

Research and Innovation example between ESIF and H2020

The ALFRED Project



Lungotevere Thaon di Revel, 76

00196 Roma – Italy

www.enea.it

Alessandro Del Nevo

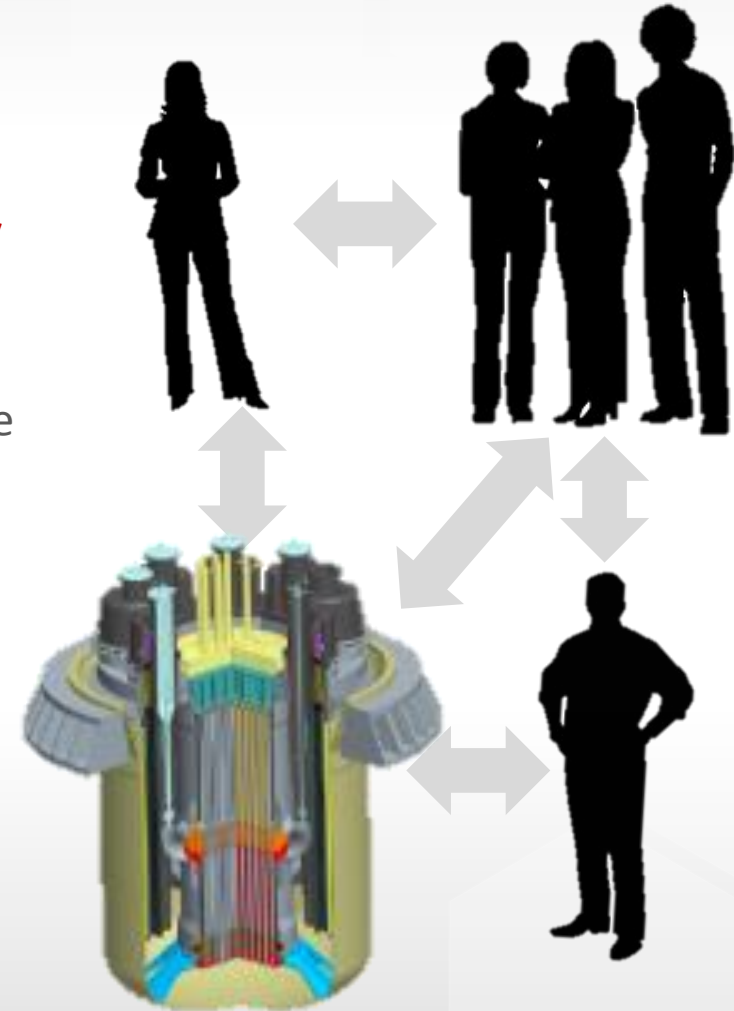
Head of Laboratory for Nuclear Design
and Analysis

Phone: +39 0534 801 130

alessandro.delnevo@enea.it

ALFRED

- ALFRED is
 - a **demonstrator** devoted to the **development** of the **LFR** technology
 - a **reactor** addressing the concerns on **safety** and **sustainability** of **nuclear energy**
 - a **Research Infrastructure** to build an **European leadership** on scientific excellence
- ALFRED will be
 - a **pole of attraction** for **researchers** from all over the World
 - an **unique RD&Q platform** for **industry**, **safety authorities** and **utilities**
 - a **catalyzer** for **joint programming** among European countries towards common policies



