

The proposed co-programmed Partnership under Horizon Europe

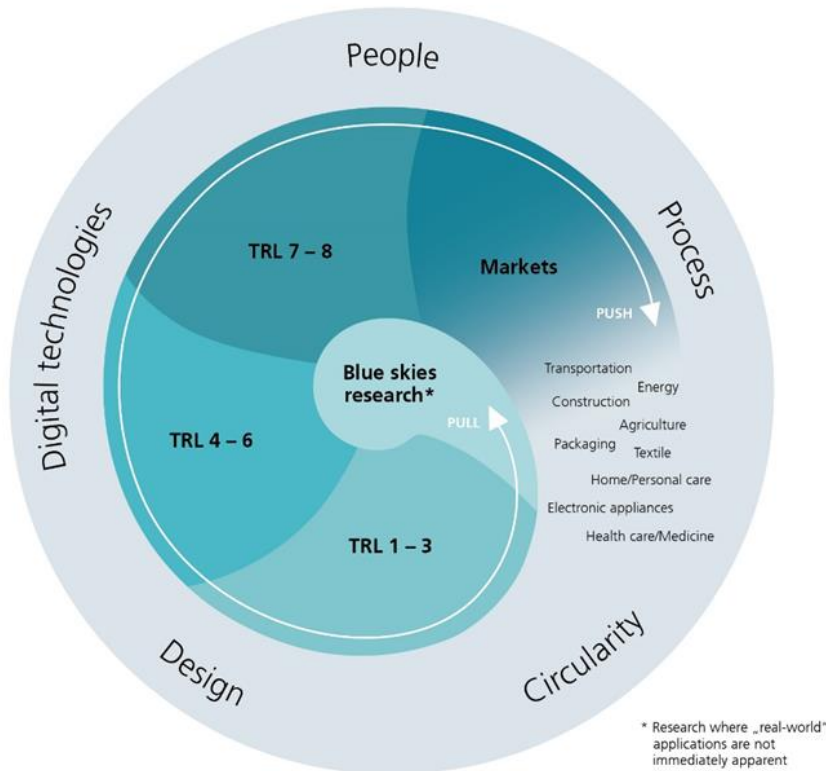
“Innovative Advanced Materials for Europe” (IAM4EU)

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AMI2030 Coordinator

April 18, 2024

The Materials 2030 Manifesto - Feb. 2022

A call for new forms of inclusive cooperation across the entire value chain to overcome the current fragmentation of Europe's R&D



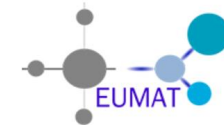
Europe must support the evolution of materials research

- Uniting Digital and Material capacities and competences
- Combining technology push and market pull
- United EU

“A systemic approach is needed to develop the next generation solution-oriented advanced materials which will offer faster, scalable and efficient responses to the challenges and thus turn them into opportunities for Europe’s society, economy and environment today and in the future”

2 years later...

- 560+ organisations involved
- ~ 870 contributing experts

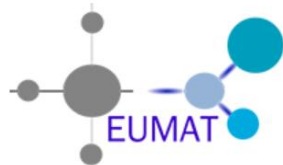


“Innovative Advanced Materials for Europe”

A co-programmed EU partnership building on the experience of...



The Energy Materials Industrial Research Initiative



The European Technology Platform for Advanced Materials and Technologies



An EU flagship initiative



The European Technology Platform for manufacturing technologies

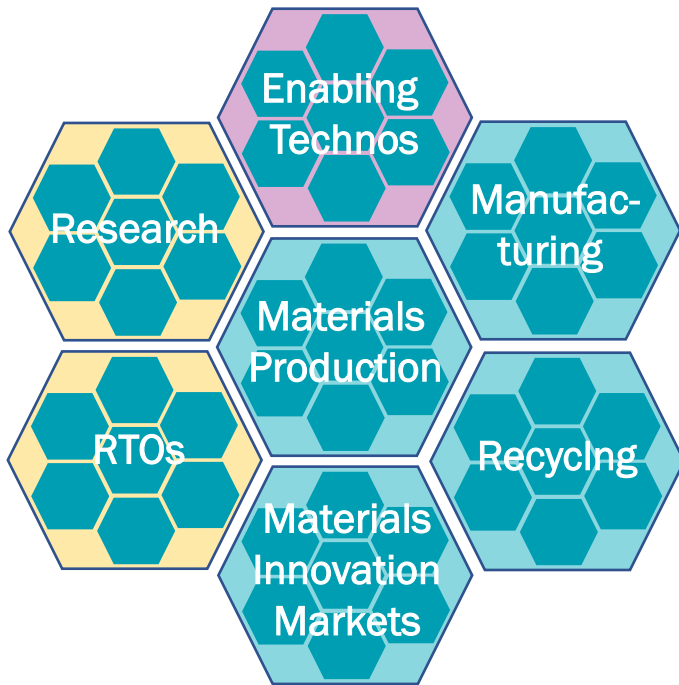


The European Technology Platform for Sustainable Chemistry

“Innovative Advanced Materials for Europe”

