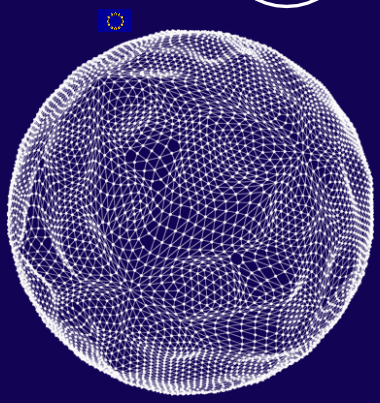
ATTRACT

Developing breakthrough technologies for science and society



# D5.3 – Overall study summary report

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# 1. Executive Summary

In the rapidly evolving landscape of scientific research and technological innovation, the European research community stands at a critical crossroads. The ATTRACT Socioeconomic Studies (SES) consortium has undertaken an unprecedented, comprehensive investigation into the complex mechanisms that drive breakthrough innovations, revealing insights that challenge traditional approaches to research, collaboration, and technological development.

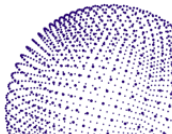
This groundbreaking initiative represents more than an academic exercise. It is a strategic deep dive into the heart of innovation ecosystems, examining the intricate interplay of psychological, social, and structural factors that either propel or impede scientific advancement. Over two intensive years, eight distinct research projects converged to create a holistic understanding of how transformative technologies emerge, develop, and create societal value.

The European research environment faces multiple challenges, such as siloed research practices, limited interdisciplinary collaboration, bureaucratic barriers, and a persistent gap between academic discovery and market application. Traditional funding models and institutional structures often inadvertently create obstacles to true innovation, constraining the potential of brilliant researchers and groundbreaking ideas.

Our consortium took an unprecedented, multi-dimensional approach to understanding how to optimize European Research Infrastructure Innovation Ecosystems (ERI-IE):

- Investigated psychological dynamics of scientific collaboration;
- Analysed structural barriers in research ecosystems;
- Explored mechanisms of technology transfer and commercialisation;
- Developed experimental methodologies for innovation assessment;
- Examined the role of diversity and inclusivity in research teams.

This report provides a comprehensive overview of the findings, tools, and strategic insights developed by the SES consortium. It serves as a blueprint for creating more adaptive, inclusive, and impactful research and innovation systems, based on real-world evidence from the European science and technology landscape.



# 2. Introduction

## 2.1. Background of the ATTRACT initiative

The ATTRACT program emerged from a bold vision, to transcend the conventional limits of scientific research and to establish a dynamic, interconnected ecosystem for technological advancement. Launched under the European Union's Horizon 2020 research and innovation framework, this initiative marked a significant departure from the traditional research funding models.

Recognising the immense potential of early-stage deep-tech research, ATTRACT aimed to bridge the gap between discovery and impact, by creating an environment that fosters interdisciplinary collaboration, rapid prototyping, and user-centric approaches. However, despite substantial resources being dedicated to the development of new technologies, a critical, and over overlooked aspect, remains relatively unexplored: the socio-economic and institutional conditions that determine whether scientific breakthroughs successfully translate into public value.

To address this issue, the Socio-Economic (SES) component of the ATTRACT Phase II was launched as an integral part of this vision. Comprising eight research projects that unite a diverse group of scholars and researchers. Their common goal was to investigate the 'invisible infrastructure' that either supports or hinders scientific innovation. This exploration included various aspects, such as the behavioural dynamics within research teams, organisational learning patterns, legal frameworks for collaborations, open innovation methods, the effectiveness of entrepreneurship education, and the tools used to measure success.

Taken together, the SES projects shared a systemic perspective on innovation. Instead of viewing scientific commercialisation as a linear process, from invention to market uptake, these studies conceptualised innovation as an evolving ecosystem. This ecosystem consists of a network of actors, institutions, incentives, and capabilities that interact over time. This framing allowed the consortium to interrogate not only the types of technologies being developed under ATTRACT, but also the methods used, the individuals involved, the conditions under which development occurred, and the ultimate goals of the innovation efforts.

Under the coordination of ESADE Business School, the SES projects engaged in ongoing dialogues, exchanging ideas, and direct collaboration within SES studies as well as with the R&D&I and ATTRACT Academy projects. This collective effort represents an ambitious attempt to redefine how we understand and support the science-innovation interface in Europe. As this report will demonstrate, the SES consortium served as both a mirror and a roadmap: a mirror that

reflects the current limitations of our innovation systems, and a roadmap that points toward more adaptive, inclusive, and impact-oriented futures.

