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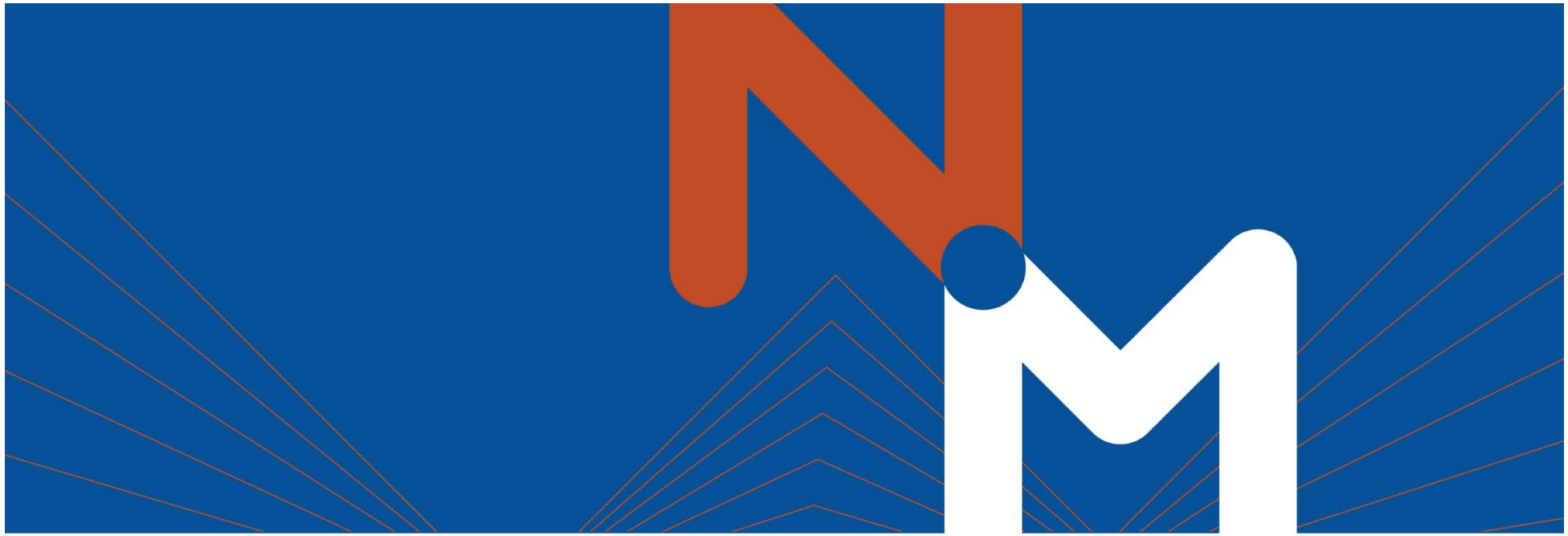

ORIENT
Organisation of the European Research Community on Nuclear Materials

ORIENT-NM - Organisation of the European Research Community on Nuclear Materials

A single European vision and research agenda on nuclear materials : towards a co-funded European partnership

L. Malerba, CIEMAT, ORIENT-NM and EERA JPNM coordinator, lorenzo.malerba@ciemat.es

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What is ORIENT Nuclear Materials?

A Coordination and Support Action partially funded by Euratom, WP 2019-20, NFRP-08

Goals as from the call:

- Consolidate the domain of nuclear materials in Europe
- Avoid duplication, improve complementarity
- Involve EERA (JPNM) and SNETP (NUGENIA)

In practice:

- **Explore the ground for a Co-funded European Partnership* on nuclear materials (CEP-NM)**

ORIENT-NM Budget:
Total: 1.6 M€
Euratom part: 1.1 M€

*European Partnerships in HEU replace among others H2020 European Joint Programmes, EJP

Why a European Partnership on materials?

