context and Signals. We then end these snapshots with a series of recommendations.

Notably, the signals section combines expert insights and community opinion through social listening practices. In my view, these signals provide a valuable framework for assessing whether the changes driven by each specific vector are likely to remain stable, diminish, or grow. Supported by data, this approach recalls Nate Silver's work in The Signal and the Noise (YEAR), drawing on a Bayesian framework and statistics reminiscent of the Superforecasters model developed by Philip Tetlock and Dan Gardner. Certain events increase the likelihood of specific trends materializing, making these signals illuminating indicators that add dynamism and fluidity to the interconnected framework of the nine vectors.

As detailed in the report itself: "These signals were key markers or events that could cause shifts in the trajectory of that vector — specifically identifying whether it continues to grow, begins to decline, or remains stable. This process was designed to ensure that each vector was not only relevant at the time of the report but also key to the foresight nature of the approach, enabling future trend evaluation, monitoring, and analysis."

The report's recommendations aim to inform the decision-making process, providing strategic insights for the tech and foresight community and beyond. A set of recommendations is provided on the political-strategic and instrumental level, aiming to build upon the

frameworks of the Draghi and Letta reports, always within the context of the vectors of change we have identified, which together form in our view a coherent and optimal selection.

Written in an accessible, non-technical style, the report aims to reach out to the foresight & tech community and other audiences, ensuring when broadening its scope of reach consistency with the combined collective intelligence methodology followed, community and expert opinion.

In an era of weakened international defense, widespread economic insecurity, intersection with economic policies of unilateral trade policies, declining liberal democracies, all these spaces shaped by the influence of new technologies—technologies that will define the new rules of confrontation and battlefields, transform supply chains, and impact the space of individual freedoms and rights, depending on how these technologies are designed, developed, and deployed—meetings like those facilitated by the Tech & Foresight Summit and the subsequent transfer of knowledge are more necessary than ever to think about the future and remain part of the conversation.

Irene Blázquez Navarro

Director, IE University
Center for the Governance of Change

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METHODOLOGY

WHAT ARE VECTORS OF CHANGE?

Vectors of Change represent the routes or directions through which societal transformations unfold. Unlike **Drivers of Change**, which are the underlying forces or reasons behind shifts—such as technological advancements, demographic shifts, or policy decisions—vectors of change map the possible trajectories these forces may take. They do not point to specific end states but rather outline multiple, evolving paths shaped by trends, challenges, and obstacles. Thus, by imagining the future, we participate in creating it.

WHAT IS COLLECTIVE INTELLIGENCE?

"Collective intelligence is a form of universally distributed intelligence, constantly enhanced, coordinated in real time, and resulting in the effective mobilization of skills"[1]

Pierre Lévy

This report employs a collective intelligence approach, which allows for the consideration and merging of perspectives from diverse stakeholders. Through such collaborative sharing of knowledge, we broaden our understanding of potential future changes and avoid blind gaps in current thinking. This method further enriches strategic foresight planning through a more comprehensive analysis of emergent trends and alongside this, identifies the opportunities to address them.

RESEARCH METHODOLOGY

(Own elaboration)

The methodology follows **three phases**:

i Identifying today's vectors of change through a Summit with decision-makers

ii Evaluating and validating these vectors through a social listening analysis approach;

iii Fusing and interpreting the findings with members of the Center for the Governance of Change and an independent expert also a driving force behind the Summit. Going forward, we will refer solely to the CGC when attributing the authorships of the report.

PHASE 1

DECISION-MAKERS INSIGHTS

Our inaugural Tech & Foresight Summit, held in Madrid in November 2024, explored global scenarios and foresight strategies for resilience amid accelerating technological disruption. A carefully curated international audience of over 50 decision-makers from diverse backgrounds and professions were in attendance.

The Summit was structured into two main sections: Listen (A) and Produce (B).

Panel 1 for the Tech and Foresight Summit. From left to right: Enrico Letta (Former Prime Minister of Italy and Dean of the IE School of Politics, Economics and Global Affairs), Manuel de la Rocha (Secretary of State and Director of the Bureau of Economic Affairs and G20, Cabinet of the Prime Minister of Spain), Markus Reinisch (Vice President for Public Policy in Europe of Meta) and Irene Blázquez (Director of the Center for the Governance of Change).

A_ LISTEN

In the **Listen** section, two panels were conducted—one on “The Geopolitics of Technology: Europe's Competitive Age in the Digital Age” and one on “Tech Governance: Diplomacy, Norms and Values.” These panels featured stakeholders from various sectors who presented their visions of the future, examining the vectors of change that they observed. Using these insights, along with real-time interaction through the Mentimeter platform, allowed for the identification and validation of the key **Vectors of Change** that will shape the future of foresight technology.

Foresight workshop, November 2024, IE Tower.

B_ PRODUCE

The **Produce** section, co-designed and moderated by Scott Smith and Susan Cox-Smith from Changeist, focused on three teams, each consisting of approximately ten participants supported by student rapporteurs, each tasked with a different direction and objective. The first team concentrated on the integration of emerging technologies into daily life over a 20-year timeline, focusing particularly on ethical and beneficial advancements. The second team tackled the building of sustainable prosperity with finite resources, exploring the foundations required for a sustainable Europe five years ahead. The third team participated in a "crisis room" scenario, strategizing the European Union’s six-month response to a new U.S. administration, balancing immediate policy actions with mid-term strategic objectives.