A co-programmed partnership between the EC and a dedicated Association

Preliminary sketch of the private-side association to gather all relevant stakeholders



- Open, Inclusive, inter-disciplinary, gathering all stakeholders communities**
- **Along the AdMat value chain**
 - Producers (all materials types)
 - Transformers / Integrators
 - MIMs
 - Recyclers
 - **From supporting/enabling technos**
 - Digital
 - Equipment & tooling
 - Characterization & testing
 - ...
 - **Along the Innovation Cycle**
 - Academic Research
 - RTOs
 - R & T Infrastructures
 - Industry (SMEs, Companies)

- Transparent Governance**
- Full members (voting rights)
 - Companies
 - RTOs & universities
 - Associate members
 - Associations
 - NGOs
 - Governing bodies
 - Weighted representation from the different sectors
 - weighted voting system (75% industry / 25% research)
 - Financial contribution
 - Per member category and size

Target #	Industry	RTO / Academic	Associated
Q4 2024	60	60	15
2027	100	100	30

Focus on Innovative Advanced Materials

Advanced Materials – what is covered?

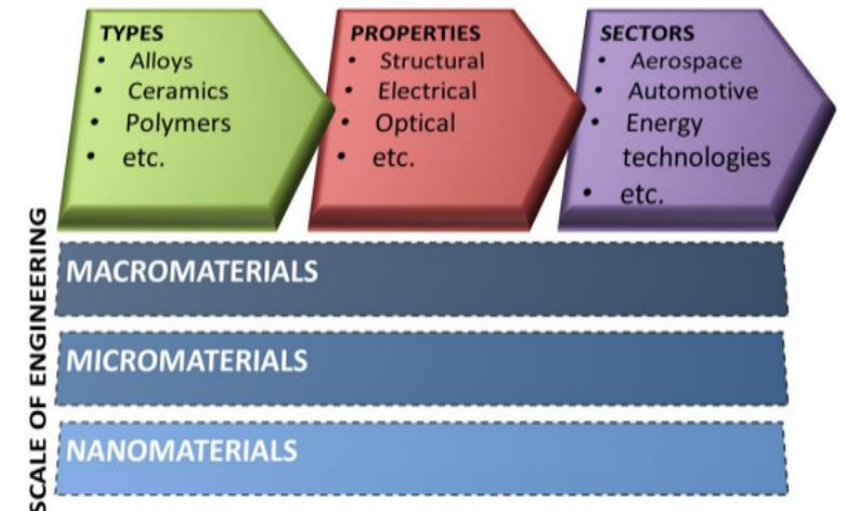
- **Intentionally designed** and engineered materials¹ to have:
 - **new or enhanced properties**, and/or
 - **targeted or enhanced structural features**to achieve specific or improved **functional performance**.
- Advanced materials include both:
 - **new emerging** materials from innovative manufacturing processes (high tech materials) and
 - materials that are **manufactured from traditional** materials (low tech materials).

2

¹ Source: [https://one.oecd.org/document/ENV/CBC/MONO\(2022\)29/en/pdf](https://one.oecd.org/document/ENV/CBC/MONO(2022)29/en/pdf)



“**Innovative**” emphasizes the commercial potential of these materials / refers to innovative ways to use classical materials in new applications



Problem Statement & Ambition

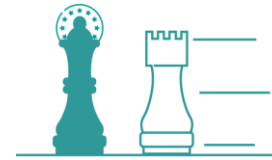
Main challenges, failures, gaps,...



The need for advanced materials addressing ever **more stringent requirements at an ever faster pace**



A **fragmented landscape** of the stakeholders, competences, resources and initiatives



EU leadership at risk in AdMat innovation and industrial competitiveness challenged in strategic markets



Lack of resilience and sustainability of materials value chains

A multi-sectorial accelerator for the design, development and uptake of safe and sustainable advanced materials towards a circular economy

Intervention Logic

*Aligning with Horizon Europe Strategic Plan for 2025-27
Contributing to implementing EC Policy on Advanced Materials for Industrial Leadership*

