InnoMatSyn

Innovative Materials Ecosystem to Gain Synergies
of regional, national and EU Initiatives

1st InnoMatSyn Event

Three interactive workshops addressing challenges and opportunities in the European Advanced Materials ecosystem

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Introduction

Whilst arriving to the end of the year of InnoMatSyn project, the consortium organized the 1st InnoMatSyn Event in Bilbao (Spain), the 12th of February of 2026. The event was structured around three different interactive workshops, introducing preliminary results of the InnoMatSyn project as well as collecting feedback from the audience through dedicated sessions as well as open dialogue.

- The first workshop **"Validating the Present, Shaping the Future: Funding Perspectives for Advanced Materials"** focused on exploring challenges and opportunities in shaping upcoming R&I agendas beyond 2027 and in de-fragmenting the current funding landscape across the continent.
- The second workshop **"Who does what in the EU Materials Ecosystem"** presented the results of a recent survey shared with, and answered by the Advanced Materials community and a live dialogue with all attendees, about who does what in the Materials Research Ecosystem followed.
- The third workshop **"Interactive Session on Critical Technology Leakage"** provided a short impulse on the Technology Leakage concept and the Initial criticality report on FLAG-ERA and M-ERA.NET projects and related content, as well as an interactive discussion with attendees from the funding agencies, Member States and other interested parties on the experience with dual use, technological sovereignty, and leakage concerns.

The event gathered a total of 164 registrants of different type of stakeholders: 74 from the academic/research field, 23 representing specific associations, clusters or networks, 22 representatives of funding bodies and/or public authorities, 7 representants of EU institutions, 4 belonging to EU-funded projects category, 19 industry representatives, 5 from international organizations, 3 regulatory bodies and finally representatives of 5 different technology platforms (*Figure 1*).

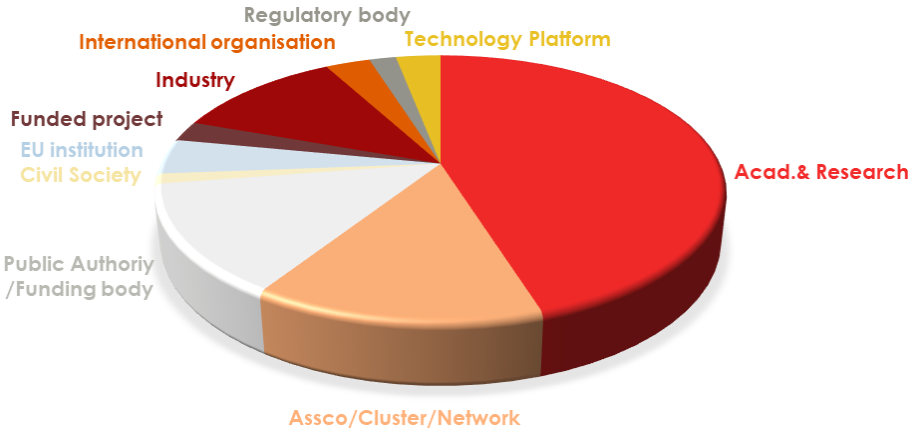

Figure 1: InnoMatSyn 1st Event registrants categorized per type of stakeholder.

The following sections include a brief summary of the details of each workshop as well as main outcomes and results, including the contribution from the audience.

Workshop A:
"Validating the Present, Shaping the Future: Funding Perspectives for Advanced Materials"

1.1 Description and main goals of Workshop A

This interactive workshop brought together representatives of European and national funding bodies, alongside other key stakeholders from the Advanced Materials (AdMa) community to reflect on how to strengthen coordination and reduce fragmentation across the broader EU AdMa ecosystem[1].

The session was mainly framed around the lack of cross-country and cross-regional alignment: an urgent challenge in the current funding landscape, often leading to a dispersion of efforts in funding allocation and to difficulties in scaling-up AdMa R&I. In such context, funding bodies were identified as crucial players in shaping a more coherent and integrated approach to AdMa funding and in contributing to more coordinated long-term policy implementation.

The workshop was specifically designed to facilitate **dialogue and interaction with and between funding bodies**, as well as to set the stage for future InnoMatSyn co-creation activities involving funding bodies, based on inputs collected and ideas shared.

Three main goals oriented the discussion:

- Assessing the strengths and the limitations of existing funding instruments, including overlaps and gaps across EU countries and regions;
- Reflecting on emerging thematic priorities and working models for the post-2027 landscape;
- Identifying concrete opportunities for an enhanced alignment between EU, national and regional programs (e.g., joint calls for proposals).

During the session, a collective reflection was stimulated through a highly interactive format consisting of a set of pre-defined Mentimeter questions, resulting in the collection of real-time feedback from participants, facilitated by InnoMatSyn's partner APRE (Agency for the Promotion of European Research).

