Nuclear Innovation 2050

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UK Nuclear Academics Meeting
September 5, 2018

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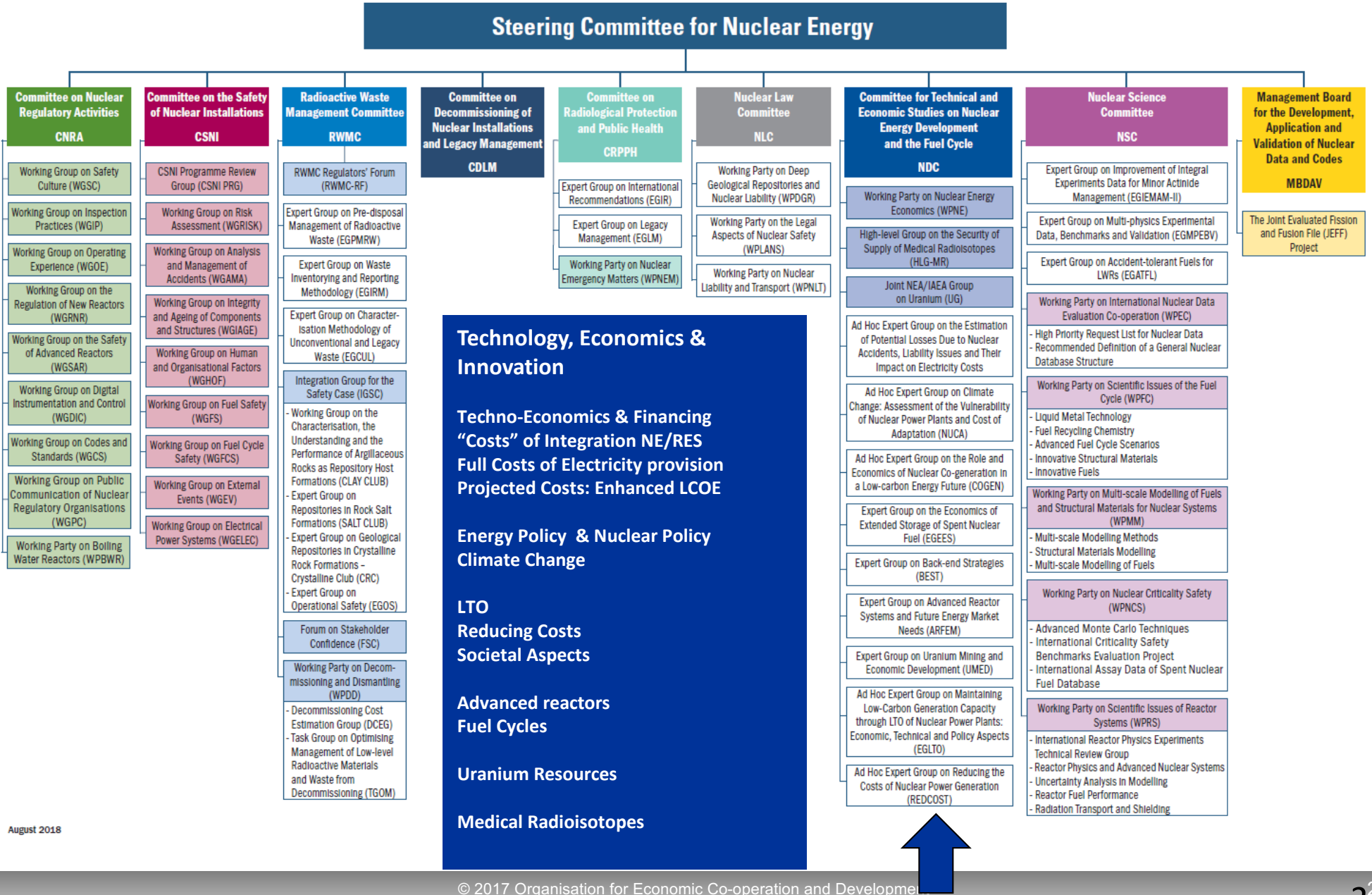
Structure of Nuclear Energy Agency Committees and Subsidiary Bodies