The varying geographical scope and time horizons required each team to explore flexible frameworks adaptable to different technologies, different social influences and different political agendas. Given the foresight focus on the criticality of these in Europe, a tailored version of Three Horizons framework was chosen for sense-making and for the exploration of emerging change. Originally developed by Bill Sharpe with Andrew Curry, Graham Leicester, Andrew Lyon, and Ioan Fazey, the Three Horizons framework helps describe and analyze systemic change—clarifying forces that maintain the status quo, identifying early signals of change, and mapping future transformations that connect today to tomorrow. The intuitive structure of the Three Horizons framework

allows participants new to foresight to engage more fully, thus strengthening collaboration and collective intelligence gathering.[2]

Rather than progressing linearly through each of the three Horizons, all teams first defined the present (H1), then shifted to envisioning a plausible future (H3) before returning to address transitional forces (H2). This future-first approach helped teams distinguish incremental adaptation from transformative change, better recognize transition dynamics, and more clearly identify points for action. Critically, this approach forced teams to articulate which forces were sustaining the present, which pressures were disrupting it, and what was emerging as foresight change and opportunities for the future.

The H1-H3-H2 sequence ensured teams anchored in the present, could visualize a desired future, and were able to map enablers and barriers in H2, the Horizon in which old and new collide. Discussions were consciously structured around the following key questions per Horizon to avoid the defaulting to short-term fixes or speculative long-term visions:

1	What defines the world at this horizon?
2	What enablers support or sustain it?
3	What barriers, risks, or constraints hinder evolution from it?

This remit focused teams to engage deeply in systems thinking and deepened the exploration of transition dynamics and strategic trade-offs. Crucially, it enabled participants to synthesize discussions, integrate personal expertise, and engage in rapid social sensemaking whereby complex foresight insights could be distilled into actionable steps.

Even in the high-paced workshop environment, the use of the adapted Horizons approach ensured that rapid synthesis of insights was not only possible, but that it was underpinned by a recognition of the trade-offs, interdependencies, and consequences, albeit sometimes unintended. Hence was set the foundation for the next phase: social listening and the understanding of how emerging changes could be used more concretely to build for the future.

PHASE 2

SOCIAL LISTENING

The Center for the Governance of Change utilized a Social Listening approach in Phase 2 to identify and evaluate the presence and evolution of vectors of change within public perception and with academia. This core step validated whether the ideas prominent in the agendas of decision-makers' also resonated within public opinion on social media and were being reflected in scientific portfolios and academic publication. By monitoring the volume and variance of discussions in this way, the Center was able to classify vectors of change into three levels: **The 'Now', The 'Next', and The 'New'.**

- **'Now' vectors show a constant decrease in presence across social media and academic publications.**
- **'Next' vectors have seen a consistent increase in discussions for at least two years, signaling steady and growing attention.**
- **'New' vectors have experienced a recent increase, with increases observed for less than a year or showing abnormal peaks in attention.**

The CGC developed a Boolean query for each of the 70 vectors identified at the summit, conducting systematic searches across the social listening platform Buzzsumo and Google Scholar. This analysis tracked conversation volumes, engagement trends, and scholarly output over a five-year period, from January 1, 2020, to February 1, 2025.

To further structure the analysis, vectors were categorized into three thematic areas: Geopolitics, Geoeconomics, and Society.

Out of nearly 70 vectors identified at the summit, the CGC chose to highlight nine. These vectors align with public interest and represent trends that can function both independently and in connection with one another. Each offers valuable insights on its own, while together they form a broader framework for understanding future developments. This selection ensures that readers can explore multiple pathways for adaptation, whether by focusing on specific trends or assessing how they interact. By structuring the vectors this way, the aim is to help future-proof strategies and provide a clearer view of emerging opportunities and risks.

Regardless of their area of operations, readers should evaluate how these key vectors will impact them and monitor their influence over time.

PHASE 3

INTERPRETATION

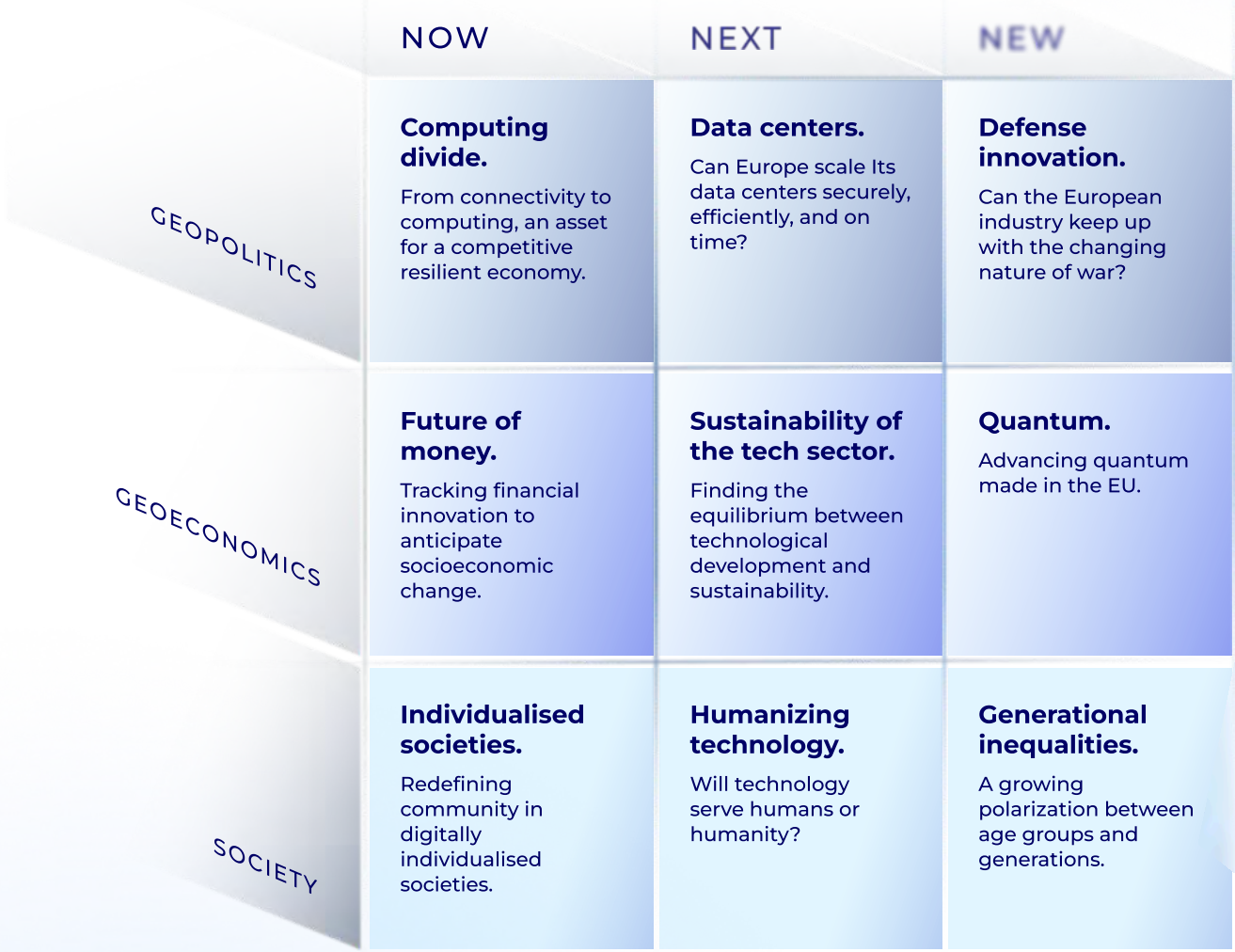
The final step of the methodology following the selection of the vectors of change was a synthesis of findings by the Center for the Governance of Change, using the output of the social listening analysis. Each selected vector of change was individually scrutinized and challenged, to identify clear and actionable insights.