1.2 Workshop participants

Written feedback was collected from a total of 60 participants who engaged via the Mentimeter, complemented by additional points discussed verbally. Participants' affiliations were diverse (*Figure 2*) and among the representatives of funding bodies, 7 participants indicated that their organization acts as a funding manager (*my organization directly funds, co-funds, or manages funding, e.g., cascade funding, in support of R&I AdMa initiatives*), while 15 described their organization as a funding owner (*my organization defines funding priorities and contributes to the development of funding call content*).

In terms of geographical coverage, participants represented organizations from Spain, Italy, Austria, Portugal, Belgium, the Netherlands, Denmark, Greece, Slovakia, Germany and France, operating at the EU, national, regional, or international (extra-EU) level in almost equal measure.

[1] *Disclaimer: the information in this report is based solely on feedback collected from workshop participants. The sample is not statistically representative, and the results should not be considered universally applicable.*

Finally, 15 participants reported that their organizations have been involved in M-ERA.NET or FLAG-ERA projects, either as a funded project (12) or as a funding body (3).

Figure 2: Workshop A participant's type of stakeholders.

1.3 Key Outcomes of Workshop A

1.3.1 Validating the present

When asked which sectors are most relevant in today's AdMa funding landscape, energy received the highest number of votes, followed by mobility and transport, health, digital, security and defence, and food and agriculture. In addition to these pre-set, ranked options on the Mentimeter, participants also pointed to construction and the built environment, space applications, aerospace, semiconductors and chips, recycling and circularity as priority application and adoption sectors.

On what influences the selection of topical areas for R&I agendas and funding calls, national and regional policies and political goals ranked first. Economic competitiveness and market analysis followed, then societal challenges such as energy transition, public health crises and digital transformation, collaboration and coordination mechanisms and internal expertise. On top of these, participants raised regulatory and standardisation concerns among relevant factors, as well as EU independence and sovereignty related issues that also play a significant role in decision-making processes. In this regard, it was noted that calls are often very aligned with political goals and not sufficiently aligned with the latest industry trends.

Regarding the types of R&I actions currently funded or carried out by participants, most activity concentrates on prototyping and validation (TRL 4-6), followed by demonstration (TRL 7-8); fewer organizations focus on basic research (TRL 0-3), while only a small number on market deployment (TRL 9). Highest TRLs were indicated as subject to the biggest funding gap, followed by basic research and prototyping.

Lack of funding for AdMa scale-up and commercialization was also agreed to be ***one of the main challenges in AdMa funding***, coupled with the absence of a complete chain from TRL 1 to TRL 9, short-term funding instruments, lack of financial continuity and the fact that research and collaboration often stop once a project ends. To address these challenges and to turn research into products and add socio-economic value, the room suggested creating industrial demos, including investors from early stages and developing conclusive business models as critical actions, still insufficiently supported.

Other barriers raised include too much focus on applications at the expense of deep tech exploration of new materials, too high or too low TRL targets in certain calls, few opportunities for high-risk high-gain projects and scarce national funding allocated specifically for AdMa innovation. Notably, funding bodies were "criticized" for focusing mainly on publications as a metric for project impact and success

and for producing some national and/or regional programmes that are narrow in scope and even misaligned with EU policies.

Industry engagement was described as very necessary yet difficult at multiple levels: from attracting end-users early enough, to engaging industry partners to meet funding requirements, to bringing together full supply chains and finding the right actors at each stage of the value chain. SMEs, which represent the vast majority of EU companies, often struggle to access funding, which adds another layer of complexity to the stakeholder engagement framework. The same applies to private investors, who should be engaged earlier in the process and connected to start-ups and SMEs more actively, potentially enabled by higher risk calls for proposals.

Finally, ***administrative and structural constraints emerged as a key barrier currently preventing the advancement of AdMa R&I***, with special regards to heavy bureaucracy, limited cost eligibility, difficulty finding appropriate contractors, low success rates and high time input for proposal preparation compared to chances of success.

1.3.2 Exploring future directions

Looking ahead, there was no indication of a major shift in thematic priorities. The ranking of future key sectors was in fact identical to the one identified for the current landscape, with energy remaining first and additional areas mentioned for future attention such as tech manufacturing, textiles, homecare and stronger integration of regulation and standardisation aspects. As pointed out during the discussion, this consistency suggests that the ***issue might not lie in redefining focus areas, but rather in adjusting how support is structured around them***.

Since the main funding gap was identified at scale up and commercialisation stage, most participant suggestions concentrated there. ***If the objective is to bring AdMa closer to market, then funding models need to evolve accordingly***; namely, public private partnerships should be promoted and boosted, mixed financing schemes combining grants, loans, venture capital and private foundations should be implemented, the need for stronger public-private leverage should be followed up on, and clearer risk sharing should be introduced with large industry. Some participants later pointed to the importance of allowing CapEx and OpEx[2] as eligible costs and of using fiscal incentives to mobilise private investment. IPCEI[3] projects, innovation procurement and dedicated investment programmes were mentioned as practical instruments in this context.