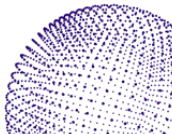
## 2.2. From output to outcome

A key theme that emerged from the eight SES projects was the need to critically rethink how we define and measure success in science-driven innovation. Conventional models, which are still common in policy and funding frameworks, often equate success with linear progress measured by Technology Readiness Levels (TRLs), the generation of patents, the creation of spin-off companies, or the number of licensing agreements formed. While these indicators can be important, the SES studies collectively demonstrated that such metrics capture only a narrow aspect of what truly matters when assessing the full impact of public investments in research and development.

Innovation, particularly in early-stage deep-tech environments, is rarely a straightforward process. The journey from the laboratory to the market is a more dynamic progression of continuous experimentation, learning, and adaptation. Importantly, much of the value generated in these ecosystems lies not only in the final product, but also in the interactions, capabilities, and flow of knowledge throughout the research process. This can involve the development of new skills among researchers, the building of trust between sectors, the refinement of team dynamics, and the establishment of new institutional pathways for collaboration.

By demonstrating how research infrastructures and publicly funded breakthroughs may generate substantial value in ways that are not easily measurable, projects such as COMPUTE IMPACT and CASEIA have challenged the focus on economic and commercialisation metrics. For instance, the development of open-access data platforms and AI-driven scientific tools, like AlphaFold, can drastically reduce barriers to entry for researchers and innovators globally. This, in turn, encourages fresh waves of scientific research and applied innovation. Additionally, behavioural interventions explored by ABC4E and EMDOI, have shown that shifts in mindset, motivation, and team dynamics are critical for encouraging the adoption and sustainability of open innovation practices.

Therefore, the SES consortium highlights the need to move beyond traditional metrics that only focus on outputs in order to gain a more comprehensive understanding of the outcomes. This includes observing changes in behaviour and attitudes, enhancing institutional learning capacity, improving collaboration structures, and promoting inclusivity in research design. Essentially, the SES findings suggest that we should measure what we truly value, rather than only valuing what we can measure. This perspective has significant implications for how the European Commission and other funding bodies design, monitor, and evaluate future innovation programs. It indicates that, to fully put to use the transformative potential of deep-tech research, we must create policy environments that recognise, support, and reward a broader and more systemic range of innovation outcomes.



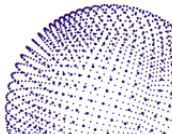
# 3. Integrated learnings from the SES projects

## 3.1. Mindsets that enable innovation

Innovation is typically viewed in terms of infrastructure, funding, or intellectual property. However, at its essence, it is fundamentally a human effort. The ability of scientists to adopt new ideas, take risks, work together with unfamiliar partners, and maintain resilience in the face of uncertainty relies not only on institutional structures, but also on the psychological flexibility, cognitive framing, and behavioural readiness. Two projects from SES, ABC4E and EMDOI, brought this sometimes-neglected facet to the forefront of the consortium's findings.

ABC4E addressed the challenge of limited knowledge exchange through the lens of behavioural science. Building on psychological theories, such as Acceptance and Commitment Therapy (ACT) and Relational Frame Theory, the project proposed that psychological inflexibility, defined as the inability to adapt one's thinking in the face of discomfort, was a major impediment to effective open innovation. To test this hypothesis, the team developed a tailored behavioural training program for researchers from five leading European research institutions: IIT Genova, INFN Rome, University of Bologna, Polytechnic of Turin, and teams from the ATTRACT project. By employing a combination of surveys, focus groups, and psychological measurement tools, ABC4E discovered that over 65% of participants demonstrated increased psychological flexibility following the intervention. These participants reported higher engagement with industry partners, a stronger willingness to explore boundary-spanning collaborations, and an enhanced openness to knowledge exchange. Notably, the study shifted its focus from attitude change to measurable behavioural outcomes. Post-training interviews found that participants were more inclined to contact companies, attend interdisciplinary conferences, and engage in knowledge transfer activities. Although the training did not immediately lead to high-risk entrepreneurial actions, such as creating start-ups or filing for patent, likely, because of the existing institutional and structural restrictions, it effectively laid the foundation for developing capabilities in the long-term.