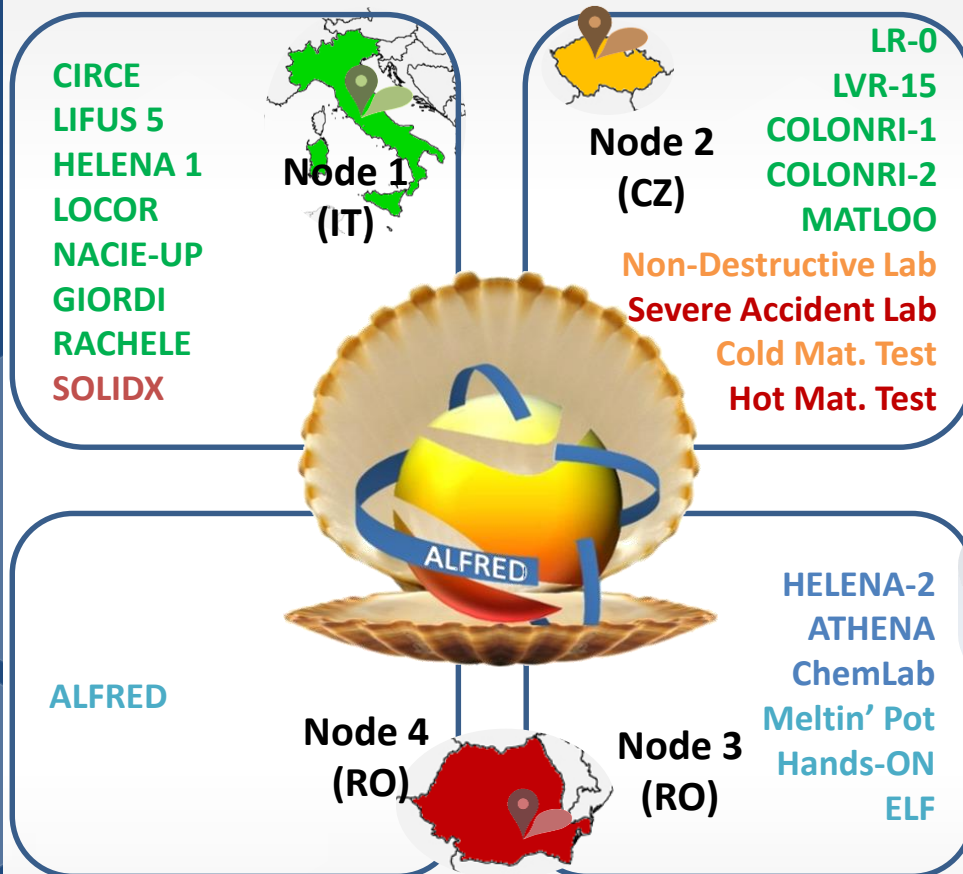
ALFRED and iCRADLE



9 Scientific Objectives

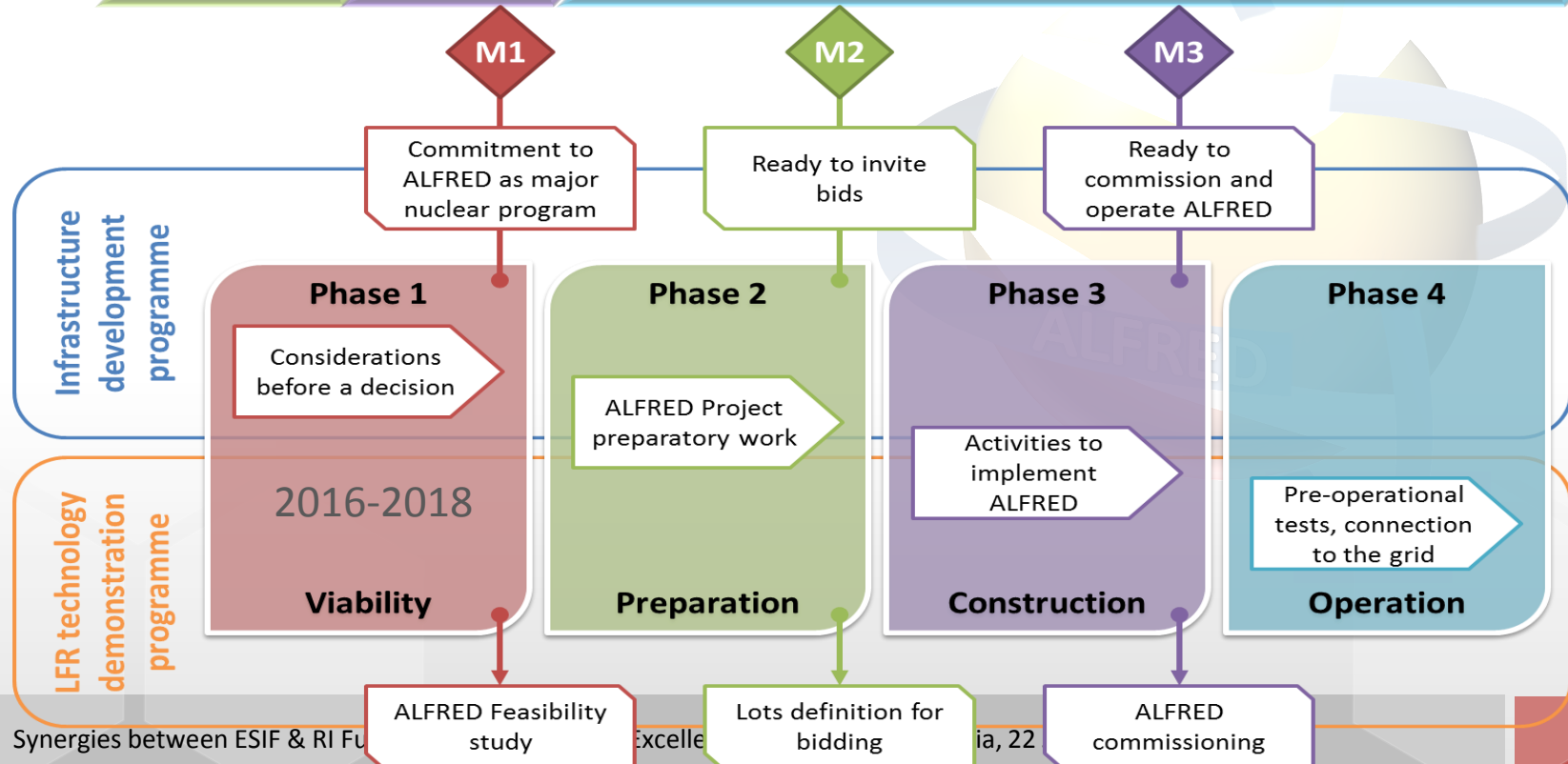
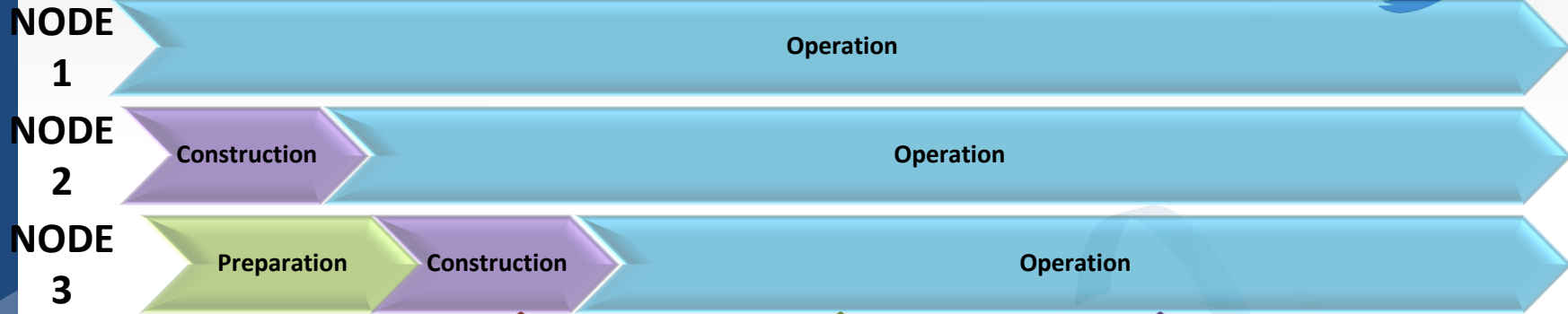
- Material science for qualified solutions
- HLMs physical-chemical properties
- HLMs as coolants in practical applications
- Solutions and provisions to exploit HLMs
- Characterization of concepts
- Qualification of prototypical SSCs
- Integral tests for NESS
- Viability of LFR concept
- Safe and sustainable operation of LFRs