At the same time, strengthening higher TRLs was not seen as sufficient on its own. Basic research and low TRL activities still require priority, particularly for deep tech materials development. For this reason, it was suggested that a longer duration is foreseen for projects at low TRLs, possibly entailing an evaluation phase involving industrial advisory boards. Other participants suggested defence- and security-driven actions, stronger government base funding and more resilient long-term instruments; and others proposed revising state aid rules for technologies developed for societal benefit and introducing pay back mechanisms once technologies reach the market.

Through this discussion, one common thread emerged: ***future funding should better connect public support, private capital, industry commitment and SME participation across the entire innovation chain***. The discussion did not in fact point to a lack of ideas, but to the ***need for instruments that are coherent enough to support materials innovation from early research to deployment without structural breaks.***

[2] *Capital Expenditures and Operating Expenses.*

[3] *Important Projects of Common European Interest.*

1.3.3 Supporting synergies and coordination

Participants agreed that for funding to better support scaling up and continuity across TRLs, ***funding bodies need to work together in a more integrated and aligned manner***. Many participant organizations are already involved in joint calls (or plan to be), but most described the process as time-consuming and administratively heavy. Because of different national rules, reporting systems, long evaluation processes and bureaucratic procedures, participation likely becomes challenging to manage, and in some cases the funding does not seem to feel worth the effort. Additional rules regarding partner eligibility and funding conditions sometimes add further challenges, especially for SMEs and industrial actors, who often find it difficult to meet these requirements; and differences in national priorities and political cycles make cross-country alignment even harder.

Several ***suggestions were shared on practical ways to make cross-country and cross-regional collaboration smoother***, such as:

- Harmonizing funding rules, aligning terminology and establishing common standards;
- Developing a single administrative system for joint calls, removing the need for extra national documentation;
- Introducing targeted cooperation frameworks, including specific joint calls with clear requirements, thematic funds based on shared priorities, mapping of infrastructures and capacities, cross border foresight exercises, digital repositories and co funding templates;
- Designing shared R&D platforms based on the use of open data standards for enhanced transparency.

Only about one third of participants said that mechanisms to avoid overlapping or ensure complementarity are already in place, although no concrete examples were provided.

Looking at FP10, participants made several recommendations, including dedicated joint EU and national calls, better alignment between national/regional processes and FP10 timeline, clearer incentives for participation, more open, inclusive and bottom-up calls, and stronger involvement of SMEs and industry. ***The overall message was clear: cooperation is widely desired, but it will only succeed if the rules and procedures are simpler, the structures are clearer, and the effort required is realistic.*** Without these adjustments, joint calls risk being too burdensome for many participants, with substantial limitations to their potential impact**.**

1.4 Conclusions of Workshop A

The key takeaways from Workshop A can be grouped into three main areas.

First, the **AdMa innovation chain**: the gap is not in defining priority sectors, but in moving from research to scale up; early research is supported, but continuity across TRLs is still weak. To face this issue, scale-up, industrialisation and market uptake need stronger backing, investors should be involved earlier and both start-ups and SMEs need better connections to industry and finance. As a result, more risk should be allowed by some calls for proposals if real impact is expected, and public-private partnerships should be further pursued.

Second, the **administrative burden**: existing funding models, with related bureaucratic rules and procedures, do not always allow for an efficient resource allocation. With resource-intensive, application and reporting processes, joint calls that often require navigating multiple national systems and eligibility rules acting as structural barriers, there can be mismatches between actual effort required and funding available. Simplification is key in this context.

Third, **cross-border collaboration**: valued, but seemingly difficult to manage in practice. Participants asked for more practical cooperation formats, clearer joint calls and better alignment between EU and national funding, especially in view of FP10, as national priorities and timelines do not always align.

Workshop B:
"Who does what in the EU Materials Ecosystem"

1.5 Description and main goals of Workshop B

Workshop B aimed to validate and leverage the survey results *"Who does What in the EU Materials Ecosystem"* by presenting the mapping of initiatives and roles across the European materials landscape and collecting structured feedback from participants through Mentimeter. Following a policy framing from DG RTD, a multi-stakeholder panel (including European Commission and key European partnerships, networks and communities) discussed practical ways to strengthen cooperation, improve alignment, and build synergies between stakeholders and programmes. The workshop concluded by consolidating key takeaways and agreeing on future steps to translate the discussion into actionable recommendations and follow-up actions.