On the other hand, EMDOI examined similar dynamics from a different perspective, highlighting how entrepreneurial intentions and inclusive team practices influence commercialisation outcomes. Using data from 18 ATTRACT Phase II projects, including two rounds of surveys and 29 semi-structured interviews, EMDOI uncovered a striking pattern: team members often remained focus on traditional academic outputs, even though several project leaders had a strong entrepreneurial mindset. Therefore, the study identified several factors contributing to the gap between intention and action, and that is the lack of business training, limited exposure to industry, and a narrow view of innovation that excluded end-user perspectives.



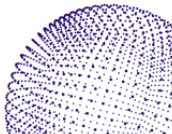
EMDOI also explored how team diversity, especially in terms of discipline, ethnicity, and gender, impacted innovation. At the start of the study, most teams had not considered diversity as a factor in their research design. However, by the second round of surveys, over half of the projects had taken concrete steps to incorporate diversity considerations into their methodologies, user engagement strategies, or commercialisation plans. These changes were often prompted by the reflective interviews and training tools used in the project, indicating that increased awareness and structured support may be effective drivers of inclusive innovation. On top of that, the study revealed a strong link between outbound open innovation practices, coupled open innovation practices, and inclusive design. This means that teams that co-developed solutions with external partners or involved end-users during the early stages of development were significantly more likely to include broader societal needs and viewpoints into their work. This reinforces the notion that open innovation is about more than just efficiency or market access, it is also about allowing for different ideals and perspectives to be included in the research process.

Overall, these two projects show that the human dimension of innovation, such as the mindset, adaptability, and inclusion, is central, not peripheral. Policies aimed at increasing research commercialisation must extend beyond just funding and institutional mandates. They should also support the psychological, interpersonal, and ethical skills that enable scientists to traverse the complicated social realities associated with innovation. These findings urge for the integration of behavioural science, and inclusive design training into research programs and institutional frameworks, ensuring that scientists are not only technically competent, but also behaviourally and socially prepared to contribute to open and impactful innovation.

## 3.2. Entrepreneurial learning in scientific contexts

One of the persistent challenges in Europe's innovation ecosystem is the effective cultivation of entrepreneurial capabilities among scientists, particularly those situated within academic and public research institutions. The critical imperative lies in developing comprehensive mindsets, skills, and strategic awareness that can facilitate the translation of scientific research beyond the laboratory boundaries. Although entrepreneurial learning has been extensively studied within business education and startup incubation contexts, the landscape of science-based entrepreneurship reveals distinctly unique characteristics. It is often slower, more unpredictable, strongly based in disciplinary standards, and frequently deviates from ordinary market logic.

Two SES projects, NEXT-GEN-TECH-ED and EMDOI, investigated how scientists learn to navigate commercialisation and entrepreneurial engagement, offering complementary insights into what works, what is missing, and how educational and policy frameworks can be redesigned to better align with scientific contexts. Therefore, NEXT-GEN-TECH-ED began with a seemingly straightforward question: *how do scientists learn to be entrepreneurs?* To address this, the team undertook a series of interconnected studies. One study focused on Entrepreneurial Self-Efficacy (ESE) within research teams, another one examined learning strategies during the commercialisation process, and a third analysed the design principles of entrepreneurship



education in STEM areas. Their findings showed that, while scientists are generally confident in their scientific expertise, they have a considerable lack of self-efficacy when it comes to making entrepreneurial decisions, mostly because about those involving risk, ambiguity, and involvement with external stakeholders. Moreover, the study on ESE indicated that entrepreneurial confidence among scientists is not something that they are born with, nor is it automatically developed simply by being close to innovation environments. Rather, ESE tends to develop through specific team structures, access to mentorship, and real-world exposure to commercialisation channels, because institutional support alone is not enough. What counts most is whether researchers can envision themselves thriving in entrepreneurial positions, and if they are provided with safe and supported opportunities to experiment those roles out in practice.

Another key contribution from NEXT-GEN-TECH-ED was the identification of two primary learning strategies used by science teams at various stages of the commercialisation process, which the researchers named 'seeding' and 'soloing'. In the early stages (usually Technology Readiness Levels, TRLs, 4-5), teams frequently rely on seeding, which involves learning through indirect means, like external advice, observation, or engagement with partners. As projects progress though and begin to develop tangible prototypes or engage in market testing (Technology Readiness Levels 6-7), teams transition towards a 'soloing' approach, characterised by direct experiential learning and repetitive refinement. This pattern suggests that support systems should be organised and matched to different TRLs, providing external exposure and scaffolding in the early stages, and allowing for more autonomy and iterative exploration in the later phases.