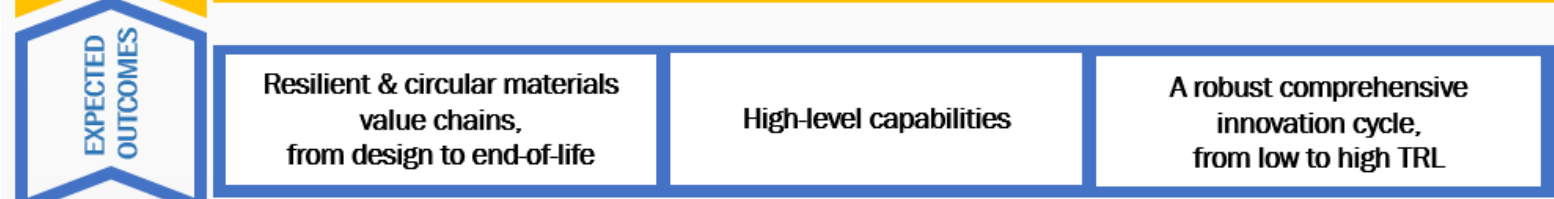
HEU Strategic Plan 2025-27

General Objectives



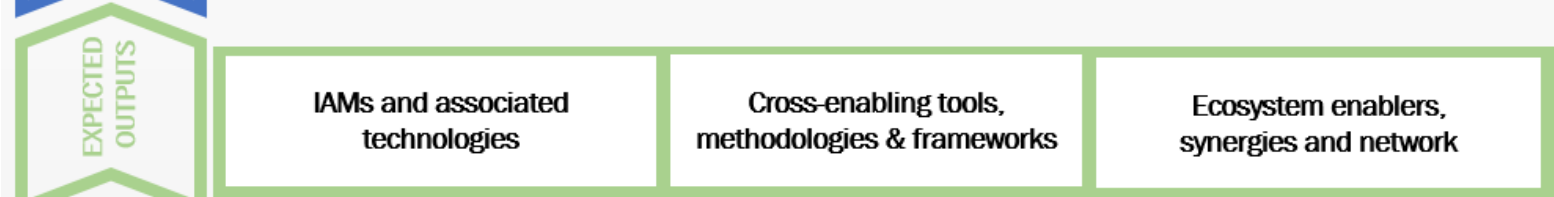
SRIA outline

Specific Objectives



SRIA priorities

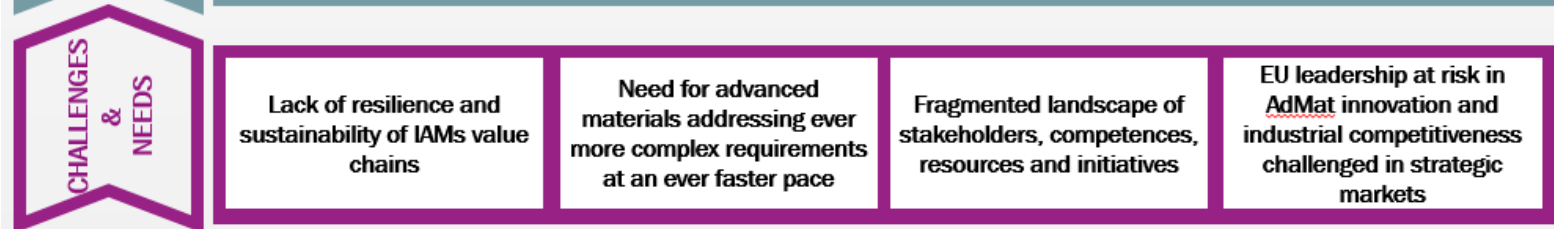
Operational Objectives



A co-programmed EU Partnership contributing to 'Advanced Materials for Industrial Leadership'