The workshop agenda was organized as follows:

- Presentation of Survey Results "Who does What in EU Materials Ecosystem", by Jaione Aguirre (TEKNIKER),
- Online and face2face workshop assistant feedback collection through Mentimeter
- Panel Session "How to improve cooperation and synergies between different stakeholders, moderated by Amaya Igartua (TEKNIKER, EUMAT)
- Set the scene presentation by Carsten Schierenbeck, Head of Unit, DG RTD – Prosperity – Industrial Transformation,
- Experts of the panel: George Kotsikos (HADEA – EC, Project Officer of InnoMatSyn), Jerome Gavillet (IAM-i)**;** Roland Brandenburg (M-ERA.NET), Tanja Eckardt (EiT Raw materials) and Patrick Bressler (EMRS).
- Conclusions from the Workshop and future steps, Jose Caldeira (INESC-TEC)

During the workshop participants, written feedback through Mentimeter was collected from a total of 52, complemented by additional points raised during the open discussion. Participants represented a broad range of affiliations including academia, associations, funded projects, and clusters/networks; industry, public authorities and funding bodies.

1.6 Presentation of the results of the survey "Who does What in the EU Materials Ecosystem"

A survey has been conducted to map the materials initiatives at EU, National and regional levels. The survey was distributed to 128 initiatives (68 initiatives completed the survey with 61 validated surveys). The main outcomes of the survey are:

- **Initiative profile:** Medium size clusters and technology platforms targeting European scope, with diversified sectoral profiles.
- **European scope but no synergies:** Although 66% of the initiatives claim to have a European/international reach, according to the survey, the main obstacle to synergies is inadequate funding instruments for cooperation and, secondly, poor mutual visibility between initiatives.
- **The materials initiatives focus on the beginning of the value chain and not so much at the end.** The focus is predominantly on design/development and less so on the use phase.

- **Low societal engagement:** Only 29% respondents report involving citizens or civil society in their decision-making processes. Academia–RTO–industry forms the core of the initiatives' members, which would explain to some extent the low level of social engagement.
- **European umbrella structures:** 37% of the initiatives have no relation with any alliance, suggesting that a significant share of initiatives operate independently or outside the main EU-level umbrellas. 63% of the initiatives declare to be part of wider European alliances or umbrella initiatives such IAM-i and A4M/EUMAT.

1.7 Mapping results feedback through the Mentimeter

Regarding the "Who does What" mapping exercise, participants highlighted that the map should primarily help users understand target sectors addressed, followed closely by activities and services offered (e.g., projects, brokerage, training) and the materials covered. By contrast, contact points and especially geographic scope were considered useful but secondary, suggesting that ***the map's value lies in clarifying what each initiative does and for whom, rather than where it operates***.

When discussing how to improve cooperation and synergies, the strongest signal was the need for a shared map of initiatives and competencies, reinforced by interest in regular joint meetings/workshops across initiatives, while the idea of a single "one-stop information point" received comparatively less support.

For better strategic alignment between initiatives, participants prioritised joint EU-level roadmaps, closely followed by shared foresight/strategic intelligence exercises and regular inter-initiative meetings, whereas shared KPIs/indicators were less frequently selected.

Finally, ***to improve access to and use of EU materials R&D infrastructures***, respondents pointed to support for access costs and better information on available infrastructures. In addition, researcher mobility support and training to use infrastructures effectively was identified as additional enablers.

1.8 Panel Session "How to improve cooperation and synergies between different stakeholders"

Prior to the start of the panel session with the invited experts, a **Welcoming note** was done **by Marco Falzetti (chairman of EUMAT).** His key message was to emphasize that the Advanced Materials landscape is at a critical and complex juncture. In FP10 and the post-2028 programmes, materials R&D must redefine its role (and find its position) within the core priorities of competitiveness, new partnerships, and Member States. Thus, pointing out the specific question to be answered "How will they act together in the Materials ecosystem?

This welcome to the session was followed by the introductory key note "Setting the Scene" done by **Carsten Schierenbeck (European Commission Head of Unit Industrial transformation).**

The keynote and main message highlighted that AdMa(s) play a crucial role as enablers for many sectors. The 2024 COM strategy[4] takes AdMa into account in all major sectors, notably in electronics, construction, mobility, aerospace, energy, and health, taking part in almost every value chain.

[4] COM strategy: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024_en

The public consultation (with ca. 190 contribution) shows again that we need to team up and co-operate, at business level, research level, and policy level. InnoMatSyn has mapped the Materials R&D landscape, showing gaps in funding, skills, CE aspects, but also in market upscale and deployment.

Three ***major points*** be taken from the consultation:

- Our ***dependencies from raw materials*** and inputs;
- ***Regulations, lengthy validations and missing standards as barriers*** for Time-to-market that needs to be shortened,
- The ***link between industry and research needs to be reinforced***.

There are ongoing activities at COM: (1) the co-funded partnership IAM4EU; (2) the Technology Council, closely linked to Member States; and (3) the Advanced Materials Academy. Going further from that, the Materials Act, due in IV/2026, will support scale-up and improve framework conditions.

AdMa, together with advanced manufacturing, play a role in different policy windows; prominently in Clean Transition and industrial decarbonization, but are also highly relevant in many other policy windows, like resilience, defense or space, pointing out the cross-sectorial relevance of AdMa.