ALFRED and all its satellite facilities will provide Europe with a **Research Infrastructure**, to complete the scope of the **ALFRED Project** through a **Center of Excellence** for cooperative **Education, Training and Research**

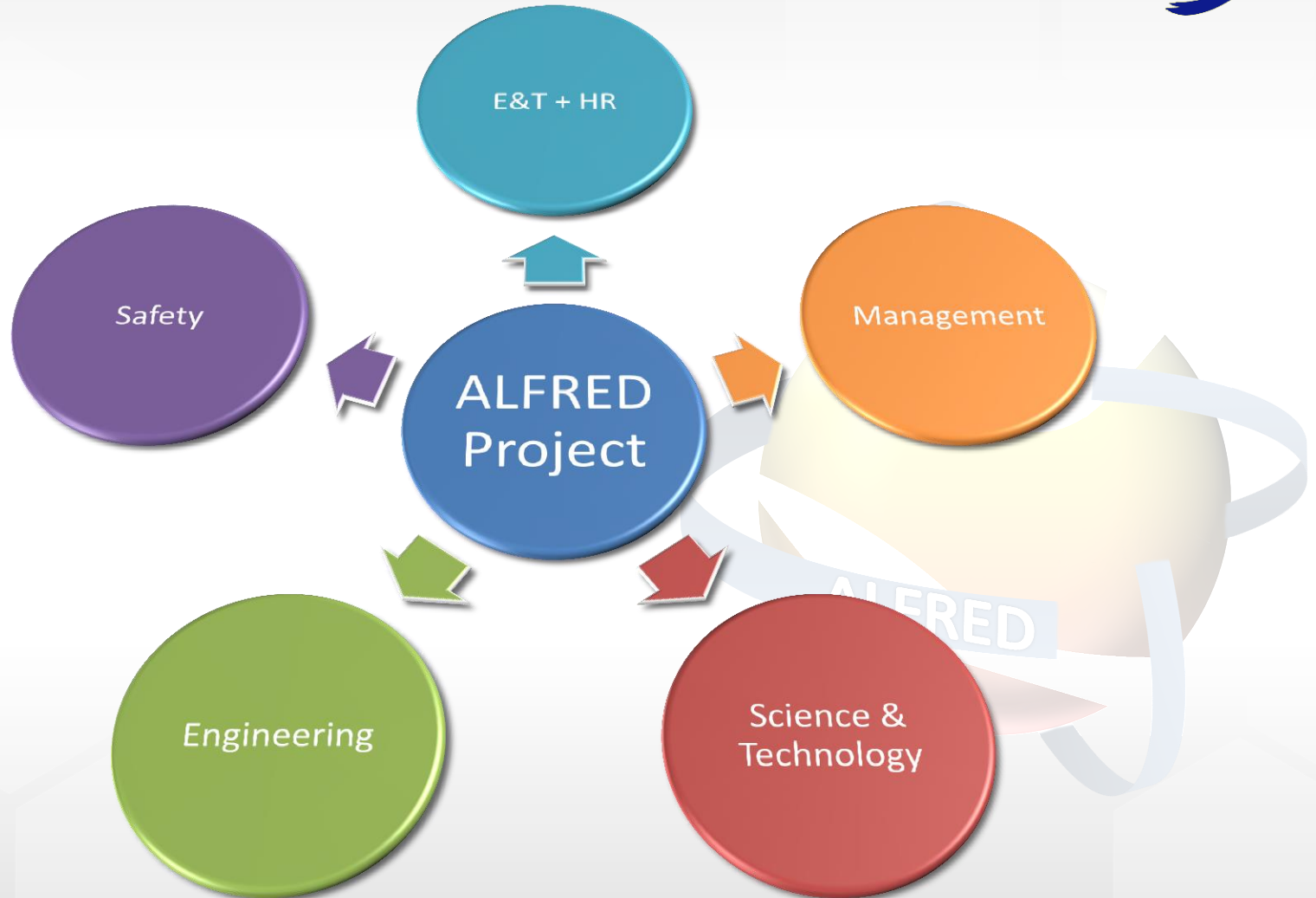


i-CRADLE: Infrastructure for Coop. Research to Advance up to Demonstration the Lead technology