Whereas the EMDOI supported and expanded on these findings by highlighting the fact that scientists' entrepreneurial purpose and behaviour are stemming from organised learning ecosystems, rather than just their personalities or ambitions. Moreover, interviews with ATTRACT project leaders indicated that exposure to users, role models, and input from industry stakeholders were regularly highlighted as critical learning experiences. These influences were found to be far more significant than institutional incentives or training programs alone. Additionally, EMDOI pointed out that the entrepreneurial learning is a collaborative process, influenced by team dynamics, trust, and a shared purpose, rather than being solely an attempt.

Perhaps most importantly, both projects stressed that entrepreneurship in scientific context is not only focused on commercial outcomes. Many researchers shared social and scientific motivations for bringing their ideas to the world, for example like addressing important societal issues, enhancing healthcare tools, and minimising environmental impact. These researchers saw entrepreneurship as a tool to maximise the value and impact of their research, rather than an objective in itself. This understanding has implications for policy, meaning that support programs should consider not just the market potential, but also mission alignment and social value.

When considered together, the results of NEXT-GEN-TECH-ED and EMDOI support a redesign of entrepreneurship education in research cultures. Instead of adopting models from corporate contexts, we should create learning experiences that reflect the reality of scientific work. This would include for example acknowledging the long timelines involved, the collaborative nature of

discovery, the adaptive development of ideas, and the desire to contribute to the public good. Therefore, educational initiatives that are interdisciplinary, experiential, and focused on real-world collaboration, rather than theoretical instructions, are considerably more likely to produce confident, capable, and dedicated science-based entrepreneurs.

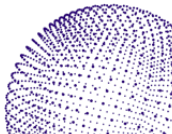
## 3.3. Open innovation and ecosystem collaboration

In the evolving world of scientific discovery, innovation is no longer the domain of solitary genius or isolated research teams. Even if individual researchers and teams may create the initial ideas, transforming these scientific concepts into societal value relies on their ability to engage with a broader ecosystem of stakeholders. This includes businesses, policymakers, users, civil society organisations, and peers from other disciplines. The effectiveness of these networks, like how knowledge is exchanged, how trust is established, and how shared goals are defined, significantly influences the success or failure of early-stage innovation.

When it comes to the SES consortium, two projects, CORE and ABC4E, explored innovation dynamics from different, but at the same time, complementary perspectives. Although ABC4E concentrated on cultivating the individual mindset needed for open engagement, CORE adopted a broader view by asking what kinds of structures and conditions allow such engagement to flourish at scale? Together, they offer a deep grasp of what it takes to create innovation systems that are not only technologically advanced, but also socially savvy.

Building on this question, CORE began with a key insight: unlike traditional innovation ecosystems, where a dominant player like a large company coordinates activities, initiatives such as ATTRACT function as distributed ecosystems. These ecosystems are made up of loosely connected participants who have diverse motivations and minimal formal hierarchy. In these contexts, successful collaboration relies on the ability of individual actors to navigate uncertainty, align around common goals, and build productive relationships across institutional boundaries. Which is why the study used a combination of qualitative interviews, surveys, and social network analysis (SNA) in order to map the collaboration patterns among ATTRACT projects and partner institutions. The findings showed that while formal structures are important, it is usually the informal relationships, the interpersonal trust, and multipurpose roles that drive knowledge exchange and foster creativity. As such, certain individuals, especially those with hybrid identities (e.g., scientists-entrepreneurs, academic-administrators, etc.), served as key brokers, linking otherwise isolated players and allowing the cross-pollination of ideas.

Translating theoretical understanding into actionable methodology, CORE designed a practical stakeholder mapping toolkit. This toolkit was tested in workshops and used in classrooms at universities such as Aalto University and TU Delft. It allowed research teams to visualise their networks, pinpoint gaps in stakeholder engagement, and develop more deliberate cooperation tactics. This addresses a major common challenge in distributed ecosystems, in which researchers usually remain unaware of their stakeholders until it is too late to engage them



effectively. By incorporating these tools early in the innovation process, CORE proved that collaboration is not only an outcome, but it is an ability that can be taught, practiced, and improved.