To conclude and appealing to the materials ecosystem stakeholders: ***the community must work together, create synergies, team up, align roadmaps, and share infrastructures.***

Finally, he emphasized that expectations from the event's discussion is: ***tell us how COM can support you! You are the connectors to the ecosystem and we need your commitment, with concrete ideas, thus, let us unlock the full potential of Europe now.***

With this inspirational intervention, the Event moved forward to the panel session, that counted with the participation of the invited experts mentioned above. Amaya Igartua (TEKNIKER) served as moderator of the panel discussion and addresses three main questions. The major answers and comments of the panelists and audience to the questions are summarized as follows:

Question 1: ***If you were tasked with implementing a common European strategy for 'Advanced Materials TOMORROW, how would you align and coordinate today's ecosystem of materials-related initiatives?***

- By listening and putting focus on industry: Industry tells us about the need for AdMa and their applications.
- Find a shared common vision and a dynamic strategy of how to make this vision real. Examples for concrete measures (taken from IAM-I): Organize national events; forge alliances with industrial associations.
- Avoid overlap and double work, have more alignment and good governance. An overall common roadmap (including national and regional funding) is needed.
- The AdMa landscape is very large, with public authorities, industry, networks, and the research community. A common view is very important. Resources need to be coordinated: money is available locally, at regional and national level, with additional impact through Commission support.
- Industry is a driver for R&D&I, with companies making money along societal challenges in a free market. This is to be complemented by elements dictated by governments; both together build a reliable strategy.

***Question 2**: Do current Advanced Materials initiatives adequately cover all relevant material's classes, technology readiness levels (TRLs), stakeholder groups, and funding instruments? Where do you see gaps or shortcomings?*

- Adequate cover – yes, everything is there, but coordination is missing
- With a complex cluster of so many types and players, initiatives, at various EU levels, we should preferably work on the interfaces – for a better landscape in FP10
- There is a lack of high-TRL programs, and thus a lack of industry participation
- Despite brilliant ideas in many start-ups, there is too little funding available
- Maps are important: they show us "who does what" and thus what might be missing
- The broad work in the AdMa field should include countries beyond EU member states
- The fragmentation and lack of interaction within the Materials ecosystem could be overcome with a technical roadmap, thereby offering better business cases for upstarting materials needs.

***Question 3:** Improving today's Advanced Materials ecosystem "in one minute": What measures would you propose to prevent fragmentation and duplication of efforts, and to ensure clarity and alignment among stakeholders?*

- Well-functioning data bases, with the same terminology and key words
- A single-entry point for all stakeholders
- Smart tools for collaboration, networking, matchmaking
- Attractive conditions also for materials that are needed in small volumes only
- Bundle current initiatives, join forces
- Combine siloed initiatives along topics, i.e. societal challenges

The panel session was followed by a **summary and take-home messages given by Jose Caldeira, (INESCTEC),** closing Workshop B. Main messages include:

- The AdMa ecosystem has many initiatives and strategies. It is important to map and characterize them and give them visibility and usability. This is an important contribution by InnoMatSyn.
- For implementing Safe and Sustainability by design (SSbD), Circular Economy (CE), and high-speed Time-to-Market, we need to extend the innovation ecosystem: look at all stages of the value chain, and put together technology providers, digital aspects, trainers, regulators and infrastructure.
- We need an integrated funding network; its dynamics need the support of policy makers, the public, and politics in general.
- The strategy should support the diversity of the EU – but it needs to be aligned, with more co-creation incorporating national and regional levels.
- For the cross-cutting nature of materials: Yes, let's develop them, and then apply to other fields and bring them to other sectors.
- Let's create positive feedback and support for inter-regional co-operation where regions come together; with a positive effect on national and regional funding and just additional top-ups by the European Commission.

- Final remark: The AdMa ecosystem is based on strong EU technologies. The challenge is how to bring these initiatives together.

1.9 Conclusions of Workshop B

The workshop presented the “Who does What” mapping results in the EU Materials Ecosystem and collected written input from 52 participants via Mentimeter, complemented by points raised in the panel discussion.

Feedback indicated that the ***mapping should prioritise information on target sectors, activities and services, and materials covered, with contact points and geographic scope as secondary elements***. Participants identified ***a shared map of initiatives and competences, regular joint meetings, joint EU-level roadmaps, and shared foresight exercises*** as ***measures to improve cooperation and alignment,*** and they highlighted ***support for access costs and clearer information on available R&D infrastructures as enablers for infrastructure use***.

Workshop C:
"Technological Sovereignty & Technology Leakage Risks"

1.10 Description and goals of Workshop C

Workshop C aimed to provide a short impulse on the Technology Leakage concept and the Initial criticality report on FLAG-ERA and M-ERA.NET projects and related content, as well as an interactive discussion with attendees from the funding agencies, Member States and other interested parties on the experience with dual use, technological sovereignty, and leakage concerns.