Problem statement



IAM4EU Vision & Mission

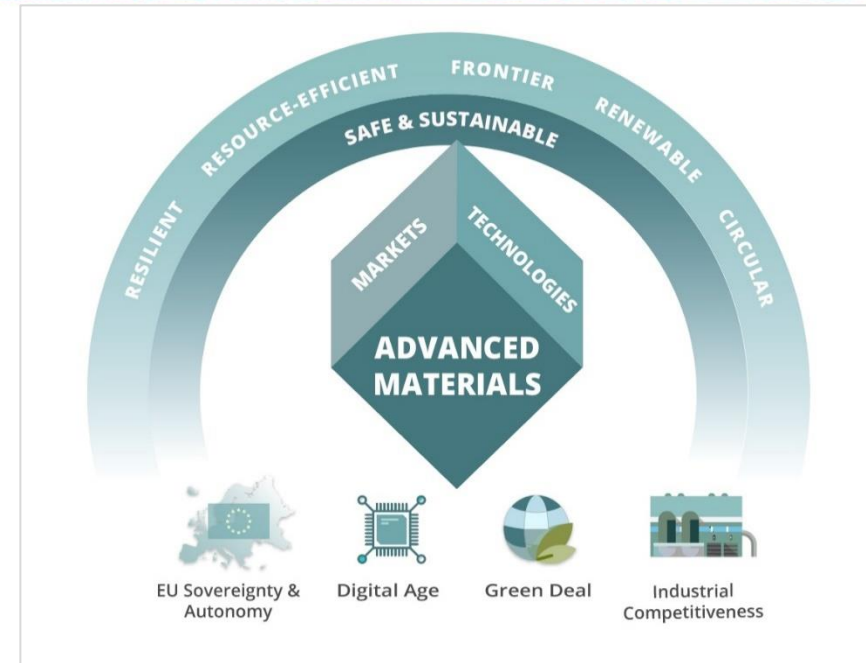
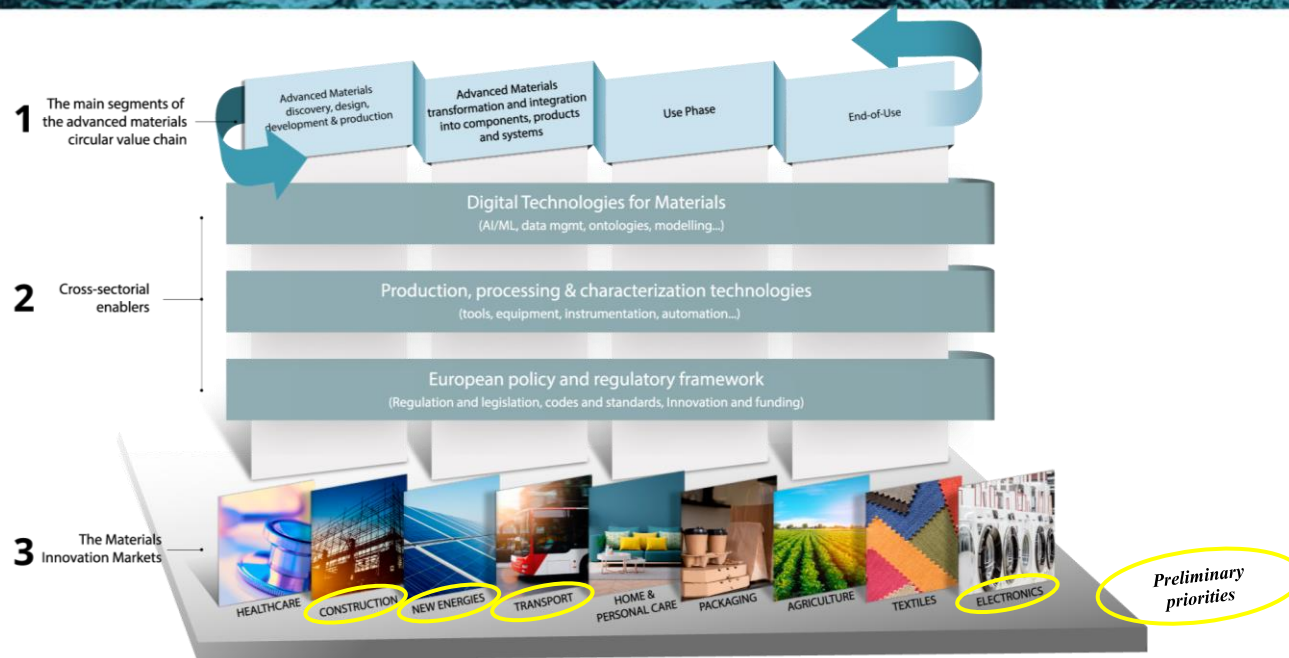
Our Vision for 2035

Innovative Advanced Materials are the backbone of technological progress. They are pivotal in achieving the twin goals of the green and digital transitions and to boost Europe's competitiveness and sovereignty.

The European industry is capable to develop, produce and integrate more rapidly Innovative Advanced Materials that meet increasingly stringent application requirements, and ever more demanding sustainability and circularity constraints, while coping with global competition and ever shorter product life cycles.

The mission of the IAM4EU partnership is to establish and maintain a cross-sectorial, multidisciplinary, collaborative Europe-wide Research and Innovation ecosystem that will significantly accelerate the time-to-market of sustainable innovative advanced materials designed for a digital & circular economy.

IAM4EU Playground and Guiding principles



- ❑ IAM4EU will cover all the segments of the materials value chain, as well as technologies and infrastructures (making use of, supporting and/or developing) enabling an accelerated design, development and uptake of IAMs
- ❑ IAM4EU will support the full IAMs innovation cycle (from basic research to innovation uptake)

- ❑ IAM4EU will recognize the key enabling role of all types of IAMs.
- ❑ As a co-programmed partnership with industry, IAM4EU will ensure that research investments meet industrial needs and boost uptake into marketable products.

Areas of Intervention (Aols), R&I Areas and Outputs

3 Areas of intervention

8 R&I Areas

RESILIENT & CIRCULAR MATERIALS VALUE CHAINS

1. Advanced materials design, production & processing driven by Safety, Sustainability & Circularity
2. Use phase and advanced materials re-use enabling circular business models

CROSS-ENABLING TOOLS & METHODOLOGIES

3. Materials digitalization and Data management
4. Materials modelling, characterisation and testing
5. Supporting European policy and regulatory framework

A ROBUST COMPREHENSIVE INNOVATION CYCLE

6. Articulation with low TRL technology-oriented material research
7. Industrial take-up in key application areas
8. Technology infrastructures to support testing and upscaling

Expected outputs

Advanced Materials and supporting technologies

TOOLS, METHODS & FRAMEWORKS

ECOSYSTEM ENABLERS, SYNERGIES AND NETWORK

Building synergies with other partnerships

Contacts with Process4Planet / Made in Europe / EIT Raw materials / ERA-MIN / Raw Materials partnership proposal / European Metrology (EURAMET) / PARC / Photonics21 / AI Data Robotics / KDT / Chips JU / BATT4EU / Clean Hydrogen / B4P / 2Zero / Clean Aviation / Circular bio-based Europe / EOSC

Joint Interest (examples)

- with MiE and P4P on energy & resource efficiency; end of use & recycling and the setting up of a federated digital framework covering the life cycle of materials
- with EIT Raw Materials and RM partnership proposal to articulating research priorities with industrial needs, address new skills and upskilling and the networking of cross-border infrastructures in the field of materials (in general) and critical/strategic raw materials
- ...