In parallel, ABC4E expanded upon this ecosystem viewpoint by investigating individuals' intrinsic readiness to engage in such open systems. Through its behavioural training program, the project addressed not only the technical or procedural barriers to open innovation, but also deeply ingrained psychological biases and identity conflicts. Participants who had previously resisted industry collaboration because of scepticism, fear of compromise, or lack of expertise, reported significant shifts in their viewpoints after the training. This implies that capacity-building should occur both within and beyond the individual, focusing on both relational and reflexive skills.

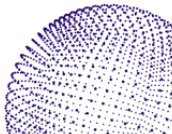
Additionally, both projects shed light on the conflicts between public and private interests in collaborative research and development (R&D). In interviews, academics frequently mentioned challenges related to intellectual property, project timelines, and objectives, especially when working with commercial partners. Also, CORE found that acknowledging and navigating these conflicts openly might results in creative tension rather than confrontation. However, if left unaddressed, these issues often resulted in withdrawal, misalignment, or underutilisation of promising technologies.

Therefore, the implication for policy is clear. If Europe wants to develop high-performing and inclusive innovation ecosystems, it must invest in collaboration as a key strategy. This involves equipping scientists with the tools to map and manage stakeholder interactions, creating incentives for interdisciplinary and cross-sector partnerships, and integrating relational intelligence into funding and evaluation frameworks. The success of ATTRACT projects, as well as the wider Horizon 2020 agenda, is dependent not just on outstanding science, but also on the ability f that research to overcome organisational and cognitive boundaries.

## 3.4. Institutional and legal infrastructure

While behavioural and relational capacities are very important for fostering innovation, they cannot work well without supportive legal, administrative, and financial systems. Often, promising collaborations between public research organisations (ROs) and industry fail, not due to a lack of intent or capability, but because of uncertainties and inefficiencies within institutional and legal frameworks. What more, questions around intellectual property ownership, licensing terms, valuations procedures, and state aid compliance commonly hinder progress and damage trust.

The ExSACT project was initiated to address these systemic issues in science-industry collaboration within the European Union (EU). Its primary aim was to clarify and simplify the regulations related to state aid, intellectual property rights (IPR), and contract research. Through a comparative legal analysis focusing on Slovenia, with additional insights from Italy and the Czech Republic, the project developed a comprehensive toolkit, which includes legal templates, procedural guides, and valuation models to assist ROs in navigating this complex landscape.



Beneath the legal complexity, the project identified a critical challenge, one that affects the day-to-day functioning of research institutions across Europe. One of the main findings was the widespread ambiguity in how EU legal frameworks are interpreted and implemented at the institutional level. Many ROs lack internal rulebooks or standardised pricing practices, which exposed them to legal risks. For example, confusion between terms like 'market activity' and 'economic activity', particularly in Slovenian policy, led some institutions to inadvertently exceed the 20% threshold for economic activity, jeopardising their classification and eligibility. Interviews with legal officials, technology transfer managers, and financial staff, revealed a deeper issue. Even when EU rules are clear, their practical application often is not. This disconnect, coupled with resource constraints, might cause delays in collaborations or discourage researchers from pursuing commercialisation due to the perceived administrative burden.

To address these issues, ExSACT developed a customisable set of contract templates, which include Non-Disclosure Agreements (NDAs), collaborative research agreements, intellectual property (IP) frameworks, and licensing models. Additionally, they have created valuation tools that align with the EU State Aid Communication 2022/C 414/01. These resources are intended to ensure that publicly funded IP transferred to private partners are appropriately valued and openly managed.

Another important matter is that the project also conducted a survey of the ATTRACT community. They found out that while over 90% of the teams have developed new IP, only a quarter of them successfully licensed it. More than half of the teams did not have formal inventor reward systems in place, and only 1/3 reported a positive experience with IP valuation. These results show that institutional culture and incentives need to evolve alongside legal clarity, in order to effectively support technology transfer.

On that account, the policy implications are evident. The EU and its member states need to work to improve the consistency of laws and definitions, and they should also offer training and funding to help ROs improve their governance capabilities. Innovation ecosystems cannot thrive if the polices intended to preserve public investment simultaneously limit their potential.

ExSACT's lasting impact lies not just in its tools, but also in its core message, that strong governance is essential to innovation, not an optional addition. Legal clarity, fair value, and transparent agreements are more than just formalities, they are essential for creating trust, collaboration, and shared development among public and private institutions.