NEA NUCLEAR ENERGY AGENCY



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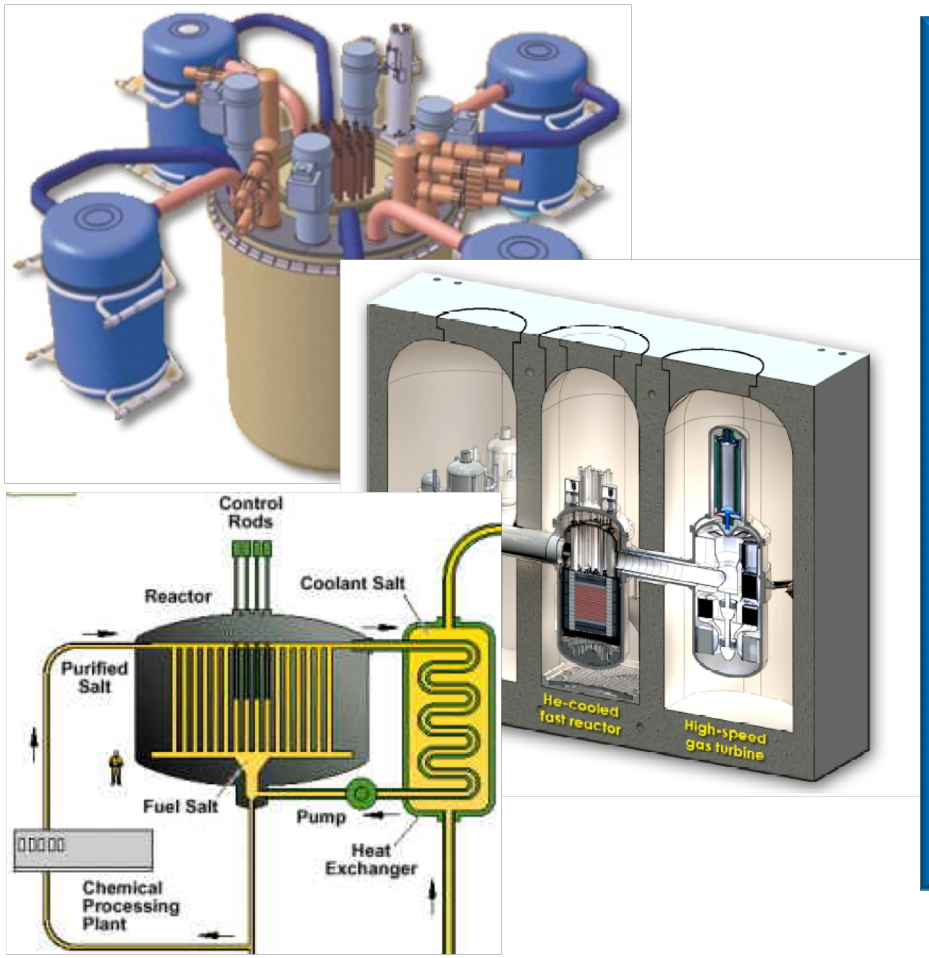
Nuclear Innovation 2050, Identifying Key Nuclear R&D Needs and Innovation Pathways



What technologies will be needed in 10 years? 30 years? 50 years?

What R&D is needed to make these technologies available?

How do we regain the ability to push innovation into application?

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Nuclear Innovation Headwinds

INFRASTRUCTURE

- Unlike many other areas of innovation, nuclear technology often requires the availability of special facilities (test reactor, hot cells, test loops, etc.) and nuclear-skilled workers.
- Tests using fissile materials require appropriate facilities, trained workforce, security and licencing.
- Much of the global infrastructure was built more than 40 years ago and is shrinking steadily.

REGULATORY

- The job of today's nuclear regulatory organisations today is to assure public safety, not to promote innovation.
- Regulators in most countries will not actively participate in technology development – but will wait for the finished technology to be presented for approval.
- Regulators are often perceived by researchers and industry as a barrier to innovation.

COST

- Nuclear technology research budgets have been under pressure in most countries for the last decade.
- Nuclear technology often requires an order-of-magnitude increase in funding to transition between research and engineering-scale demonstration.
- The cost and risk of nuclear technology innovation has become prohibitive in many countries.