Heatmap of joint interest of partnership across IAM4EU R&I priorities (SRIA)

	RM	EIT RM	Chips JU	2Zero	Clean Aviation	CBE JU	BATT4EU	PARC	EOSC	MiE	CLEAN H2	B4P	P4P	EURAMET	Photonics	AIDR
1.1 Eco-design, harnessing the full potential of Innovative Advanced Materials in their design, production and processing	#	1	0	2	3	3	3	3	3	1	3	3	2	2	2	2
1.2 Innovative Advanced Materials with cutting-edge functionalities â pushing the frontiers on materialsâ performan	#	1	0	2	3	3	2	3	3	0	3	3	2	1	3	3
1.3 Reducing CRIMs dependencies through Innovative Advanced Materials	#	3	3	2	3	3	1	3	2	0	3	3	1	1	2	2
1.4 Innovative Advanced Materials with minimized resource usage throughout their lifecycle	#	2	0	2	3	3	2	1	3	0	3	3	2	3	1	2
1.5 Innovative Advanced Materials purposed for secondary use	#	0	0	1	3	2	1	1	3	0	3	2	2	2	1	1
1.6 Innovative Advanced Materials sourced from sustainable and renewable resources	#	0	3	2	3	3	3	1	3	0	3	3	3	2	1	3
1.7 Innovative Advanced Materials transformation by Generative Design (GD) and 3D printing (3DP)	#	0	0	0	1	3	1	0	3	0	3	2	2	0	2	3
1.8 Innovative Advanced Materials for (mass) customization of products and components	#	2	1	0	1	0	3	2	2	1	3	2	1	2	1	3
2.1 Enhancing component and product longevity	#	2	0	2	3	3	2	2	3	0	2	3	3	0	2	3
2.2 Smart components & productsâ maintenance and repair strategies	#	0	0	2	3	3	1	0	3	0	2	2	1	2	1	2
2.3 Recovery technologies (including for multi-materials), to reclaim valuable materials from end-of-life components & p	#	2	0	3	3	3	2	3	3	0	2	3	3	3	1	2
2.4 Innovative Advanced Materials recycling technologies for second use	#	3	1	2	3	2	2	3	1	3	0	2	3	2	3	1
3.1 Establish an integrated, trusted, federated digital framework covering all the materials lifecycle	#	3	1	0	1	2	3	2	3	2	3	1	3	3	3	2
3.2 Model driven SSbD and LCA materials development tools	#	0	0	2	0	3	3	3	3	1	2	3	3	2	2	3
3.3 Digitalization of materials performance management systems	#	0	0	2	3	3	1	3	3	0	1	2	2	3	1	3
3.4 Innovative Advanced materials identification and traceability connecting Digital Materials and Product Passports	#	1	3	1	3	3	3	3	3	0	2	2	3	2	3	1
4.1 Life Cycle Analysis (LCA) data for informed materials design	#	1	2	3	3	3	3	2	3	2	1	3	2	2	2	3
4.2 Multi-physics, multi-scales modeling and characterization to accelerate materials design	#	0	0	2	1	3	1	3	3	0	1	3	1	1	3	2
4.3 Digital methods enhancing characterization and testing	#	1	0	3	1	3	2	3	3	0	1	3	3	0	3	3
4.4 Materials knowledge systems and models	#	1	0	2	1	3	1	2	3	0	1	3	2	2	3	2
5.1 SSbD as an Integrated Part of Innovative Advanced Materials Development	#	1	0	3	0	3	3	1	3	0	1	3	2	3	2	3
5.2 Harmonized Testing Guidelines That Address the Specifics of Innovative Advanced Materials	#	0	0	2	0	3	3	1	3	1	1	3	3	0	3	2
5.3 Regulations Keeping Pace with Innovation	#	3	0	3	0	3	3	3	3	0	1	1	1	1	3	1
6.1 Articulating research priorities with industrial needs	#	3	3	3	3	3	3	3	2	0	1	3	2	1	2	1
6.2 Contributing to new skills and upskilling	#	3	3	3	3	3	3	2	3	2	1	3	2	1	2	2
7.1 Networking of cross-border infrastructures	#	3	3	2	0	3	3	2	3	3	1	3	2	0	3	2
7.2 Digital infrastructures, including decentralized, federated materials data spaces	#	1	0	1	0	3	1	3	3	3	1	2	2	2	3	2
7.3 Technology infrastructures (OITBs, MAPs,...)	#	2	0	0	0	3	2	3	3	0	1	3	3	0	3	1
7.4 Portfolio of R&I and Business development services	#	2	2	2	1	2	1	1	3	0	1	1	3	1	2	1
8.1 Advanced Materials end-of-use strategies and circular business models	#	2	3	2	3	3	3	2	3	0	1	3	2	3	1	1
8.2 Building up synergies and cross-exploitation of Innovative Advanced Materials across strategic markets	#	0	0	1	1	2	3	1	3	0	1	3	1	1	1	2
8.3 Feedstock marketplace for Innovative Advanced Materials	#	1	8	1	2	1	0	3	3	0	3	0	1	1	1	0