Materials performance is crucial to enhance safety

Innovative materials solutions are needed and should be rapidly brought to the market

This goal requires to develop the capability to rapidly and efficiently:

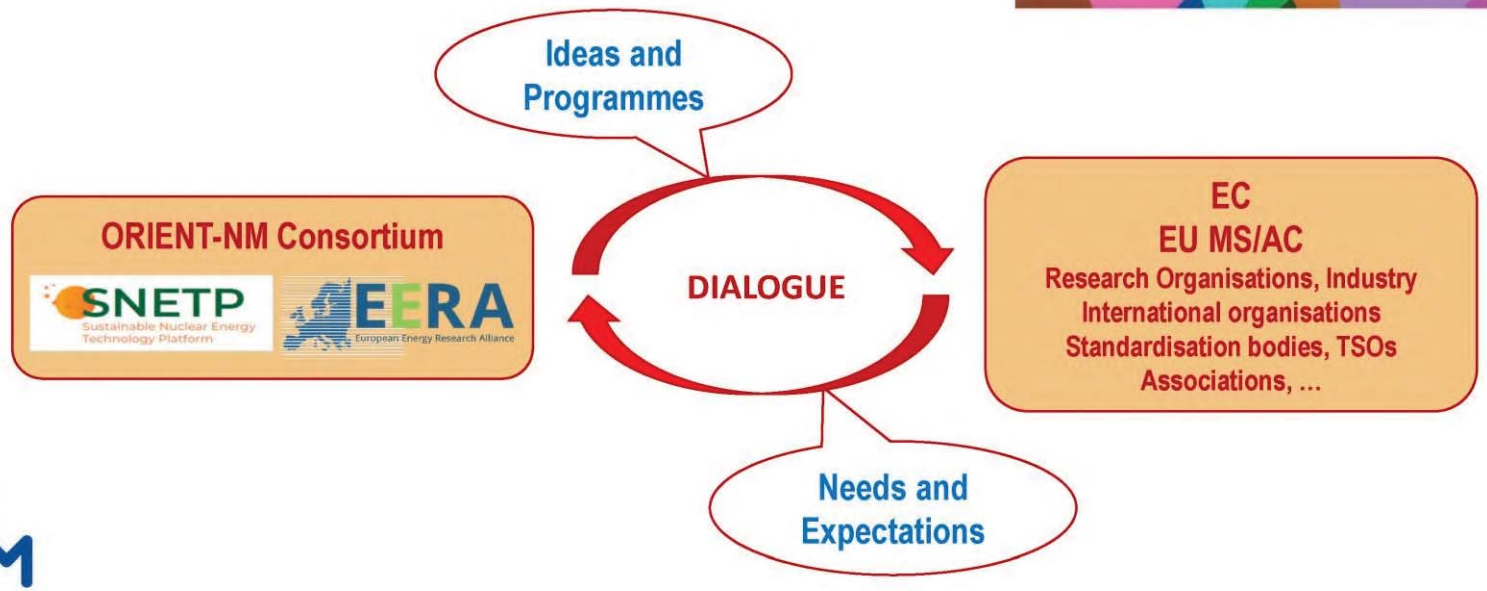
- ❑ design materials with targeted properties
- ❑ flexibly manufacture and qualify them through exposure and testing
- ❑ predict and monitor continuously their behaviour in operation
- ❑ timely replace and repair components

Change of paradigm: from traditional "observe and qualify" to modern "design and control", using advanced digital techniques

No single EU country is fully equipped to reach this goal

An integrated research programme with clear research lines is needed to avoid fragmentation and guarantee continuity towards the goal, by valorising every MS/AC's research assets, and maintaining competences, by attracting young researchers

How is ORIENT-NM working?



What is ORIENT-NM producing?