## 3.5. Impact assessment and policy experimentation

Perhaps one of the most significant findings from the SES consortium is that our method to evaluating innovation has a fundamental impact on how it is pursued, supported, and sustained. Traditional assessment frameworks, which focus on quantitative outcomes, like patents, spin-offs, and licensing revenues, may offer clear information to funders. However, they often fail to capture the whole spectrum of value provided by research ecosystems. Furthermore, these

indicators provide no guidance for improving systems over time. Recognising this limitation, several SES projects aimed to question, broaden, and rethink the tools and assumptions used to assess innovation performance.

The CASEIA project offered an important perspective on this discussion, by examining the long-term socio-economic impact of three Phase I ATTRACT projects. By using a comparative case study approach that included both commercially successful and technical unsuccessful initiatives, CASEIA was able to explore the various ways in which public R&D investment creates value. The analysis showed that while industry-led projects were more likely to produce immediate commercial results, projects driven by European research infrastructures (ERIs), significantly contributed to knowledge generation, skills development, and capability building, even when there was no direct market application. In response to these findings, CASEIA created a multi-dimensional framework for assessing research impact. This framework includes factors such as serendipity, spillovers, spin-offs, skills, social structures, and broader socio-economic contributions. It provides a more comprehensive view of value creation, recognising that impact can occur in unexpected ways and over long timeframes. For example, one project in the study, despite being a technical failure in terms of commercialisation, generated valuable industrial insights and established a foundation for future collaborations. These cases highlight the necessity for evaluation frameworks that track impact beyond the lifespan of a project or the narrow focus of a product.

The COMPUTE IMPACT project further advanced this argument by focusing on one of the most significant breakthroughs in computational biology, AlphaFold. Hosted by EMBL-EBI, and based on public research infrastructures, AlphaFold revolutionised protein structure prediction using artificial intelligence. While its algorithm was developed by DeepMind, a private entity, it was the open-access database infrastructure, supported by European public institutions, that democratised its use and catalysed a wave of innovation across life sciences. COMPUTE IMPACT highlighted that the true value of such tools lies not only in their technical excellence but also in their accessibility, usability, and adaptability, factors that are often overlooked in traditional assessments of impact. To support this, the project conducted bibliometric analysis and interviews, and mapped ecosystems. It proposed a new model of infrastructure-enabled innovation, suggesting that research infrastructures act not just as service providers but also as platforms for creating global and distributed value. The AlphaFold case serves as a compelling example of how publicly a funded digital infrastructure can lead to open-ended, cumulative impact that extends well beyond its initial purpose.

Finally, the NEXT project addressed how innovation policy itself can be tested and improved, arguing that it should not only be evaluated, but also experimented with. NEXT introduced a structured, experimental approach to university-industry collaboration by conducting real-world randomised controlled trials (RCTs) to assess interventions, such as alumni-led webinars, researcher training, and business outreach strategies. Through its Impact Accelerator, NEXT demonstrated that experimentation is not just confined to the lab and that it can also be applied

to policy design, allowing funders and institutions to make evidence-based decisions on how to support commercialisation most effectively.

By piloting these experiments with agencies and universities across Portugal and the UK, NEXT highlighted the fact that even modest interventions, when rigorously tested, can provide valuable insights into what works, for whom, and under what conditions. More broadly, the project championed the idea of embedded learning within innovation systems, urging policymakers to transition from static evaluation to continuous adaptation and feedback.

These three projects collectively advocate for a significant change in how Europe assesses and guides innovation. Instead of solely relying on past, outcome-based evaluations, the SES consortium promotes a future where impact is perceived as dynamic, multi-faceted, and collaboratively developed. In this approach, policy is viewed as an evolving experiment rather than a fixed plan. Implementing this shift would allow Europe to better recognize the value of its research investments and to create more responsive, inclusive, and effective innovation ecosystems.

# 4. Cross-cutting recommendations

Even though the SES projects took different approaches in their work, exploring various disciplines, methods and themes, they ultimately pointed toward the same underlying message: Europe's success in translating research into tangible impact relies not only on technology, but also on the systems that support it. Rather than offering isolated findings or technical solutions, the eight studies identified structural patterns and common needs within the innovation landscape. This section consolidates those insights, providing a set of cross-cutting recommendations for policymakers, institutions, and educators, grounded in the real-world challenges and opportunities faced by the SES consortium.

## 4.1. For EU Policymakers

The SES findings highlight the need for a broader and more nuanced definition of innovation impact. While traditional indicators such as publications, patents, and TRL (Technology Readiness Level) progression remain useful, they are inadequate for capturing the full range of value generated by research. Multiple projects revealed that behavioural change, institutional learning, collaboration capacity, and inclusivity are equally important forms of impact, even though they often go unnoticed.