ALFRED & iCRADLE Roadmap



Five areas of action



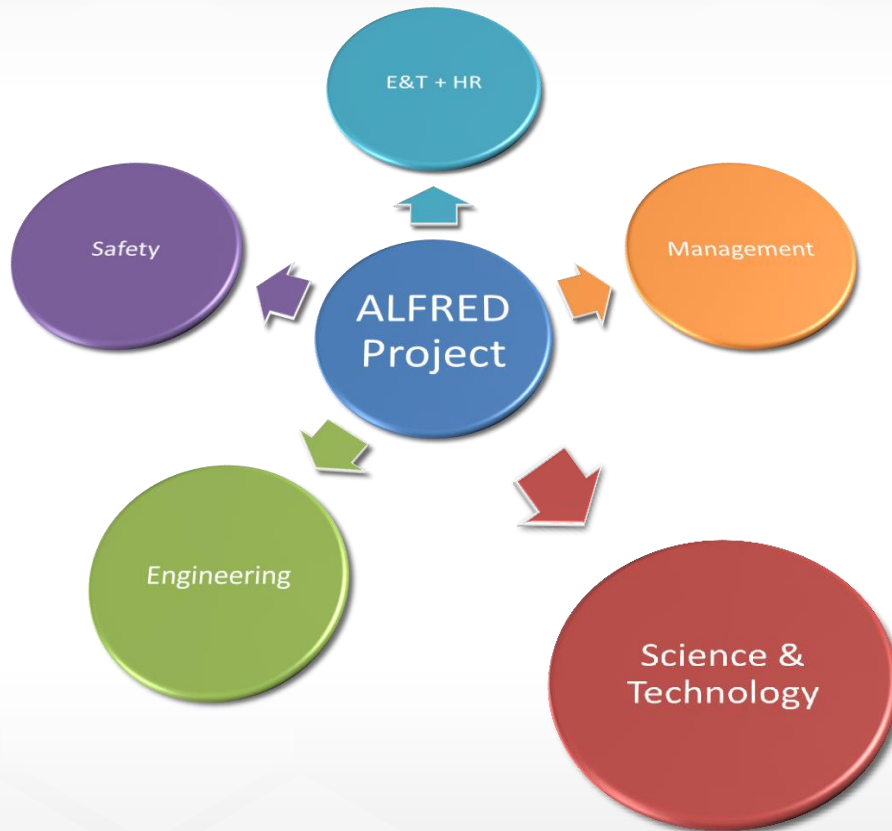
Five areas of action



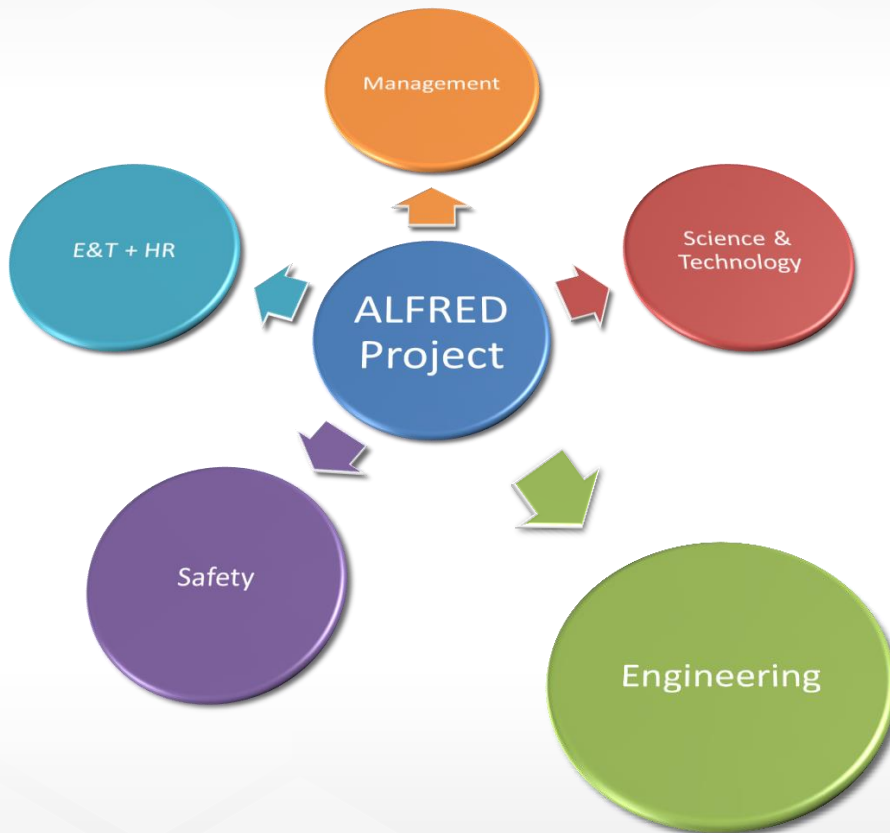
Science & Technology

- Assess the remaining scientific and technological issues permitting the realization of the D-RI
- Qualify solutions (materials, components, systems) for short-term applications
- Research and develop (including in outsourced service) advanced solutions (materials, components, systems) for long-term applications

EURATOM funds integrate and complement the **national public and private funds** for more than 15 years, summing up to more than **100 M€**



Five areas of action



Engineering

- Assess the design of the facilities meant to support ALFRED
- Construct the largest set of top-notch facilities on the HLM technology
- Integrate RD&Q evidences in the ALFRED design
- Train a prepared supply chain made of EU industry towards excellence
- Construct ALFRED as a unique facility for RD&Q in support of future LFRs

Whilst the design of all the facilities of the RI (including ALFRED) is performed by means of a combination of national and private contributions supported through **EURATOM funds**, the construction of the facilities has relied and will rely on **ESIF**