The workshop started with a presentation from Henning Döscher (Fraunhofer ISI) and was followed with a set of questions to the audience using Mentimeter.

1.11 Introduction "An approach to dealing with Technology Leakage Risks"

Security in Research and Innovation has become an increasingly legitimate concern as malignant, adversarial or at least competitors have taken to obtaining European research output in a far more targeted manner than was. In today's geopolitical situation, the core of the challenge is to avoid the diffusion of state of the art or even world leading knowledge that could be used to undermine European Member States national security. A second concern regards technologies that could be used for purposes related to public security and to stabilizing government functions in political systems that do not share European values. Finally, there are concerns regarding the leakage of technologies strengthening competing nations economically as well as with a view to the resilience of their critical infrastructures.

On the other hand, the geo-economic situation has changed from one where Europe was among the leaders in most domains to one where Europe is now more often primarily in need of strengthening its own capacities. To guarantee domestic control over those technologies required for maintaining robust government institutions, reliable and resilient critical infrastructure as well as to safeguard economic competitiveness (Draghi Report), Europe will have to assert technological leadership, rebuild own technological capacities and safeguard access to diverse external resources. Necessarily, all these ambitions stand in contrast to tightening controls for international exchanges in science and technology or even from refraining from funding certain types of technologies.

***Hence, Europe will need to continue funding critical technologies**.*

Against this background, the InnoMatSyn project aims to better understand technological leakage mechanisms, to ultimately help research funders to identify particularly vulnerable projects in the advanced materials domain. A component of importance in assessing technological leakage risk, resides in whether research projects are 'critical'. In this work, criticality is considered as to whether research conducted has relevant applications in technology related to defense and dual use. The research presented develops a methodology to identify the criticality potential of research proposals. It shall serve as a practical tool to identify proposals that deserve specific consideration.

In summary, our methodology aims at identifying projects addressing technologies which are critical – primarily but not exclusively from a dual use perspective. Flagging projects in a timely manner would enable research funders to work with research teams towards protecting valuable assets, and avoiding technological leakages through known mechanisms (which is part of other research activities of the InnoMatSyn project).

1.12 A method to identify criticality in AdMa research projects

InnoMatSyn piloted a novel method to assess criticality of research proposals in the field of material sciences, with particular regard to dual-use potential, which is at the core of both technological sovereignty and leakage risks. The suggested method is designed to prevent that aspects of planned research projects which may become critical for Europe's technological autonomy and security are overlooked. The methodology is meant to flag relevant projects, so that funders and applicants may systematically address potential issues in order to mitigate risks, for instance through confidentiality and protective measures for eventual critical results, and the funder has an opportunity to provide support to these projects, both as it is running and beyond.

1.12.1 Data Constraints of assessing criticality in research proposals

Methodologically, the biggest challenge is that, at the stage of application, only very limited information on the project's substance will normally be available. Hence, any assessment of criticality will have to primarily focus on the object or domain of research, and potential results that can be expected on those, whether openly stated in the abstract text or not. A heartening finding in this regard, however, is that the suitability of publicly available texts of funded projects in this regard may be better than could be expected, at least in relative terms. In general, for example, the added value of analyzing publications attributable to enhance the identification of criticality proved comparatively limited. Given the limitations at hand, we nonetheless suggest a two-step approach: Based on an in-depth text analysis of diverse publications related to dual use challenges in advanced materials, researchers at Fraunhofer ISI were able to identify a set of keywords and a differentiated search strategy that allows for an automated pre-scanning of abstracts. While coarse, it can differentiate between those applications that are rather definitely without identifiable challenges and those that deserve closer scrutiny.

1.12.2 Summary of the criticality assessment results

In the samples considered, about one fourth of all proposals were singled out for further scrutiny. The second scanning of proposal will – now and in the future – have to remain manual, including potential deeper inquiry with the applicant. In the (sub-)samples here considered, only about 25-30% of the pre-identified proposals proved to indeed raise robust and obvious concerns, another 25-30% gave rise to at least some justified skepticism while another 40-50% could be cleared as unproblematic upon deeper scrutiny. While this confirms the inherent danger of discarding too many applications too swiftly, it equally underscores that there are indeed a number of projects under those currently funded which, under changing geopolitical framework conditions, would require closer attention. Overall, the work has delivered on its ambition to provide a technical tool suitable to pre-scan project applications in an effective manner. Further manual inquiry into the results demonstrated both its effectiveness and the necessity of human expertise to improve accuracy.

1.13 Workshop C results

Following the presentation of the approach the workshop had a moderated discussion with participants as to their awareness concerning how to treat critical projects to avert technological leakage risks. This section presents the workshop results following this discussion. The results overall show that **technology and knowledge leakage risks are widely perceived as relevant but insufficiently understood nor systematically managed** within the research community. While participants recognize increasing geopolitical and technological sensitivities, awareness levels and practical preparedness remain heterogeneous.