Operationnal Objectives for 2025-2027



IAMs and associated technologies

of **SSbD IAMs technologies** (concept / prototype) along materials VC

- raw materials & CRMs
- renewables (fossil-free) & resource efficiency
- circularity (secondary raw materials)

of **scalable technologies** (demo) per/**across sector(s)**

of technologies **uptake** and markets

...

Cross-enabling tools, methodologies & frameworks

of **digital tools** & methods (MAP, ML, digital twin...)

of **SSbD & LCA** tools & methods

of **modelling, characterization, testing** tools & methods

of digitalized IAMs cases (incl. data management approaches)

of implementation of materials **traceability** serving DPP

of standardization support / policy recommendations

...

Ecosystem enablers, synergies and network

of publications, patents, licensees

of **circular business models**

of inter-operable databases

of **operationalization of SSbD & LCA** tools

of access to, **use of**, contribution to **digital infrastructures, data spaces, pilot lines, OITBs**

of **education and skillset** identification

of supported **start-up, SMEs**

...



Alignment of R&I strategies between Industrial and Academic communities

- Academic/industry engagement in WGs
- SRIA supporting academic/industrial joint actions
- SRIA implementing specific academic/industrial joint activities
-

Private association with cross-sectorial membership & industry-driven governance

- Association set (articles; charter;...)
- Stakeholder engagement and diversity (incl. U13)
- Governance and office in place
- WGs structure supportive of the SRIA
- MoU signed
- Private in-kind contribution
- Communication & dissemination strategy
- ...

Synergies with transversal and applicative partnerships

- Collaboration with other partnerships
- Collaboration with other initiatives
- Collaboration with EIC (e.g. Accelerator in WP25)
- Collaboration with EIT (.g. AM Academy)
- International cooperation
- ...

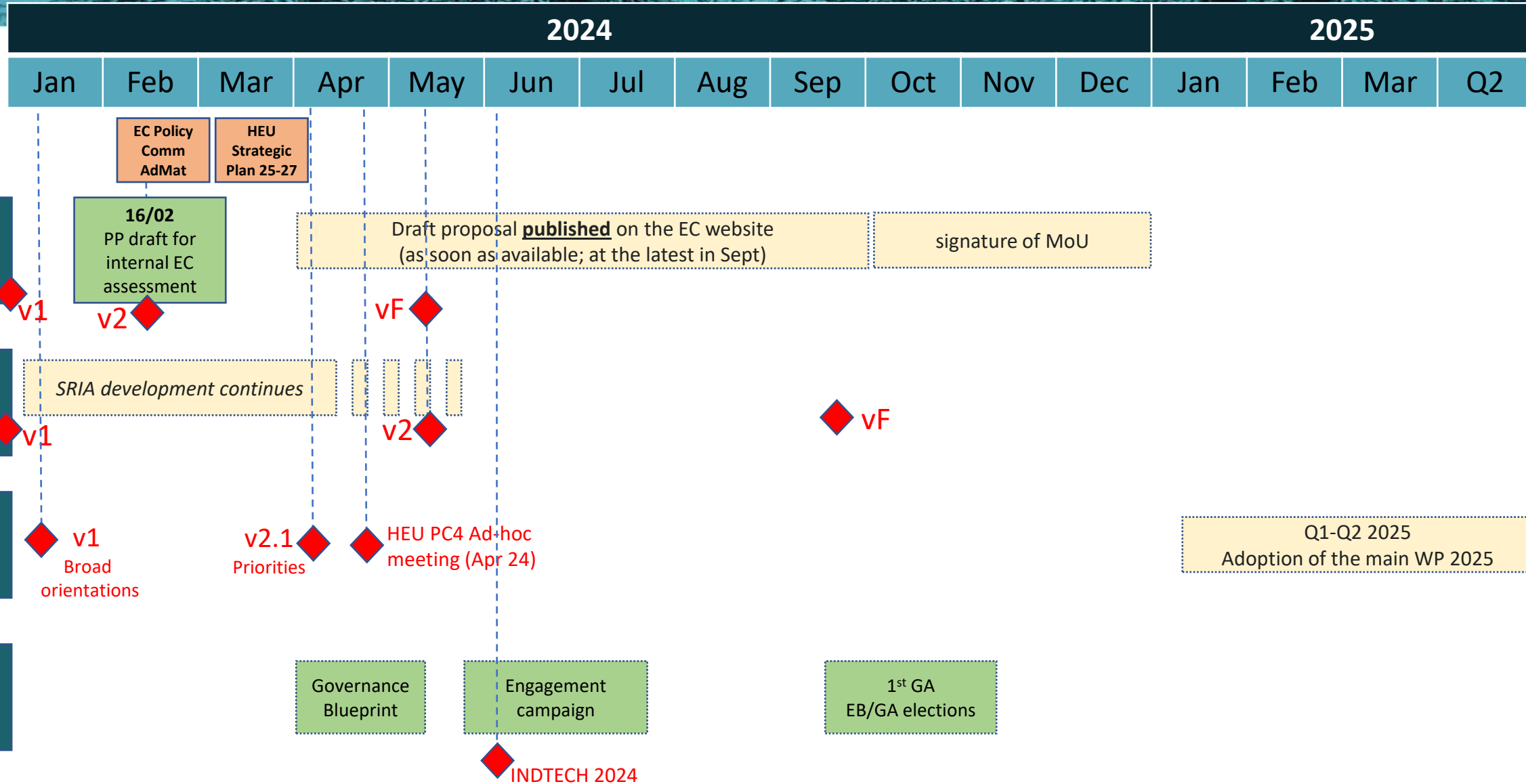
First proposals of priorities for WP'25 (1/2)