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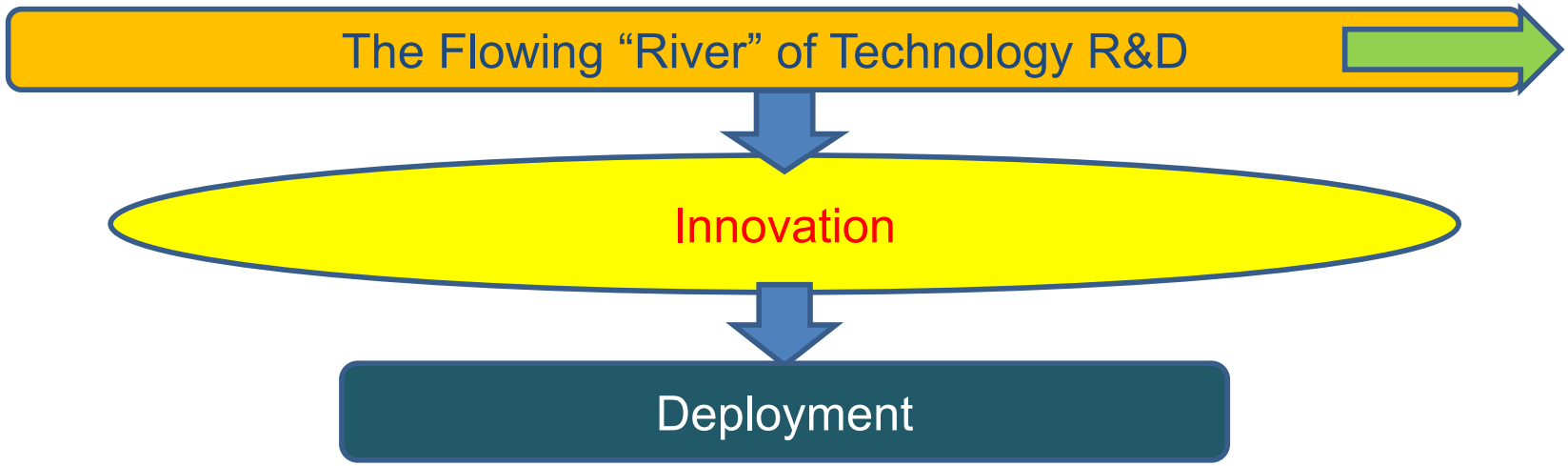
NI2050 CHALLENGE:
How to Move from Research to Innovation

- Most countries have ongoing technology R&D in both government and in the private sector.
- Financial constraints, deployment timelines, infrastructure limitations, and other factors inhibit the progression from R&D to the successful deployment of innovation.