To achieve this, the CGC identified specific indicators or "signals" for each vector. These **signals** were key markers or events that could cause shifts in the trajectory of that vector —specifically identifying whether it continues to **grow**, begins to **decline**, or **remains stable**. This process was designed to ensure that each vector was not only relevant at the time of the report but key to the foresight nature of the approach, for future trend evaluation, monitoring, and analysis.

The outcome of this methodology informed the series of recommendations set out in this report. It is designed to inform stakeholders across private, public, academic, and civil sectors, based on collective data intelligence. With foresight at the heart of this approach, the consolidation of our methodologies as described above will allow decision-makers and public opinion to be engaged more effectively in shaping our future.

Collective Intelligence session. IE Tower, Novemeber 2024.

3 MATRIX OF VECTORS OF CHANGE



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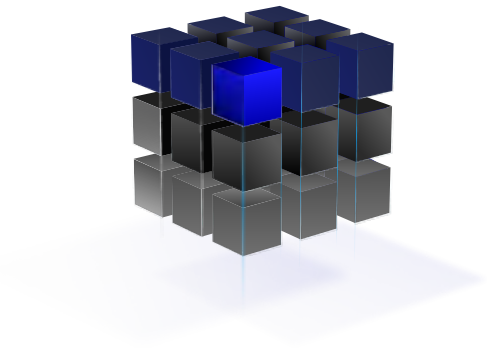


COMPUTING DIVIDE

FROM CONNECTIVITY TO COMPUTING, AN ASSET FOR A COMPETITIVE RESILIENT ECONOMY

SALIENCE DATA: CONSISTENT DECREASE ON SOCIAL MEDIA

1/ CONTEXT

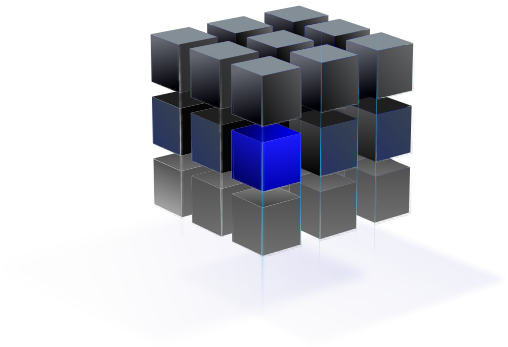
When talking about the digital divide, conversation frequently focuses on internet connectivity as broadband access is seen as a prerequisite for digital inclusion. By 2023, more than nine out of every ten households in the EU had internet access (93.1%), with slightly higher coverage in cities (94.9%) compared to towns and suburbs (92.7%) and rural areas (90.5%).[3] However, connectivity alone is not enough to secure Europe's long-term competitiveness, technological sovereignty, and leadership in emerging technologies.

The challenge is the computing divide—the gap in access to advanced computing infrastructure (e.g., high-performance GPUs, cloud services), open-source AI models, and venture funding for AI development and adoption. Without broad access to these resources, AI innovation risks becoming too geographically concentrated. Across Europe today, AI innovation is primarily found in a few regions, with France and Germany concentrating 85.75% of all AI Venture Capital (VC) funding.[4]

Promoting the geographical diversification of AI development within EU borders is essential for the continent's long-term competitiveness, innovation resilience, and technological sovereignty. A more distributed computing infrastructure would enable different regions and social groups to contribute to a greater extent to AI advancements, increasing the variety of perspectives and practices and consequently therefore applications developed (what some call "technodiversity"). This diversification reduces dependency on a small number of actors, mitigating risks associated with bottlenecks or failures in centralized systems. By reducing reliance on a few innovation hubs, the EU can better withstand shocks and disruptions, particularly important given increasing geopolitical instability and the weaponization of economic dependencies. A decentralized approach also strengthens digital infrastructure, which allows for the adoption of more localized and edge computing operations to reduce latency, improve resilience, and optimize performance.