1. Strategic Research Agenda on Nuclear Materials
2. Governance, structure and implementation design for the European Partnership
3. Plan of interaction of the European Partnership with all interested stakeholders

Mission of the nuclear materials science community based on the analysis of the current European context

The research activities of a European partnership dedicated to nuclear materials should **support**:

⇒ Safe and affordable LTO of current generation reactors

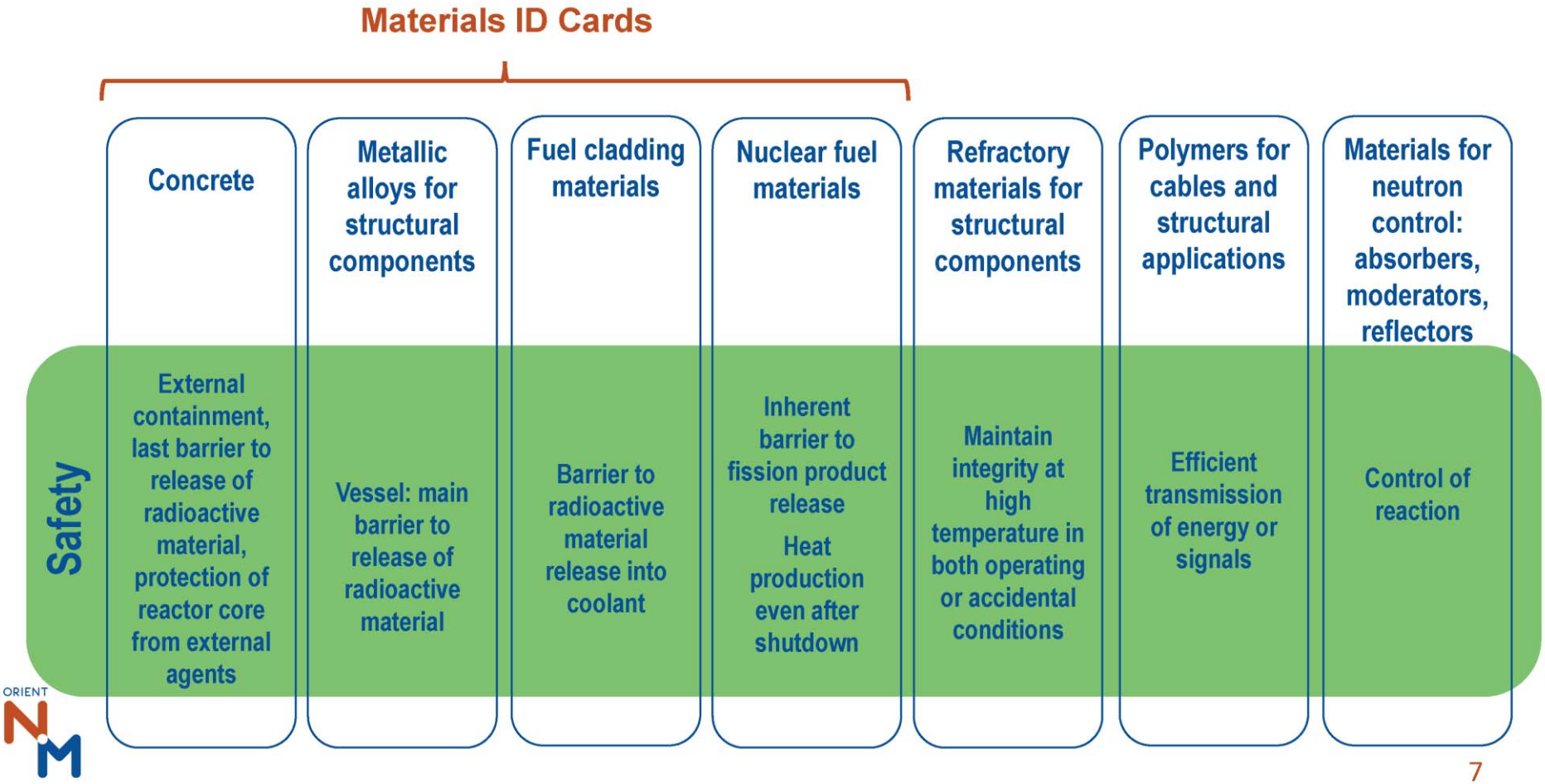
⇒ Increasingly safe design, licensing and construction of Gen III+, e.g. ATF, and light water SMRs

⇒ Reduction of time and costs for the design, licensing and construction of safer nuclear reactors, including advanced SMRs