TOPIC	OUTCOMES	Programme	TYPE	TRL
Topic 1 - IAMs for photonics, enabling low-power and ultra-broadband performance for telecommunication networks	Demonstrated added value of IAM for full-link (transmitter and receiver) integrated photonic communications, devices and systems, with focus on low power consumption, enabling future telecommunication networks in which Europe can build competitive value chains.	CL4	RIA/IA	3-6
	IAMs for miniaturized and outperforming photonic integrated technologies e.g. in terms of state-of-the-art performance, low power, low cost and no cryogenic cooling, enabling the development of future-proof, scalable, low-power and high-bandwidth devices.	CL4	RIA/IA	3-6
	Compatibility with existing photonic integrated platforms and low-voltage electronics.	CL4	RIA/IA	3-6
Topic 2 - IAMs for conformable, flexible or stretchable electronics	Sustainable and circular electronics for high volumes applications	CL4	RIA	3-5
	Large-area and ubiquitous Structural Health and Condition Monitoring	CL4	RIA/IA	3-6
	Wearable or minimally invasive medical and wellbeing electronic devices	CL4	RIA	3-5
	Seamless integration of energy subsystems designed for low-power applications	CL4	RIA	2-4
Topic 3 - IAMs for advanced coatings, sealants, adhesives and functional surfaces	IAMs- based coatings, sealants, adhesives and functional surfaces that include new sustainable chemistries with robust, and cost efficient production processes	CL4	RIA	2-4
	IAMs-based coatings, sealants, adhesives, and functional surfaces designed to withstand specific, or complex requirements for challenging service environments	CL4	RIA/IA	3-6
	IAMs-based coatings, sealants, adhesives and functional surfaces with optimized performance and efficiency designed by applying advanced modelling, characterization, AI/ML -based tools.	CL4	RIA/IA	3-6
	IAMs-based coatings, sealants, adhesives, and functional surfaces designed for an end-of-life circularity	CL4	RIA/IA	3-6
Topic 4 - IAMs For Product Monitoring, Enabling Smart Maintenance And Repair Strategies	IAMs-based functional and structural monitoring of products & systems combining efficiency and performance in use	CL4	RIA	3-5
	Cross-sectorial monitoring, smart maintenance and repair tools & strategies for high performance and sustainable utilization of products & systems			
	Improved decision-making processes facilitated by FAIR data generation, dissemination and exploitation across the entire IAM value chain			

First proposals of priorities for WP'25 (2/2)