Policy frameworks must therefore evolve to acknowledge this complexity. Projects such as CASEIA and COMPUTE IMPACT have demonstrated that tools and platforms developed within publicly funded infrastructures can produce long-term, system-wide effects that extend well beyond immediate commercialisation. Policymakers should encourage and fund multi-dimensional evaluation frameworks that enable projects to report not only on outputs but also on changes in mindset, network strength, user engagement, and societal benefits.

In parallel, programs should be designed to include built-in opportunities for experimentation, as demonstrated by NEXT. By encouraging funding recipients and agencies to test, iterate, and evaluate various approaches, such as in training, stakeholder engagement, or intellectual property management, we can gain valuable insights and enhance policy responsiveness over time. Rather than viewing program design as something static, Horizon Europe and future frameworks would benefit from integrating real-time, adaptive learning processes into their core structure.

In the end, numerous projects have highlighted the need for greater regulatory clarity and alignment across member states. The work of ExSACT has shown that even well-designed EU regulations can hinder innovation if interpreted inconsistently at the national level. The European

Commission can play a key role in supporting harmonization by providing training and shared templates, particularly in areas like state aid compliance and collaborative research contracts. This approach can help reduce administrative burdens and build confidence among stakeholders.

## 4.2. For research institutions

Research institutions are increasingly being asked to do more than just conduct excellent science, they are also expected to contribute to innovation, regional development, public engagement, and policy making. However, many of these institutions lack the internal systems and capabilities necessary to meet these expectations effectively. The SES projects provide specific recommendations on how institutions can evolve to better support these broader roles.

First, institutions should focus on building capacity for open innovation. As demonstrated by ABC4E and CORE, although researchers are often motivated and curious, they frequently lack the necessary tools and support to engage externally. Offering training in psychological flexibility, stakeholder mapping, and early-phase collaboration can greatly enhance researchers' abilities to participate in and lead interdisciplinary, cross-sector initiatives.

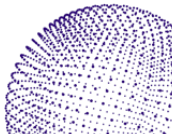
Second, institutions need to formalize and clearly communicate their policies regarding intellectual property (IP), licensing, and contract research, using resources such as those created by ExSACT. A lack of internal clarity not only discourages partnerships but also introduces legal risks. Providing templates, valuation frameworks, and transparent reward systems for inventors can help integrate commercialisation as a recognized and supported pathway, while still preserving academic freedom.

Finally, institutions should recognise diversity and inclusion as strategic assets in research and innovation. The EMDOI study showed that diversity fosters innovation only when it is purposefully integrated into team formation, problem framing, and user engagement. To support this, institutions can review their hiring practices, provide training in research design, and evaluate criteria to ensure that diverse perspectives are not only included but also empowered to influence outcomes.

## 4.3. For educators and innovation intermediaries

One of the most consistent results across the SES studies was that entrepreneurship education for scientists needs a distinct approach, one that must consider the complexity, uncertainty, and ethical obligations inherent in scientific work. Programs that simply adapt business school models to research environments, often do not resonate with scientists and, in some cases, may even deepen their feelings of alienation from commercialisation.

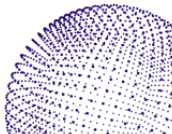
NEXT-GEN-TECH-ED and EMDOI outline a clear roadmap for improvement in education. Educational programs should focus on experiential learning, interdisciplinary approaches, and real-world problem-solving. This allows researchers to engage with commercialisation not as a



departure from science, but as a way to enhance its societal value. Training should provide exposure to end-users, role models, and real-world constraints, while also reinforcing essential scientific values such as rigor, openness, and social impact.

Intermediaries on the other hand, such as technology transfer offices and innovation agencies, must also adapt. Instead of merely serving as gatekeepers or facilitators of transactions, they can function as coaches, networkers, and translators, helping teams navigate the complex human, legal, and commercial aspects of innovation. As demonstrated in the NEXT project, even light-touch interventions, such as coaching or redesigning outreach efforts, can significantly increase engagement and impact when implemented with intention and responsiveness.

These recommendations highlight a shift from a transactional model of innovation policy to a transformational one. This new approach values human capability, systemic learning, and inclusive design just as much as market delivery. The SES consortium does not advocate for abandoning commercialisation or scientific excellence, but instead, it encourages embedding these elements within ecosystems that are intelligent, reflective, and fair.