Five areas of action



Safety

- Collect evidences on the unparalleled safety features of LFRs
- Demonstrate the performances in an early dialogue with safety authorities
- File the application for ALFRED siting in Mioveni
- File the application for ALFRED construction and operation
- Involvement of the population through public consultations

The main activities are being performed as part of **national programs**, with the in-kind support of involved organizations. **EURATOM funds** are exploited in parallel to upgrade the necessary regulation frame exchanging best practices and recommendations

Five areas of action



Education & Training + Human Resources

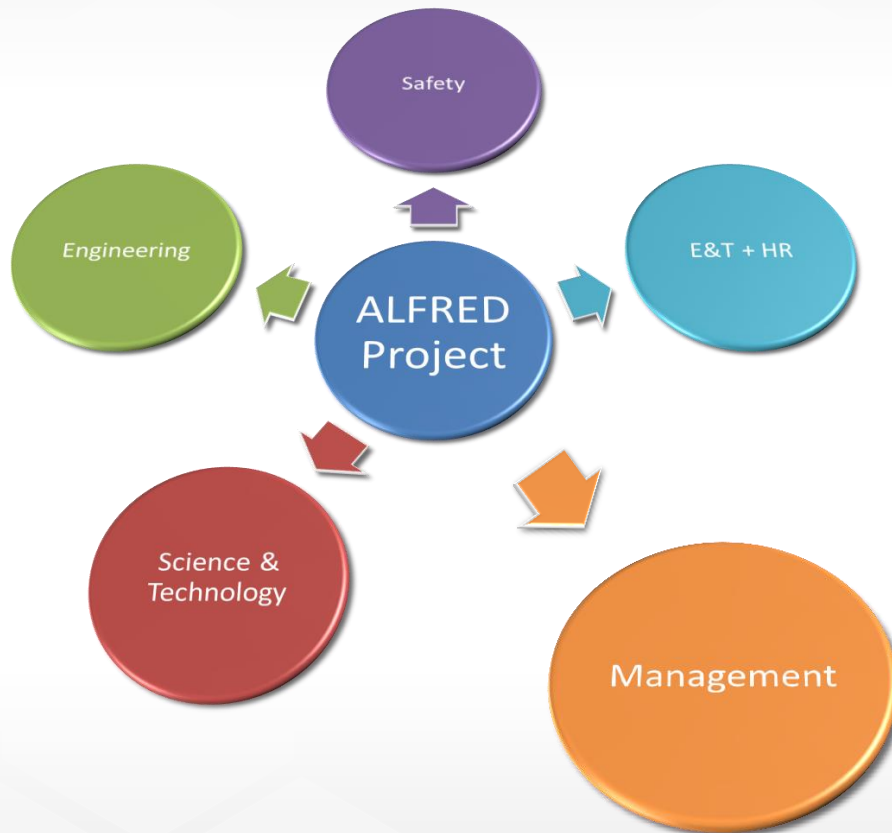
- Develop specific E&T courses and programmes for preparing the next generations of experts to work, research and operate in the HLM field
- Support industry and safety authorities in setting ready for the deployment of LFRs in a EU-wide leading position
- Support and coordinate the recruitment of talents to implement the Project