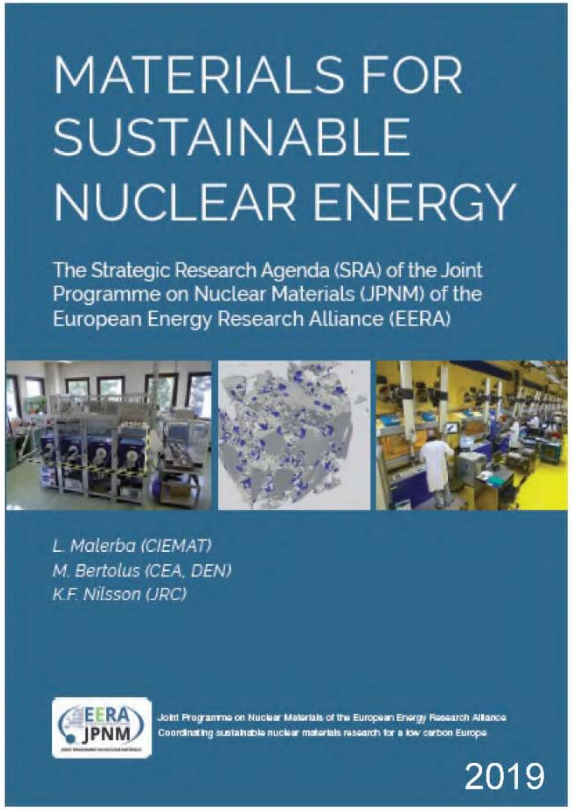
Keywords:

- Accelerated development & qualification capabilities, advanced digital technologies
- Predictive methodologies, continuous monitoring, supply chain and advanced manufacturing
- Multidisciplinarity, competence building, benefits for fusion and non-nuclear energy

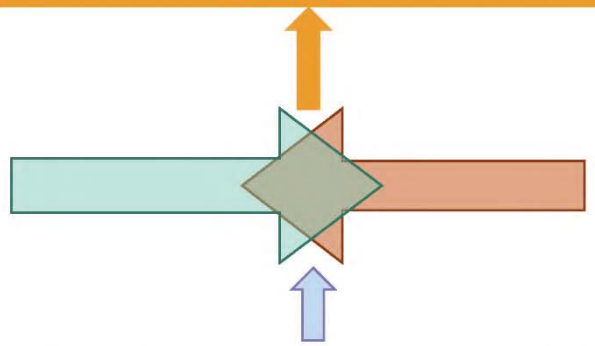
7 classes of materials to increase safety



Roots of ORIENT-NM strategic research agenda



ORIENT-NM SRIA
https://doi.org/10.3390/en15051845



MATERIALS 2030 MANIFESTO

Systemic Approach of Advanced Materials for Prosperity – A 2030 Perspective

7 February 2022

ADVANCED DIGITAL TECHNIQUES FOR MATERIALS

Vision

Materials, especially advanced materials, are the backbone and source of prosperity of an industrial society. In the context of the radical transformational changes of the 21st century, it is precisely these advanced materials that will play a decisive role.