2/ SIGNAL

A key signal to track the computing divide in the EU is the percentage of venture capital investment and unicorn generation in emerging tech hubs compared to dominant EU innovation centers. Monitoring the share of funding and high-value startups originating outside of these main established hubs will indicate whether AI and computing innovation is decentralizing or remains concentrated. A rising percentage of investments and unicorns in regions beyond the traditional core (i.e., France and Germany) would suggest a narrowing computing divide, signaling the requisite expansion, with broader access to capital, infrastructure, and talent across the EU.



FUTURE OF MONEY

TRACKING FINANCIAL INNOVATION TO ANTICIPATE SOCIOECONOMIC CHANGE

SALIENCE DATA: CONSISTENT DECREASE ON SOCIAL MEDIA

1/ CONTEXT

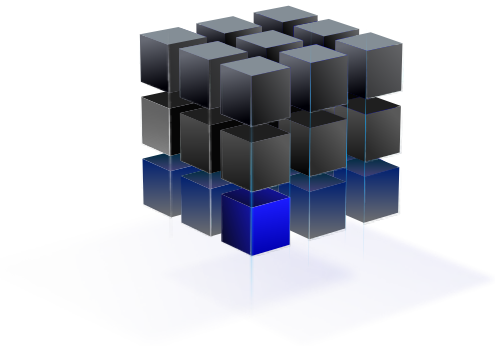
The way financial innovation evolves is one of the strongest indicators of broader economic and technological shifts. In 2025, monetary trends moved in two directions: the first toward decentralization and financial inclusion and the second, at first inspection, being scarcity-driven valuation. However, on deeper analysis, rather than opposing trends, both directions are shaped by the same logic: the financialization of emerging technologies.

On the one hand, techno-optimists envision a future where automation and AI-driven economies reshape the foundations of financial investment. Some propose models like universal crypto-income, where economic activity is no longer tied to traditional work structures but is instead linked to financial innovation, thus providing greater financial flexibility for its stakeholders.[5]

At the same time, financial systems are increasingly, reactively, having to adapt to new forms of value, where access to essential resources—computing power, energy, and semiconductors—play a key role in economic and geopolitical influence. In this scenario, there is a shift from traditional monetary currencies to resource and asset-based units, such as energy credits, access to semiconductors, or AI model ownership.[6]

2/ SIGNAL

Tracking financial innovation is important for understanding the direction of the broader economy, as financial systems often serve as the avant-garde of economic transformation and the financial sector's priorities and movements can signal what will define economic power in the future. Observing where financial systems are expanding, which innovations gain traction and where capital is flowing are all key to understanding potential socio-economic change. Financial inclusion initiatives that aim to bring banking services to misleading populations, alternative credit systems that provide loans based on non-traditional criteria, or new resource-based valuation models that appraise assets like carbon credits all offer early insights, into whether economies are heading toward periods of prosperity, new asset-driven wealth creation, or increasing scarcity.



INDIVIDUALIZED SOCIETIES

REDEFINING COMMUNITY IN DIGITALLY INDIVIDUALIZED SOCIETIES

SALIENCE DATA: CONSISTENT DECREASE ON SOCIAL MEDIA

1/ CONTEXT

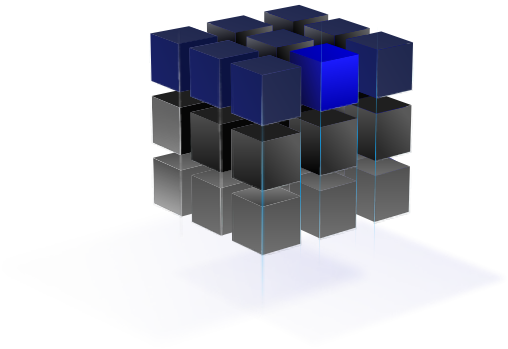
Current observations of European societies indicate a significant trend towards individualization, influenced by the proliferation of digital platforms and changes in consumer behavior. This trend is evident in the reduced frequency of physical social interactions, as more individuals opt for online social media engagement and digital entertainment, which replace traditional communal activities. The shift from physical retail to online shopping further exemplifies this trend, diminishing the social interactions and social collaborations that were once integral to community life.[7]

There is a growing responsibility and, indeed, an opportunity to cultivate methods and means to connect individuals and nurture genuine community engagement and resilience through technology. Technology companies, in collaboration with society, institutions, academia and independent innovators, are uniquely positioned to engineer features that facilitate a shared and inclusive communal identity in the digital world.

2/ SIGNAL

The development of apps and services that promote community engagement and aim to cultivate lasting relationships might indicate a societal shift. The emergence of “third spaces”—environments designed for social interaction beyond traditional homes and workplaces—reflects a growing desire for more meaningful, personalized communal experiences. If these trends become more integral to daily life rather than existing on the periphery of mainstream culture, they could signal a reversal of individualization.

NEXT



DATA CENTERS

CAN EUROPE SCALE UP ITS DATA CENTERS SECURELY, EFFICIENTLY, AND ON TIME?