# 5. Reflections from the Consortium Coordinator - ESADE

Coordinating the Socio-Economic Studies (SES) cluster within ATTRACT Phase II provided a unique perspective for observing both the individual contributions of the eight participating projects and the overall dynamics of the consortium. From this position, ESADE was able to see how various research traditions, including behavioural science, legal analysis, educational design, and policy experimentation, could engage in productive dialogue. Together, they illuminated the complex landscape of deep-tech innovation in Europe.

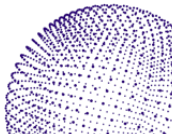
The organic thematic convergence that took place across many projects was one of the most interesting discoveries. While each team employed its own methods, focus, and disciplinary background, several key themes emerged, such as the importance of learning and mindset in shaping innovation trajectories, the value of ecosystems and collaboration, the ongoing tension between public and private logistics, and the inadequacy of conventional metrics in capturing long-term, system-wide impacts. These thematic intersections were not chosen or planned, rather, they arose naturally from the real-world challenges and questions that each project encountered while collaborating with scientists, institutions, and industry players. This suggests that a common strategic objective is emerging throughout Europe, even among highly heterogeneous stakeholders.

ESADE noted the importance of methodological pluralism within the SES consortium. The projects employed a wide range of research methods, including randomised controlled trials, network analysis, legal audits, behavioural training, and qualitative fieldwork. This diversity was a strength rather than a weakness, because it enabled the consortium to tackle problems from various perspectives, resulting in insights that were both detailed and broadly relevant. For policymakers and funders, this highlights a crucial lesson, that understanding innovation requires multiple forms of evidence, and investing in interdisciplinary, mixed-method approaches can provide significantly richer policy intelligence than relying solely on standardized impact assessments.

At a more institutional level, coordinating the SES revealed that many research organisations across Europe are eager to take on broader innovation roles but are often under-equipped to do so. Scientists express a desire to engage more deeply with industry, users, and society, however,

they frequently lack the necessary tools, incentives, or structural support. Legal and administrative teams wish to facilitate technology transfer but are hindered by unclear regulations and limitations on resources. Educators aim to prepare students for interdisciplinary futures but struggle with siloed curricula and insufficient institutional recognition for their efforts.

Lastly, ESADE witnessed the potential of a coordinated SES consortium to serve not just as a research initiative, but also as a community of practice. Throughout the program, several projects engaged with one another by sharing findings, co-hosting workshops, and collectively reflecting on what it means to generate socio-economic impact from research. This dynamic of peer learning added depth and resilience to their work and could serve as a model for future EU programs aimed at bridging research and policy. Most importantly, the SES projects actively engaged and researched the other arms of the ATTRACT Phase II project, such as the R&D&I projects and ATTRACT Academy.



# 6. Conclusion

The eight projects within the SES consortium, as part of ATTRACT Phase II, were not just independent research efforts, but they represented a coordinated initiative aimed at understanding the human, institutional, and systemic factors that determine whether breakthrough science creates public value. Together, these projects present a compelling narrative that challenges traditional assumptions, suggests actionable frameworks, and establishes a foundation for a more integrated, intelligent, and responsive innovation system in Europe.

As Europe enters a new era of mission-driven innovation to address challenges such as climate change, health equity, and digital transformation, the insights from SES are particularly relevant. These missions require not only improved scientific approaches but also the development of robust systems that integrate various disciplines, connect different sectors, and remain adaptable to uncertainties. SES demonstrates that these systems cannot be created through funding alone and that they must be intentionally designed with a focus on capabilities, mindsets, and governance.

The vision that emerges is clear:

- Build inclusive and adaptive ecosystems, where innovation is measured by both excellence and engagement;
- Learning, behaviour change, and ecosystem capacity should be viewed as strategic outcomes, rather than side effects;
- Incorporate flexibility and experimentation into both program design and evaluation;
- Empower scientists, institutions, and policymakers, by providing them with the tools they need to lead effectively across boundaries.

In short, SES projects did not just assess the impact, but it redefined it. It demonstrated that the socio-economic value is not a byproduct of scientific advancement, but rather the result of intentionally designed systems that nurture, translate, and extend knowledge into tangible benefits for the real world.

The next step is to carry these insights forwards, ensuring that the European innovation agenda evolves not only in terms of funding but also in how it defines and facilitates impact. The SES consortium provides both a knowledge base and a community of practice that is ready to support this evolution.