National initiatives are tackling the alignment of existing E&T programs to the needs ALFRED-specific courses.

The coordination efforts are supported through **EURATOM funds**, thereby ensuring a synergic and integrated work



Five areas of action



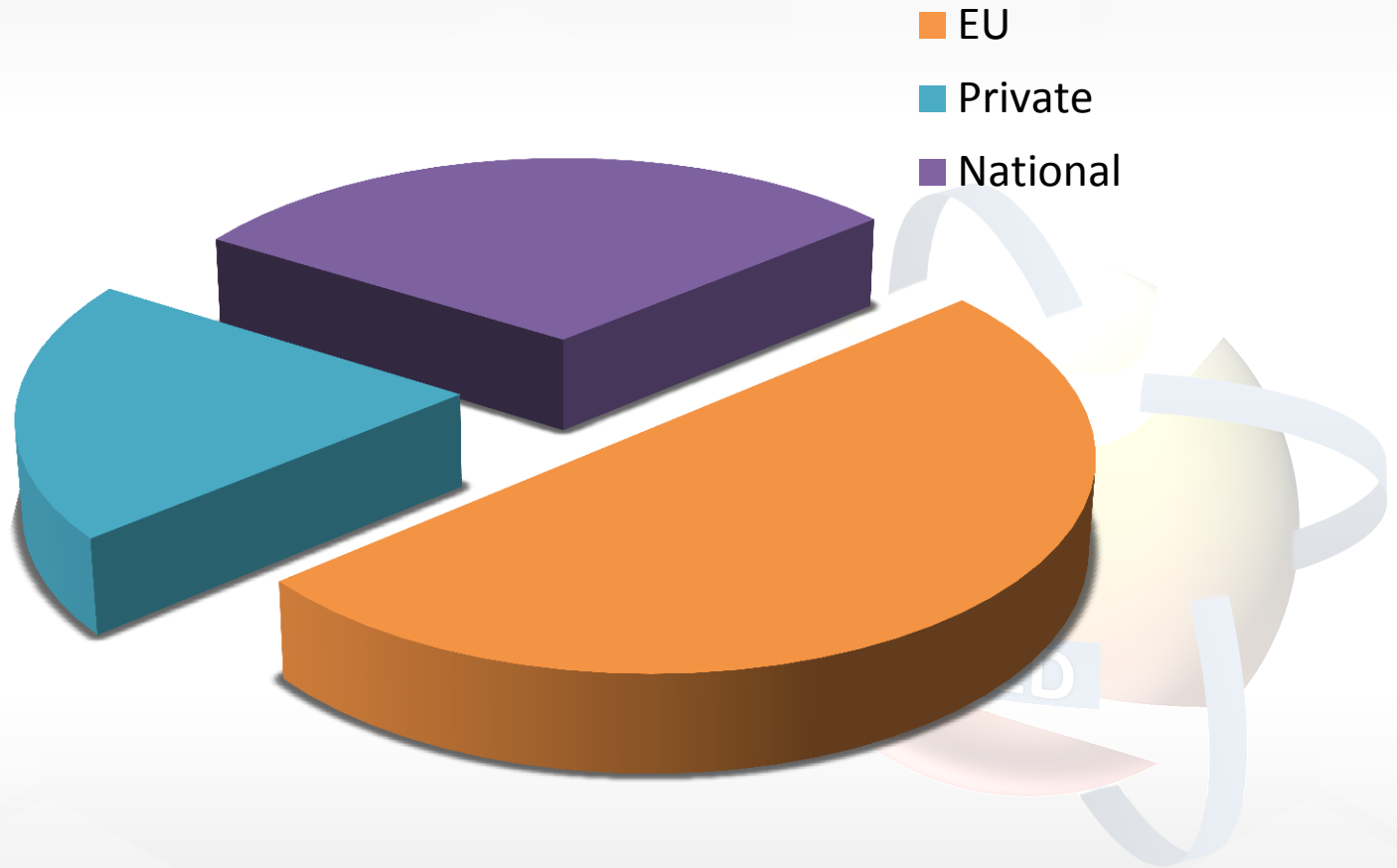
Management

- Coordinate the efforts of FALCON members and partners
- Stimulate and support joint programs among the countries of involved actors
- Supervise the evolution of project costs and draw the financial strategies
- Trigger and sync communication – within and outside the Consortium
- Open and maintain dialogue with the public for transparent information

All activities are presently being performed through **in-kind contributions** of FALCON members.