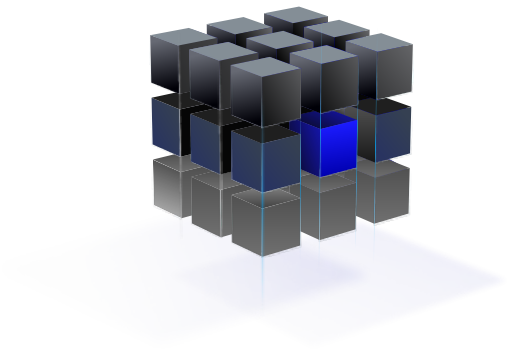
SALIENCE DATA: CONSISTENT INCREASE ON SOCIAL MEDIA / DECREASE IN PAPERS

1/ CONTEXT

Data centers are critical networks of computing and storage resources that support daily business and consumer operations. There are approximately 1,200 data centers in Europe, which is significantly behind the over 5,000 data centers hosted by the U.S.[8] The next wave of technological advancements, including quantum computing, will require a new generation of data centers designed to meet future digital demands. However, environmental concerns are significant. If the power demand for data centers rises from 460 terawatt-hours in 2022 to 1,000 terawatt-hours by 2026, this growth would be approximately equivalent to Japan's total electricity consumption.[9]

2/ SIGNAL

Data centers face risks from cyber threats and foreign dependencies (as access to semiconductors), prompting nations to prioritize domestic control and development[10]. Rapidly developing more sustainable data centers in Europe is essential to keep pace with technological advancements and prepare for future developments[11]. Given the increasing demand for data centers for today's and future technologies, it is vital to observe how the EU's climate and sustainability goals will influence the development of new data centers. As the demand for data centers rises, further innovative efforts to minimize their environmental impact will emerge. This will include using more technologies that consume less energy, as well as optimizing energy and cooling system management. This innovation effort will help the EU meet both its climate goals and the energy demand for future technologies. The location of new data centers will support this effort, particularly in European countries with a lower risk of climate hazards, good infrastructure and connectivity, and access to reliable energy sources.



SUSTAINABILITY OF THE TECH SECTOR

FINDING THE EQUILIBRIUM BETWEEN TECHNOLOGICAL DEVELOPMENT AND SUSTAINABILITY

SALIENCE DATA: CONSISTENT INCREASE IN PAPERS

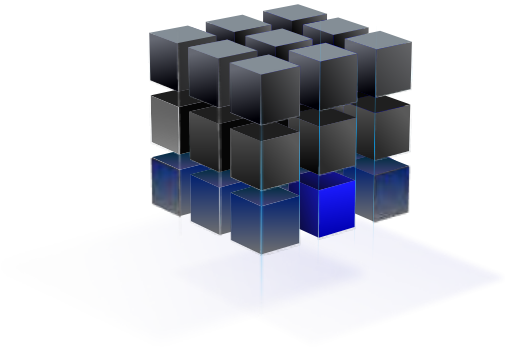
1/ CONTEXT

The tech sector faces increasing scrutiny to balance performance with environmental responsibility. Technologies such as AI are significant emitters of carbon emissions. A study predicts that in 2027, NVIDIA's AI servers will consume more energy than the amount Sweden and Argentina consumed in 2024.[12] The rising demand for data centers may drive the construction of more fossil-fuel power plants, jeopardizing climate targets.

2/ SIGNAL

A key development to monitor is the advancement of hardware and software technologies designed to bridge the gap between ecological and economic sustainability. As AI and data centers drive energy consumption to unprecedented levels, industries will be forced to adopt solutions that reduce their environmental impact without compromising performance.

Tracking innovations in energy-efficient chips, AI model optimization, and sustainable data infrastructure will reveal how the tech sector responds to mounting regulatory and market pressures. The widespread implementation of these technologies across industries will indicate whether sustainability is becoming an integrated standard rather than an afterthought in technological development.



HUMANIZING TECHNOLOGY

WILL TECHNOLOGY SERVE HUMANS OR HUMANITY?

SALIENCE DATA: CONSISTENT INCREASE IN PAPERS

1/ CONTEXT

Technology is deeply integrated into human lives, moving beyond screens and devices to become an ambient, adaptive presence. The shift from explicit user input to passive, reactive consumption is accelerating, with AI-driven interfaces replacing traditional modes of engagement and outsourcing activities to technology becoming the norm. Devices like "Rabbit r1" are already reducing reliance on conventional smartphones by integrating AI-driven personal assistants, while Meta's "Orion glasses" signal a move toward AR interfaces controlled by hand, eye, and brain signals rather than physical inputs.[13] Advancements in brain-computer interfaces suggest a future where direct neural interaction could eliminate the need for screens altogether. In this trajectory, technology will no longer be perceived as a separate entity—AI will shape interactions, decisions, and perceptions without conscious (human) effort.

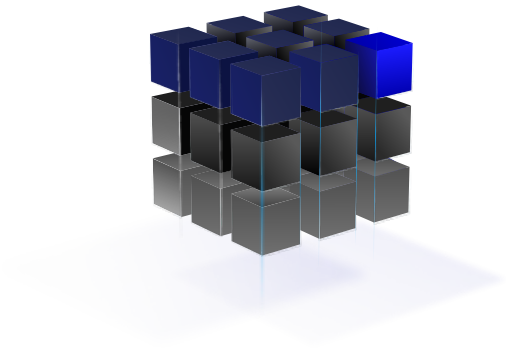
This said, our individual engagement with technology is becoming more human; interfaces are vanishing, and interactions are becoming more intuitive, emotional, and personalized. However, what is less clear is whether technology is becoming more human for the individual or for humanity at large. Currently, digital age harms such as shortened attention spans, digital dependency, uncertain future work landscapes, polarization, trust deficits, and declining mental health need rectification. Simply making AI more human-like will not necessarily enhance our quality of life if it merely amplifies these issues. Moreover, developing technology that anticipates and solves future problems, not just today's issues, is crucial. The real challenge lies not just in humanizing AI but in designing it to meet the needs and mitigate the risks of future societies.

2/ SIGNAL

A key signal to monitor is the concerns raised by activist and citizen groups about technological challenges that have not yet fully materialized. While many focus on well-known issues like privacy, misinformation, and job displacement, others are addressing future risks—such as the loss of deep human connection, the erosion of independent thinking, or the unintended consequences of AI-driven decision-making.

Examining what these forward-looking activists are advocating for can provide early insights into emerging societal and ethical challenges. Are they proposing safeguards, new governance models, or alternative technological pathways?