1.13.1 Awareness exists but needs strengthening

Participants reported a moderate level of understanding of technology leakage risks, indicating growing awareness but a clear need for further guidance, training, and structured support mechanisms (Figure 3).

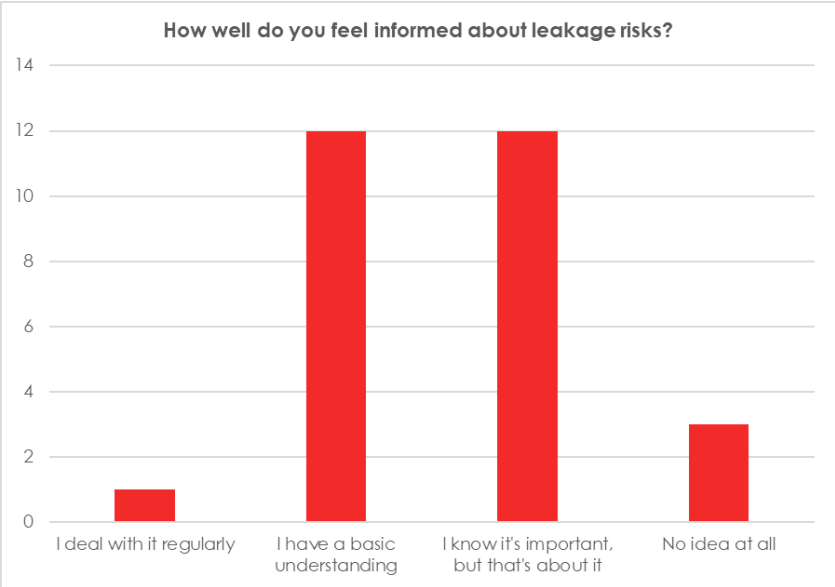

Figure 3: Question 1 to the audience of the workshop: How well do you feel informed about leakage risks

1.13.2 Leakage risks are multifaceted and extend beyond defense or dual-use concerns

Stakeholders emphasized that assessments of sovereignty and criticality should also consider: supply-chain dependencies, societal and economic impacts, critical raw materials, and manufacturing capabilities and substitution potential. The majority of stakeholders highlighted that leakage risks are moderately relevant to highly relevant.

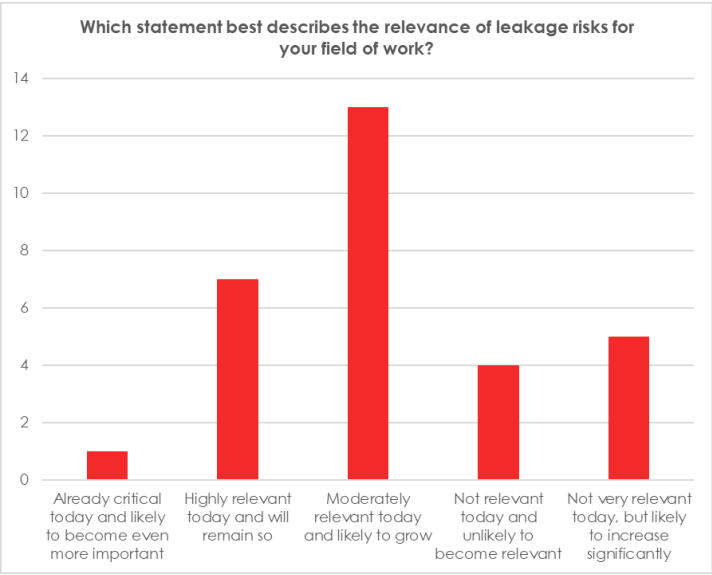

Figure 4: Question 2 to the audience: Which statement best describes the relevance of leakage risks for your field of work?

1.13.3 Data availabililty is a central challenge

Participants identified multiple potential monitoring sources, including:

- project proposals and funding databases,
- patents and literature,
- digital product/material passports,
- lifecycle and impact KPIs,
- regulatory and legislative information.

However, access limitations and fragmented data hinder systematic risk assessment.

1.13.4 Cybersecurity and knowledge misuse are major risk vectors

Reported or known leakage situations primarily involve:

- cyber-attacks,
- unfair reuse of research knowledge,
- idea or sample theft,
- reverse engineering,
- insufficient contractual or institutional safeguards,
- human factors such as naivety or lack of awareness.

1.13.5 Highest vulnerabilities occur during collaboration and knowledge exchange

International cooperation, researcher mobility, internships, and open research environments were perceived as key exposure points (Figure 5).