With iCRADLE entering the ESFRI Roadmap, **InfraDev H2020** funds will be accessible for supporting the Preparatory Phase.

Synergic funding for ALFRED



Synergic funding for ALFRED



EU Funding Scheme

ESIF

Eligible costs:
R&D
equipment,
infrastructures

H2020

EURATOM

Eligible cost:
staff,
equipment,
operation costs

InfraDev

Eligible costs:
preparatory
activities



Budget for the Viability Phase



Thematic area	Major Step	Estimated Budget	Funding Sources
Governance, Management, Financing	ALFRED as Major Project in Romania	1 M€	National Contributions
Research, Development, Qualification	Open issues addressed	25 M€	EU H2020 projects National Contributions Private Contributions
Safety, Siting, Licensing	Preliminary siting and licensing	2 M€	National Contributions
Engineering, Procurement, Construction	Lead Center of Excellence set in Mioveni	140 M€	EU Structural Funds National Contributions Private Contributions
Human Resources, Education, Training	E&T program definition and planning	1 M€	National Contributions EU H2020 projects

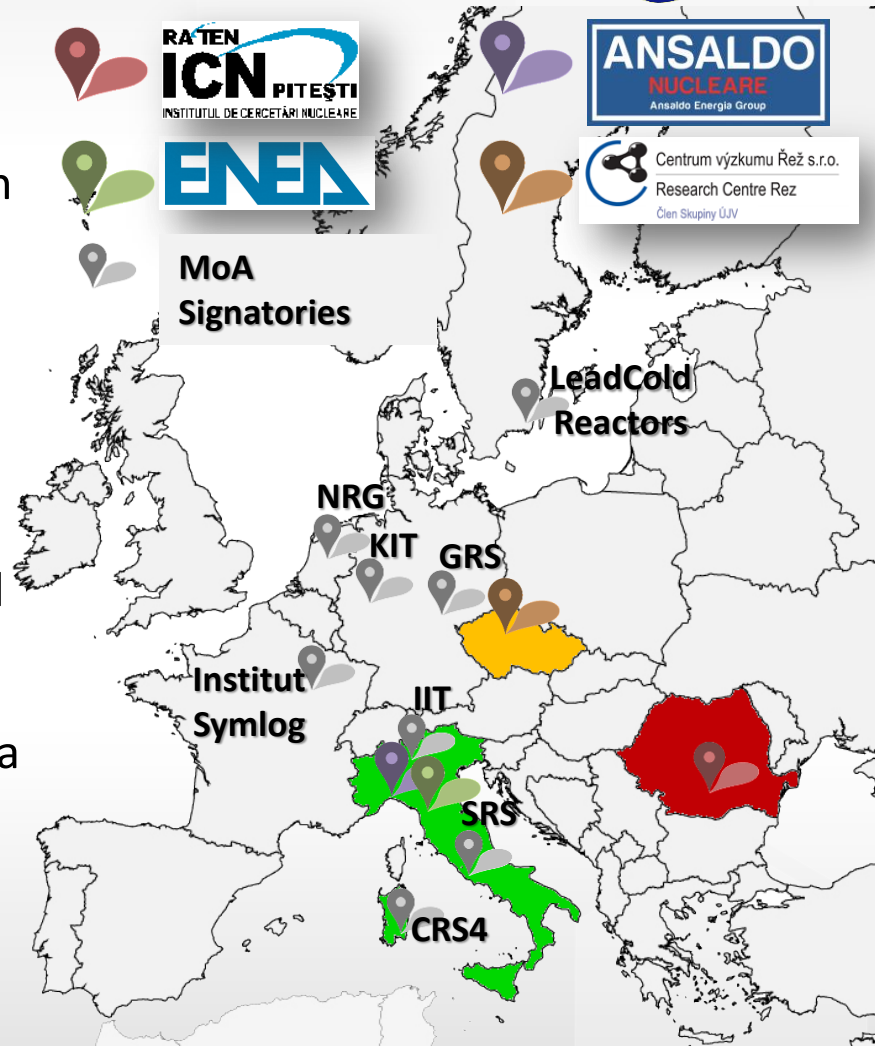


Thank you for your attention

Status of FALCON Consortium



- Short-term objectives:
 - Firm commitment to ALFRED as a Major Project in Romania
 - Support to iCRADLE for the inclusion in ESFRI Roadmap
 - Finalization of the feasibility study for the LFR demonstrator ALFRED
- Recent actions:
 - Clarifications about the **role of ALFRED**
 - Identification of R&D objectives and definition of a **Distributed Research Infrastructure**
 - Inclusion of ALFRED in Sud Muntenia **Smart Specialization Strategy**
 - Definition of a **roadmap** and an implementation plan in a phased approach