NEW



DEFENSE INNOVATION

CAN THE EUROPEAN DEFENSE INDUSTRY KEEP UP WITH THE CHANGING NATURE OF WAR?

SALIENCE DATA: RECENT INCREASE ON SOCIAL MEDIA

1/ CONTEXT

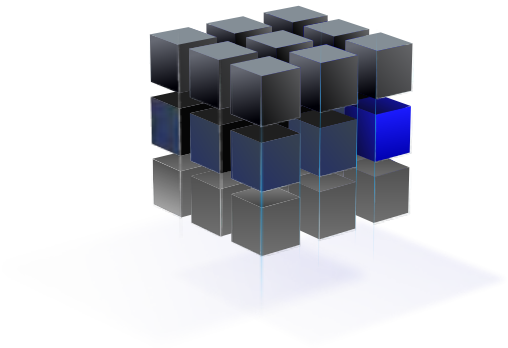
There is a significant shift in modern warfare. On the one hand, the "fog of war" is disappearing, replaced by advanced surveillance technologies that “see everything.”[14] On the other hand, threats are more sophisticated and thus harder to address. Drones, both tactical and surveillance, are becoming the norm, dominating the battlefield and providing real-time video feeds. This evolution has not only transformed military tactics but also fostered an industrial race to develop, produce, and scale more advanced and cost-effective weapons models, positioning private sector innovation as a key element in modern defense capabilities.

European defense is at the forefront of emerging technologies, but breakthrough innovations require long-term capital investment and high-risk funding. “Deep tech”, which refers to innovations that merge cutting-edge engineering with scientific advancements, is resource-intensive, characterized by high failure rates and uncertain returns. Its scalability depends on sustained financial backing and industrial adaptability. Whether deep tech becomes a transformative force in military power will depend on how regulation and financial structures align with the evolving European security landscape and concerns.

2/ SIGNAL

The key signal to monitor is who participates in public-private collaborations for deep tech defense development. Are partnerships limited to big companies with consolidated technologies, or are governments also engaging with early-stage ventures for testing and prototyping?

The nature of these collaborations will shape the battlefield of the future. Tracking public tenders and opportunities for public-private partnerships can reveal which deep tech applications are gaining traction in defense. Are investments focused on established AI and surveillance systems, or is there room for emerging technologies like quantum encryption and cognitive warfare tools?.



QUANTUM

ADVANCING QUANTUM MADE IN THE EU

SALIENCE DATA: RECENT INCREASE ON SOCIAL MEDIA

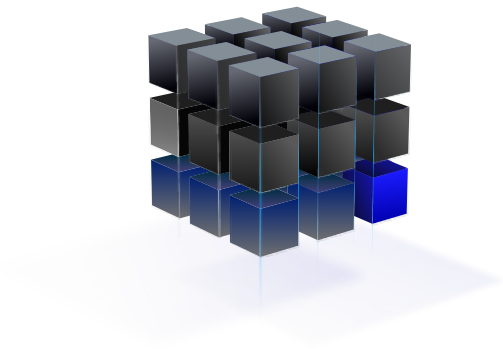
1/ CONTEXT

Quantum can be applied to various technologies and holds the potential for breakthroughs in fields such as medical research, security, and the environment. Quantum computing, for instance, differs from classical computing by utilizing "qubits" instead of "binary" bits.[15] While classical bits exist in either a 1 or 0 state, qubits can exist in multiple states simultaneously, allowing quantum computers to handle numerous computations at once.[16] This capability empowers future quantum computers to address issues that current classical systems cannot tackle.

The EU possesses a considerable advantage in the field of quantum, having the largest concentration of quantum-ready experts (231 per million habitants) and the second highest public investment in quantum (behind China).[17] However, it faces challenges, including limited private investment compared to the U.S, as well as an urgent need for greater industrialization and commercialization of quantum technologies.[18] Without a unified, large-scale European quantum program, the EU's initiatives in quantum development may lead to fragmentation and duplication of efforts and resources within the EU.

2/ SIGNAL

The rapid advancement of quantum computing presents a significant threat to the security in various areas, including the financial sector.[19] Today's computers would take thousands of years to crack current encryption standards.[20] However, a suitably powerful quantum computer could theoretically accomplish this in just minutes. Within the next 10 to 15 years, quantum computers could potentially breach these systems.[21] The primary focus of quantum technologies will be cryptographic security, which will be utilized to safeguard financial sector servers and for defense.



GENERATIONAL INEQUALITIES

A GROWING POLARIZATION BETWEEN AGE GROUPS AND GENERATIONS

SALIENCE DATA: RECENT INCREASE ON SOCIAL MEDIA

1/ CONTEXT

Advances in technology, especially in medicine, have increased people's life expectancy.

The EU has been experiencing a growing proportion of older individuals due to higher life expectancy and low fertility rates. The percentage of people aged 80 and above in the EU's population is projected to rise from 6.1% in 2024 to 15.3% by 2100, while the share of the working-age population is expected to decline during the same period.[22] Estimates indicate that there are currently three workers for every retiree.[23] However, by 2050, there will be fewer than two workers for each retiree.[24]

Current government measures include increasing the retirement age. However, these measures will have their limits, and therefore there will be significant pressure on the current and younger working-age generation to support the future elderly population, more than their older counterparts.

2/ SIGNAL

A key signal to track is whether major policy debates and public policies are increasingly framed through the lens of generational inequality. As economic and demographic pressures grow, political discussions around youth unemployment, pension sustainability, and public spending distribution across age groups may start reflecting a stronger generational divide.

Monitoring how frequently age-related disparities are highlighted in policy proposals, government debates, and political communication will indicate whether the gap between generations is becoming a defining issue. If policies on taxation, welfare, and labor reforms begin to emphasize generational trade-offs, it may suggest that societal tensions between age groups are deepening and that intergenerational inequality is becoming a central political and social concern.