Nuclear Innovation 2050

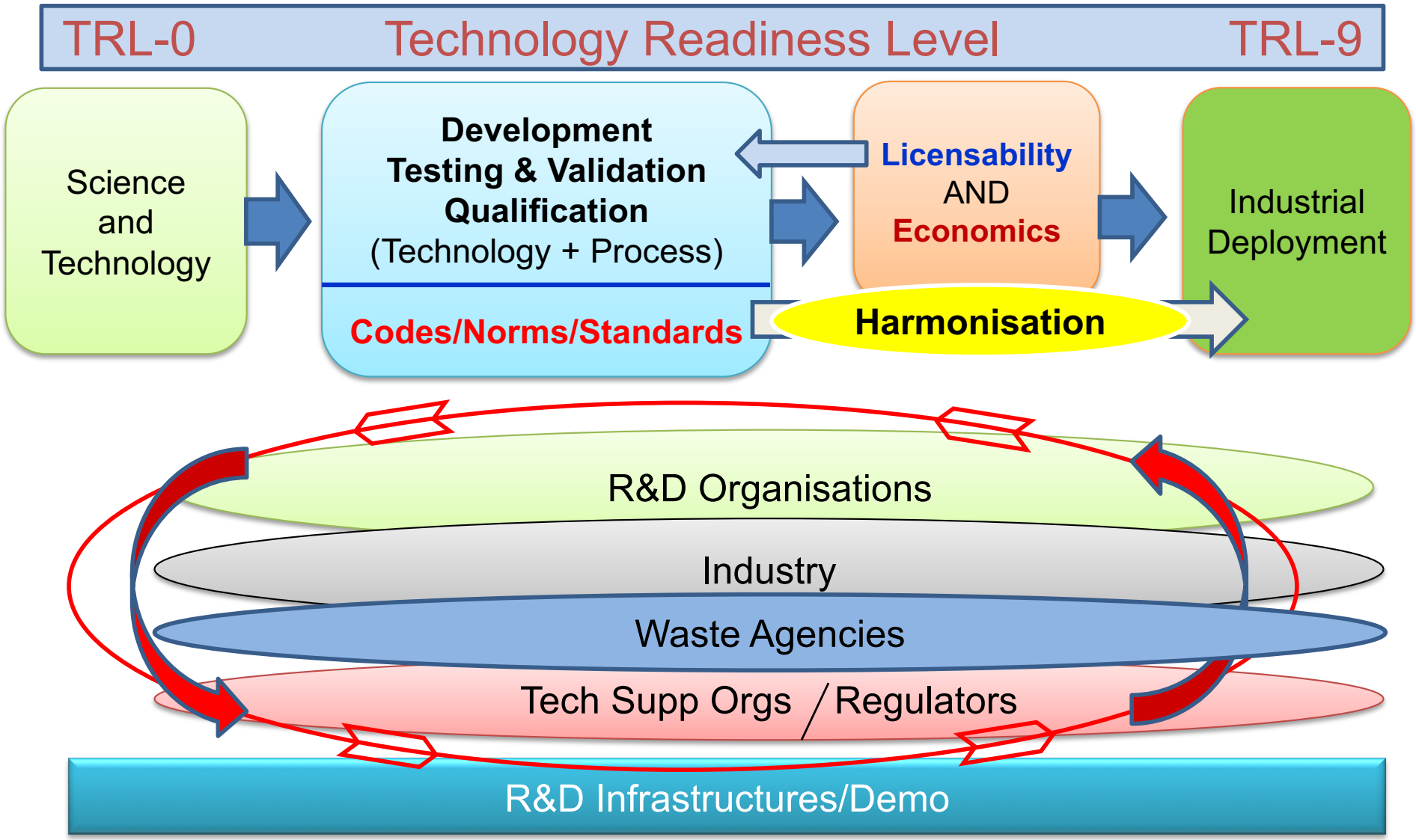
Broad NEA Initiative

Building a co-operative framework enabling innovative fit-for-purpose nuclear fission technologies