Sud Muntenia

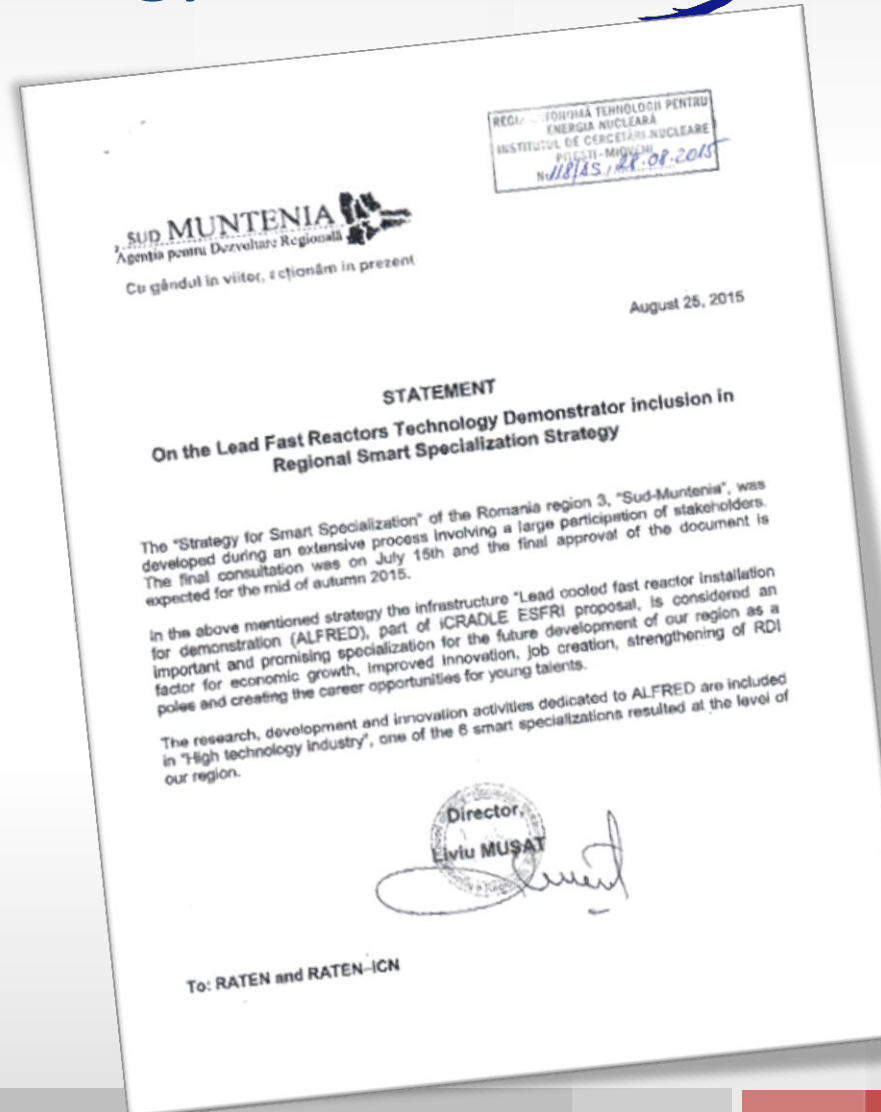
Smart Specialization Strategy



- On **July 15**, as a consequence of the final consultation of **Smart Specialization Strategy** of Romania 3 region,

*«The research, development and innovation activities dedicated to **ALFRED** are included in **High technology Industry** [...] smart specialization [...] of the region»*

- ALFRED was considered a factor for economic growth, improved innovation, job creation, strengthening of RDI poles and creating the career opportunities for young talents.



Ongoing R&D activities



	Funding source	Activities
ALFRED design	<i>IT national program</i>	optimization of the primary system design
	<i>FREYA-MYRTE</i>	validation of neutronics codes
	<i>ESNII+</i>	cross-cutting aspects for enhanced safety
	<i>SESAME</i>	TH experiments to characterize HLM flow in LFR subassembly
	<i>H2020 proposal</i>	qualification of passive DHR providing against freezing
ALFRED Licensing	<i>IT national program</i>	early dialogue with safety authorities for the pre-licensing phase
	<i>RO national program</i>	preparatory activities for the site characterization
	<i>ARCADIA</i>	ALFRED general design guidelines and general design criteria
	<i>SEARCH-MYRTE</i>	investigation of fuel-coolant interaction and of fission products retention in lead
LFR Technology	<i>IT national program</i>	characterization and qualification of coating protections
	<i>CZ national program</i>	development of the primary pump
	<i>MATISSE</i>	material testing in HLM environment
	<i>H2020 proposal</i>	characterization of austenitic steels and welding methods