4 CONCLUSIONS AND RECOMMENDATIONS

As illustrated by the vectors of change highlighted in this report, a new technological dynamic has emerged and is now embedded in daily life. Given the velocity of change, maintaining technology that is inclusive, sustainable, and relevant to the EU requires collective effort. This involves dedicating energy and resources to understanding the business drivers and market forces that shape it. Equally important is examining its interactions with geopolitical and geo-economic dynamics, as well as its impact on international organizations, governments, businesses, innovators, academia, and society—ultimately influencing individuals at a fundamental level.

Harmonization and collaboration are often advanced as an essential aspect of technology focused policy making. Focusing on the core principles behind regulations, rather than just aligning rules, can strengthen technology diplomacy and serve as a foundation for future strategies that drive innovation and development. Consequentially adoption and deployment will be better advanced by smarter investment, by the growth of foresight focused public private partnerships, supported by a more homogenized and coordinated governance approach across Europe.

With this in mind, the report concludes with a series of recommendations shaped by our Vectors of Change. Underpinned by the objective to make this report relevant and actionable for the tech and foresight community and beyond, we have analyzed the context and signals across each vector with the specific purpose of providing recommendations genuinely capable of influencing decision-making processes and driving change. Whilst these cannot be interpreted in isolation, advancing these, singularly and in the collective, will better place us to embrace technology.

RECOMMENDATION ONE

A MORE COHESIVE APPROACH TO TRADITIONAL COMPUTING

A more cohesive fused approach to traditional computing, promoting the use of open-source software and increasing the decentralization of computing across the EU will lead to a more competitive and resilient technology economy.

The CGC recommendation is to strengthen existing regional hubs such as the high-performance computing centers in Barcelona, Bologna, and Luxembourg and incentivize them to integrate into broader networks that promote shared learning and collaborative research in computing technologies. Empowering these centers of excellence to bolster regional expertise, for example focusing on Barcelona's capabilities in mobile technologies or Bologna’s focus on agri-tech will expand accessibility and innovation across more diverse geographic areas.

RECOMMENDATION TWO

ACCELERATE INVESTMENT IN NEW TECHNOLOGIES, DEEP TECH SOLUTIONS AND TECHNOLOGY INFRASTRUCTURE.

Deep tech cannot be deprioritized, as it remains slow to market and is often developed in a fragmented, siloed manner with duplication of funds, efforts, and resources. Specifically, Europe needs a unified, large-scale quantum computing program for optimizing development and scaling up funding thus allowing for more robust quantum computing solutions to be brought to market. By accelerating the integration of quantum computing into EU mainstream technology markets, Europe's competitive position will become stronger.

Smarter investment is also needed for technology infrastructure. The Data Centers, for example, are critical to sustaining technological consumption and supporting deep tech solutions. Investment must go beyond simple diversification—it requires strategic alignment with long-term technological priorities to ensure funding is directed toward scalable and impactful innovations rather than being dispersed across fragmented initiatives or siloed beneficiaries. These investments are essential for accelerating growth through innovative scientific and technological advancements, both of which are key as we move from the present into the Next and the New.

RECOMMENDATION THREE

REMOVE BARRIERS THAT HINDER TECHNOLOGY DEPLOYMENT

Governments must adopt strategies that remove barriers to technology deployment while ensuring long-term regulatory certainty. Energy resources, for example, are limited, under pressure, and often confined to regulatory and political debates. Shifting the focus back to the core principles of strategy and implementation is essential for driving investment and growth.

Sustainability concerns influence strategic decisions, and uncertainty around environmental impact can constrain financial investment in technology innovation. To find the right equilibrium, financing for energy resources and sustainability must be tackled directly, ensuring that policies enable, rather than hinder, technological development. The EU's Clean Industrial Pact provides a framework for balancing sustainability goals with industrial growth, supporting the adoption of technologies that reduce energy consumption and enhance efficiency. This includes server consolidation, virtualization, and quantum communication networks, which not only decrease energy use but also strengthen Europe's digital infrastructure. Targeted funding strategies that incentivize energy-efficient data centers and advanced computing technologies will help mitigate sustainability-related investment risks while ensuring Europe remains competitive in deep tech development.

RECOMMENDATION FOUR

REMOVE THE FRAGMENTATION THAT OBSTRUCTS FINANCIAL INVESTMENT

Fragmentation is a challenge both for the present and future of financial investment in technology. To truly transform the EU, it cannot function in isolation, where a handful of private sector innovators advance independently in silos. A more coordinated approach is needed to ensure that financial resources and technological advancements are aligned across sectors and regions.

Fostering and incentivizing initial collaborations between innovators, rewarding inclusivity and transparency, and involving financial sector stakeholders—such as banks and financial regulators—from the outset will promote financial innovation. Early engagement is crucial to encouraging entrepreneurship capable of driving meaningful socio-economic change, ensuring that investment strategies are built on sustainable, long-term cooperation rather than fragmented, short-term efforts.

RECOMMENDATION FIVE

MAKE INCLUSIVENESS A PRIORITY; RESET THE RELATIONSHIP BETWEEN THE INDIVIDUAL AND THE COLLECTIVE

To counter the trend of individualization and strengthen community connections through technology, inclusiveness and communication must be priorities. Technology solutions should be designed with collective intelligence in mind, ensuring that tech companies, policymakers, researchers, and civil society collaborate to identify and implement responsible, actionable solutions. Expanding access to cross-sectoral foresight initiatives will help assess future risks with the collective—rather than the individual—in mind, allowing these insights to be more effectively integrated into product design and governance.