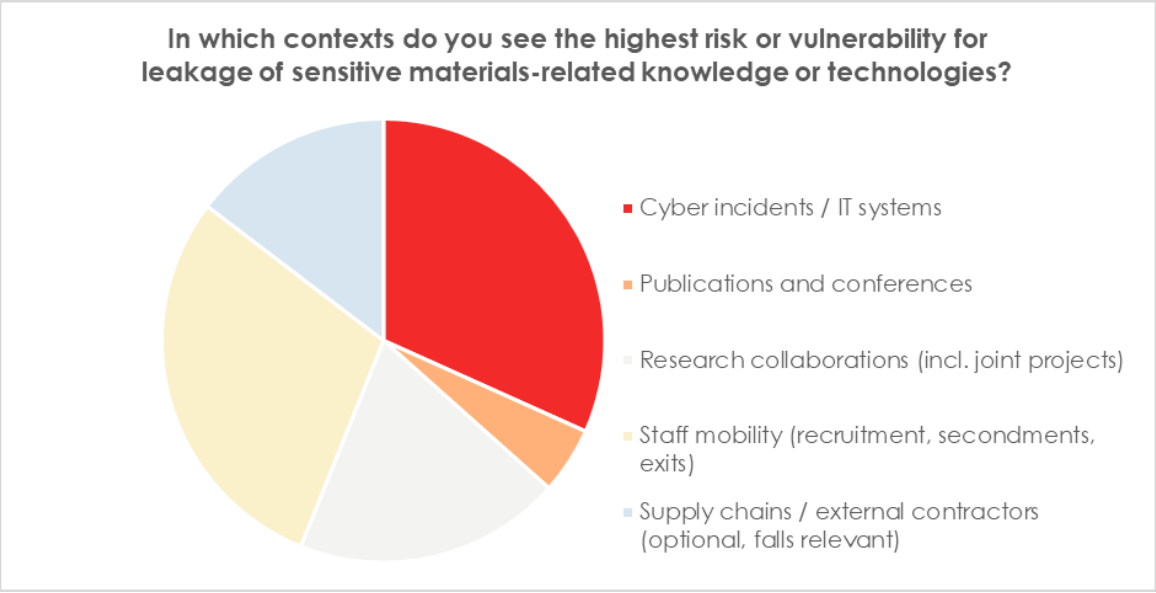

Figure 5: Question 5 to the audience: In which contexts do you see the highest risk or vulnerability for leakage of sensitive materials-related knowledge or technologies?

1.13.6 Strategic priorities for the next 5-10 years

Participants highlighted the need to:

- strengthen monitoring and early-warning systems,
- improve governance and regulatory frameworks,
- enhance cybersecurity and awareness training,
- better integrate sovereignty considerations into research evaluation.

Participants did not come to an agreement as to what the priority should be for strengthening strategic autonomy, where skills development was a top priority, followed closely by better protection of research infrastructures, clearer guidance on international cooperation risks and stronger coordination between the member states and EU funding (Figure 6).

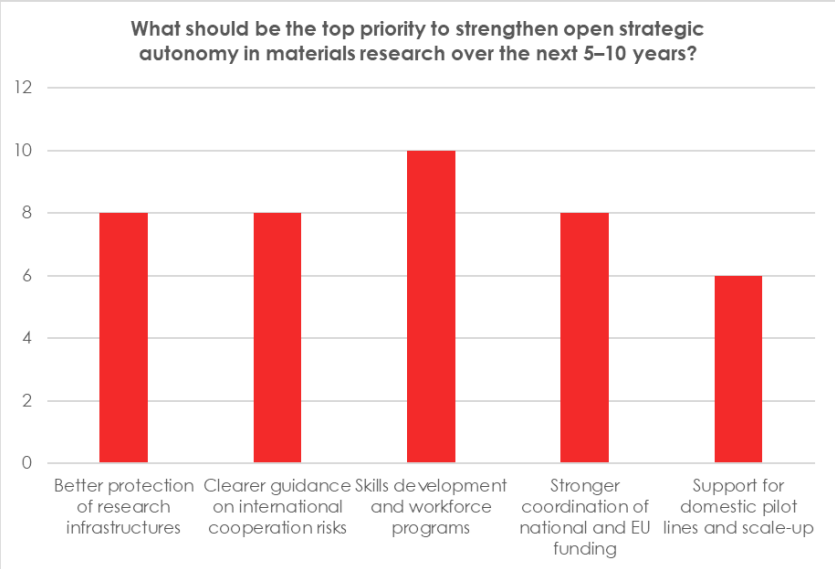

Figure 6: Question 6 to the audience: what should be the top priority to streghten open strategic autonomy in materials research over the next 5-10 years?

1.13.7 Training gaps remain significant

Only part of the participants had received formal guidance or training on preventing technology leakage, underscoring a major capacity-building need.

1.14 Conclusions of Workshop C

The workshop concludes that technology leakage risks are increasingly recognized in materials research, but effective prevention requires improved awareness, better data infrastructures, stronger governance frameworks, and systematic capacity building.