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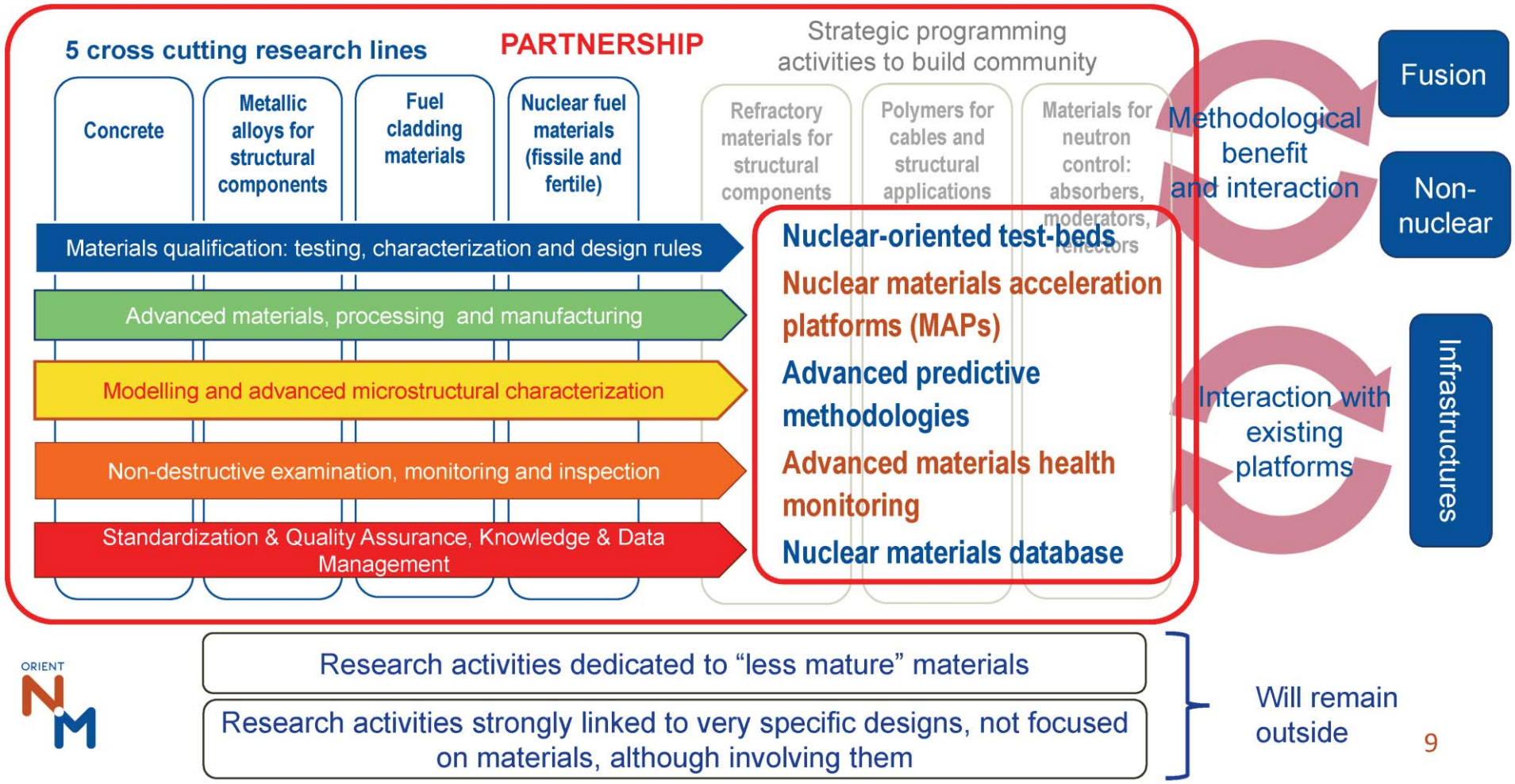
Perimeter of partnership's activities



Research activities dedicated to "less mature" materials

Research activities strongly linked to very specific designs, not focused on materials, although involving them

Will remain outside

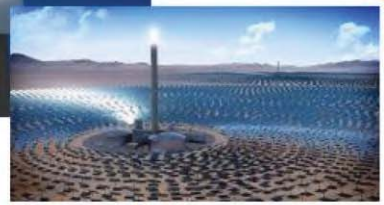
Benefit for fusion and non-nuclear energy

Fusion Energy

Fuel Cells & Hydrogen

Geothermal Energy

The partnership pursues innovative approaches to improve the performance of materials under harsh conditions



Solar Thermal Energy

This ambitious goal needs and enables participation of all MS/ACs

Bioenergy

Preparation of structure and governance of the co-funded partnership

- **The partnership needs to be planned in all of its aspects.**
- This includes:
  - Governance and structure
  - Legal issues
  - Resourcing
  - Implementation and quality management
  - Data and knowledge management
  - Education and training