Bridging generational divides is also essential for maintaining social cohesion. If left unaddressed, polarization in perspectives between generations could weaken intergenerational support systems and societal stability. The EU must create spaces for meaningful interaction between policymakers and different generations, ensuring that younger and older voices contribute to shaping policies. Cross-generational education, workforce training, and retraining initiatives would support stronger community ties and equip individuals with the skills needed to adapt to technological and societal shifts.

RECOMMENDATION SIX

DIRECT DEFENSE INVESTMENTS TOWARD SCALABLE AND STRATEGIC TECHNOLOGIES

Perhaps now more than ever, it is essential that technology is built and adopted in a way that keeps Europe secure in the light of the threat of ever more sophisticated technological warfare. Empowering decision makers, governments, businesses, to rise to the challenges provoked by bureaucratic inefficiencies, complex regulations and insufficient funding will enable traditional military techniques to keep pace with the rapidly changing landscape of warfare powered by technology.

By increasing defense spending and simplifying regulations such that venture capital investment specific for military focused technology can be increased, especially in deep tech, would enhance Europe's defense capabilities. Investing more in technologies such as quantum communications, AI and drones supports the vital security of all EU member states.

Underpinning our foresight technology recommendations, we circle back to the power of the collective. It is essential to increase collaboration and reduce duplication in tech innovation and adoption, ensuring that technology is built not just for the present but for future generations.

ANNEX

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CENTER FOR THE GOVERNANCE OF CHANGE

SPEAKERS

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Soon-to-be-Appointed Dean of the IE School of Politics, Economics and Global Affairs.

He is the current President of the Jacques Delors Institute and served as Prime Minister from 2013 to 2014 and as Secretary of the Italian Democratic Party from 2021 to 2023. He was Minister of European affairs in 1998, Minister of Industry from 1999-2001, and a Member of the European Parliament from 2004-2009. In 2014, he became Dean of the Paris School of International Affairs at Sciences Po Paris. He graduated from the University of Pisa in International Law and holds a Ph.D. in European Community Law from the Scuola Superiore Sant'Anna in Pisa.

BÁRBARA NAVARRO

Head of Research, Public Policy and Institutional Relations at Banco Santander

Prior to her current role, she spent 14 years working for Google as Director of Public Policy and Governmental Affairs for the South of Europe in Madrid, Head of Asia Pacific in Hong Kong, and head for Google Cloud APAC based in Singapore. Before her work at Google, she was Director of Public Policy and Government Relations for NBC Universal and before that Director of Intellectual Property for ClarkeModet. She received a Degree in law from Universidad Pontificia de Comillas (ICADE), an Executive MBA from IESE Business School. For 8 years, she has been a professor at Carlos III University.

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Secretary of State and Director of the Bureau of Economic Affairs and G20, Cabinet of the Prime Minister of Spain.

He advises the government on economic matters. Previously, he served as Deputy Director of Financial Advisory at ICEX Trade and Investment and worked for international organizations like the European Commission, the African Development Bank, and the World Bank. He graduated from the Universidad Autónoma de Madrid with a degree in Business Administration and holds a Master's in Latin American Politics and Economy from Universidad Complutense de Madrid, and a Master's in International Relations and International Business from Columbia University.

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Vice President for Public Policy in Europe, Meta

He is the Vice President for Public Policy in Europe at Meta, a role he has held since 2018. His portfolio includes the management of the company's regional public policy strategy and key relationships with senior policy stakeholders. Since 2022, he also oversees the company's economic policy strategy. Prior to this, he was the Global Public Policy Director at Vodafone where he was responsible for leading the company's work on developing policy strategies and engagement with policy makers. He has also held other executive policy roles within the communications industry including at Colt Group, Orange Group, and Deloitte Consulting. He holds an LLM from the University of Warwick and a law degree from the University of Vienna.

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He is a senior policy fellow and head of the Madrid office of the European Council on Foreign Relations, a position he has held since its creation in 2007. He is a professor of Political Science at Universidad Nacional de Educación a Distancia (UNED) in Madrid. He is a weekly columnist in EL MUNDO as author of the blog "Café Steiner" and a weekly contributor on RNE (Spanish National Radio) and RTVE. Previously, he was Editorial Director of EL PAIS where he also authored a weekly column in the International Section and a blog.

Ignacio holds a PhD in Political Science from the Universidad Complutense de Madrid.

JUAN SANTALÓ

Professor of Strategic Management at IE University

He is an expert in corporate governance and competitive strategy. He served as the Chair of IE's Strategic Management Department from 2008 to 2013 and has directed the Observatory on Competition Policy, contributing significantly to research on antitrust policy and its intersection with corporate strategy. He has an extensive academic career including a visiting professorship at Bocconi University, Tulane University's Freeman School of Business, and the University of Chicago.

Juan holds a bachelor's in Economics from the Universitat Central de Barcelona, and two Master's in Economics from Universitat Pompeu Fabra and the University of Chicago. He furthered his career with a Ph.D. in Economics from the University of Chicago.

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She is a technology strategist intrapreneur specialized in digital transformation and emerging technologies. She has experience driving high-tech initiatives into the market internationally, creating new digital products, and business units from the ground up. She has worked with IBM, Microsoft, and Nokia, among others, in executive roles creating business units to launch high-tech solutions based on mobile, AI, and quantum computing, creating the enabling ecosystem mostly for telco, finance, and healthcare industries.

Elena holds a bachelor's in Mathematics and Computer Science from the University of Michigan, an Executive MBA from IE Business School, and a Master's in Telecommunications Engineering from Universidad Carlos III. She further completed a Ph.D. in Telecommunications Engineering at Universidad Carlos III.

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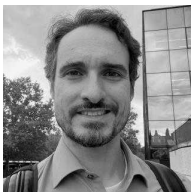

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