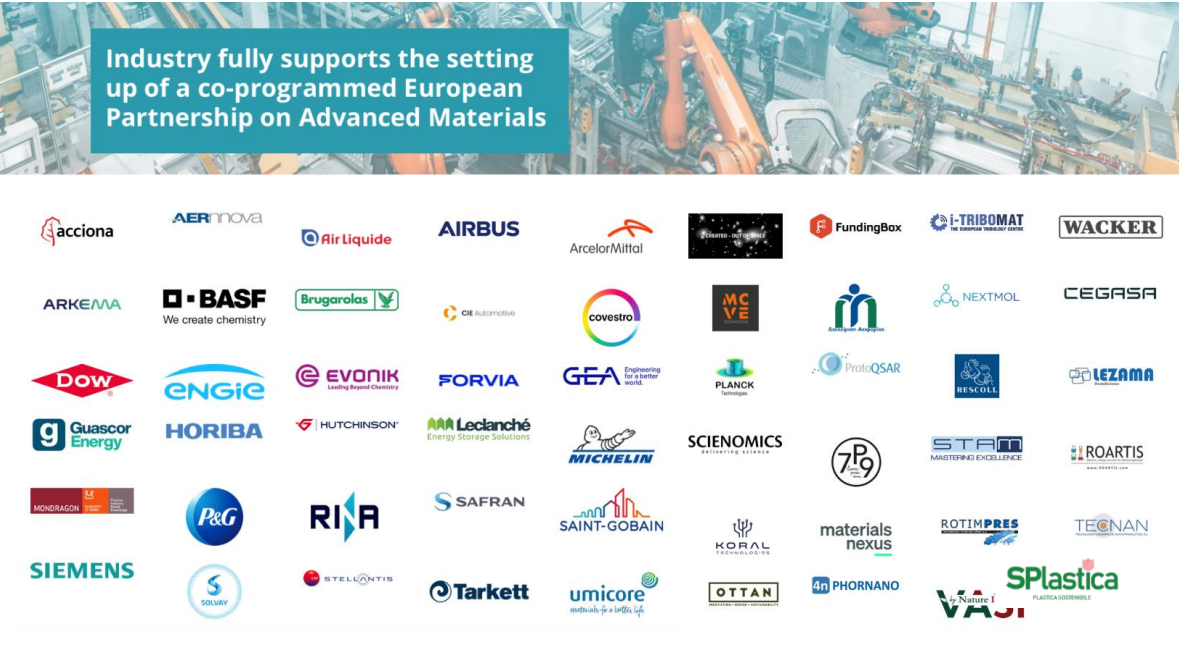
TOPIC	OUTCOMES	Programme	TYPE	TRL
Topic 5 - AI and ML based models, tools and services to accelerate IAMs design and to optimize IAMs compositions and structures	AI ready data spaces along value chains and along innovation cycles.	CL4	RIA/IA	3-5/5-7
	SSbD and LCA concepts as KPIs			
	Standardized Workflows equipped with User-centric interfaces			
Topic 6 - IAMs with broadband performance for hyperspectral sensor and imaging applications across visible, Infrared and longer wavelengths	Infrared detection technologies that are wafer-scale integrable, and operating with high sensitivity for a high spectral range, combining SWIR, MWIR and THz.	CL4		1-5
	Integration of the detection technologies with silicon electronics into compact hyperspectral image sensors for highly sensitive and/or single photon-based imaging.	CL4		
	Integration detection technologies with single photon sensitivities into single photon LiDARs reaching centimeter resolution at a distance of hundreds of kilometers, without being limited by harsh environmental conditions	CL4		
Topic 7 - Commonly applicable and validated tools and methods for the Safe and Sustainable-by-design (SSbD) framework	Increased awareness and understanding of the applicability of SSbD tools and methods for innovative advanced materials	CL4	RIA	NA?
	Enhanced uptake and diffusion			
	Improved application and deployment			
Topic 8 - Significant decrease in critical rare earth content within high-performance permanent magnets	Reducing dependence on critical Rare Earth Elements in Permanent Magnets, crucial for various industries and essential for transitioning to green energy	CL4	RIA	3-5
	More sustainable IAMs and associated technologies for Permanent Magnets, towards circular magnets value chains		IA	5-7
	Enhanced resource and energy efficiency in systems, leveraging novel permanent magnets through rationale utilization of critical materials		IA	5-7
SMEs - Safe & Sustainable innovative advanced materials, from design to recovery and re-use	IAMs and associated technologies	CL4 / EIC	EIC Accel.	5-9
	Tools & methods for materials digitalization, modelling, characterization and testing			

NEXT STEPS



Be prepared to join the IAM4EU Association JOIN US!

Industry fully supports the setting up of a co-programmed European Partnership on Advanced Materials



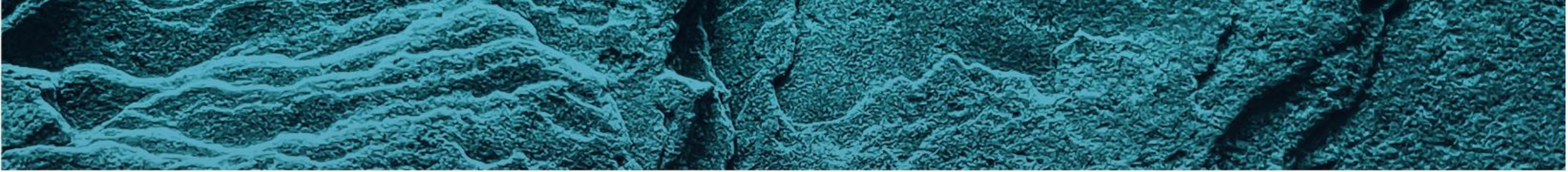
info@ami2030.eu

~ 250+ Expression of Interest
~ 20+ Countries

GRAPHENE FLAGSHIP 2DMIC



info@graphene-flagship.eu



Thank you

Questions?