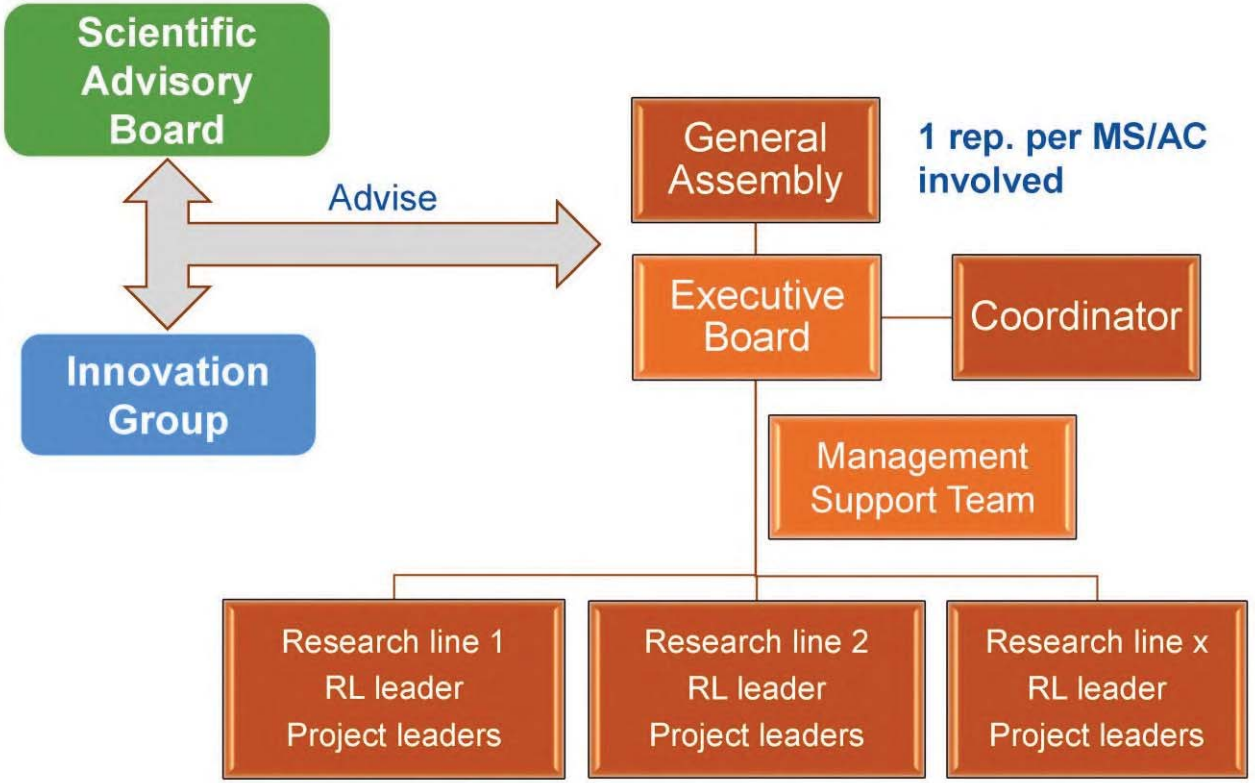
Focus here at the moment

- Expected EU funding rate: **55%**
- Matching funds: **45%**

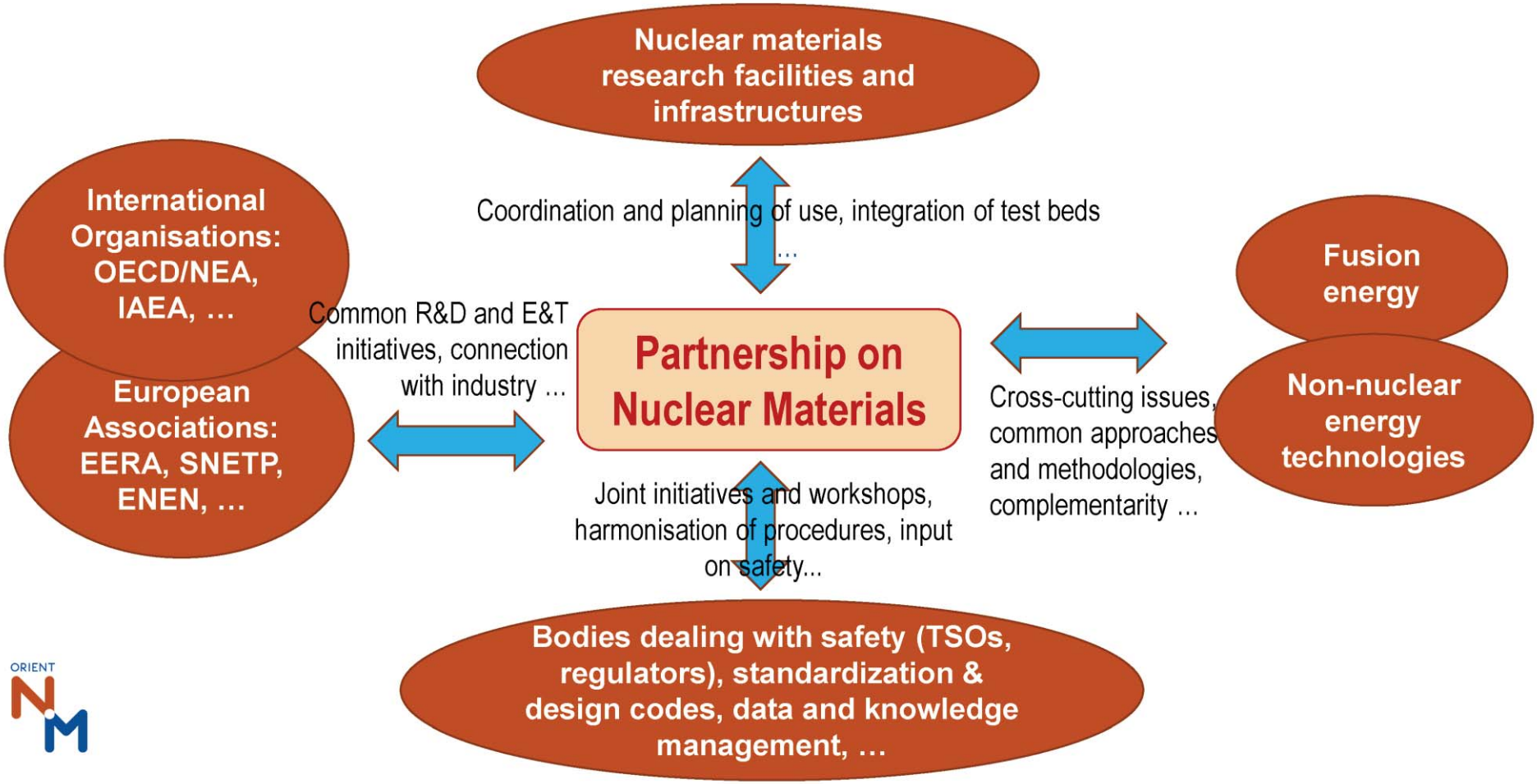
Standard structure, but with emphasis on innovation

"Standard" advisory body: experts in charge for the assessment of the activities with scientific and technical background, emanation of R&D environments

Experts in leading business, supporting entrepreneurship and commercializing technology, in connection with materials development and/or nuclear energy, emanation of industrial and innovation environments



Partnership's expected interactions



Interaction of the CEP with infrastructures and facilities

The partnership will naturally need & feed current and future irradiation facilities and relevant schemes of coordination of use

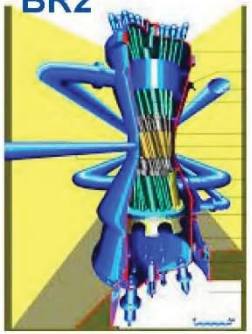
Nuclear-oriented materials qualification test-beds (n-test-beds)

Nuclear materials acceleration platforms (n-MAPs)

JHOP2040, OFFERR

FIDES (NEA-OECD)

BR2



HFR

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Neutrons in operation

Ions

PALLAS

JHR Jules Horowitz Reactor

IFMIF DONES GRANADA

Future neutrons (> 2030)

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Other facilities involved: loops, autoclaves, microstructural examination techniques, mechanical testing labs, ...