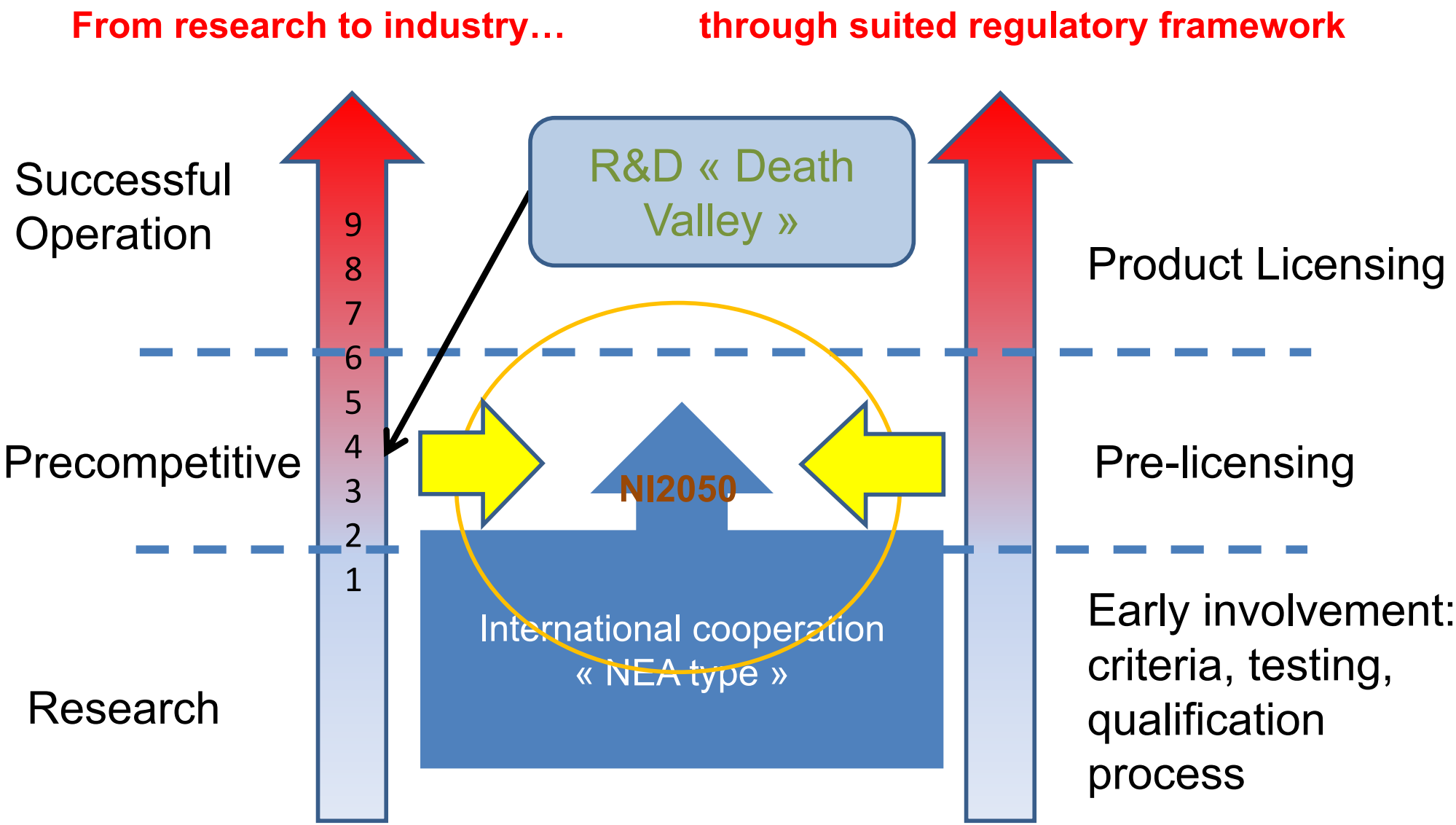
Aim

to accelerate R&D and market deployment
of innovative nuclear fission technologies
to contribute to a sustainable energy future

NI2050 CONCEPT:
From Science to Market Deployment



Technology and Licensing Readiness



NI2050 “Templates” Topics (January 2018)

Target Area/TOPIC	Leaders	Groups Engaged
Accident Tolerant and Advanced Fuels	K. Pasamehmetoglu, INL N. Chauvin, CEA	NSC (EGATFL), CSNI (WGFS)
Severe Accident Knowledge and Management	G. Bruna/D Jacquemain, IRSN	CSNI (SAREF, WGAMA) ETSON, NUGENIA
Passive Safety Systems	G. Bruna/JM Evrard, IRSN	CSNI (WGAMA) ETSON
LTO Gen II 80 Years: Ageing Management	A. Al Mazouzi, EDF	CSNI (WIAGE) NUGENIA
Advanced Materials (Gen IV)	L. Malerba, SCKCEN	NSC (WPFC, WPMM), EERA JPNM, GIF
Advanced Components (Gen IV)	H. Kamide, JAEA	GIF, CSNI/CNRA (GSAR/WGRNR)
Fuel Cycle Chemistry/Recycling (P&T)	H. Ait Abderrahim, SCKCEN	NSC (WPFC), CSNI (WGFCS)
Heat Production and Cogeneration	D. Hittner, NC2I	PRIME/GEMINI (NC2I, NGNP, JAEA, KAERI)
Modelling and Simulation	T. Valentine, ORNL	NSC (WPMM, EGMPEBV)
Measures and Instrumentation	G. Bignan, CEA	ANIMMA, NSC Wkshp
Infrastructures and Demos	All	NSC, CSNI (ia TAREF), DB (RTFDB)

NI2050 "Templates" Topics (January 2018)

Target Area/TOPIC	Leaders	Groups Engaged
Accident T		
Severe		
Pas		
LTO		
Advar		NM, GIF
Advanc		R)
Fuel Cycle		
Heat Pro		AEA,
Moc		
Measu		
Infra		DB)

OECD Nuclear Energy Agency NEA

NI2050 TOOL: Template

- **1. Justification of the selection**
  Based on a list of selection criteria, explain why this topic is an opportunity for innovation
- **2. The issue (Challenge/Opportunity) to tackle and objectives to reach**
  Explain what are the problems to be solved and the associated objectives to reach.
- **3. What is done/exist already, who is doing what, what are the means (resources and infrastructures), what are the bottlenecks, why does it not go faster…**
  In most cases, R&D and/or demonstration/validation/qualification programmes and infrastructures already exist and can be briefly described. The reason why more is necessary, identifying in particular difficulties, delays and bottlenecks, justifying the inclusion of the topic in NI2050, should be explained.
- **4. What can be done to improve/accelerate (ia through cooperation)**
  Explain conceptually how to go beyond what is done under 3, what are the game changers to overcome difficulties, delays, bottlenecks, to improve and accelerate R&D and market deployment.
- **5. Action plan and necessary means (resources and infrastructures)**
  Provide an Plan of Actions (scope, sequence and timeline) to implement the concepts described in 4. This should allow the extraction of concrete projects, with definition of necessary means and infrastructures for implementation.

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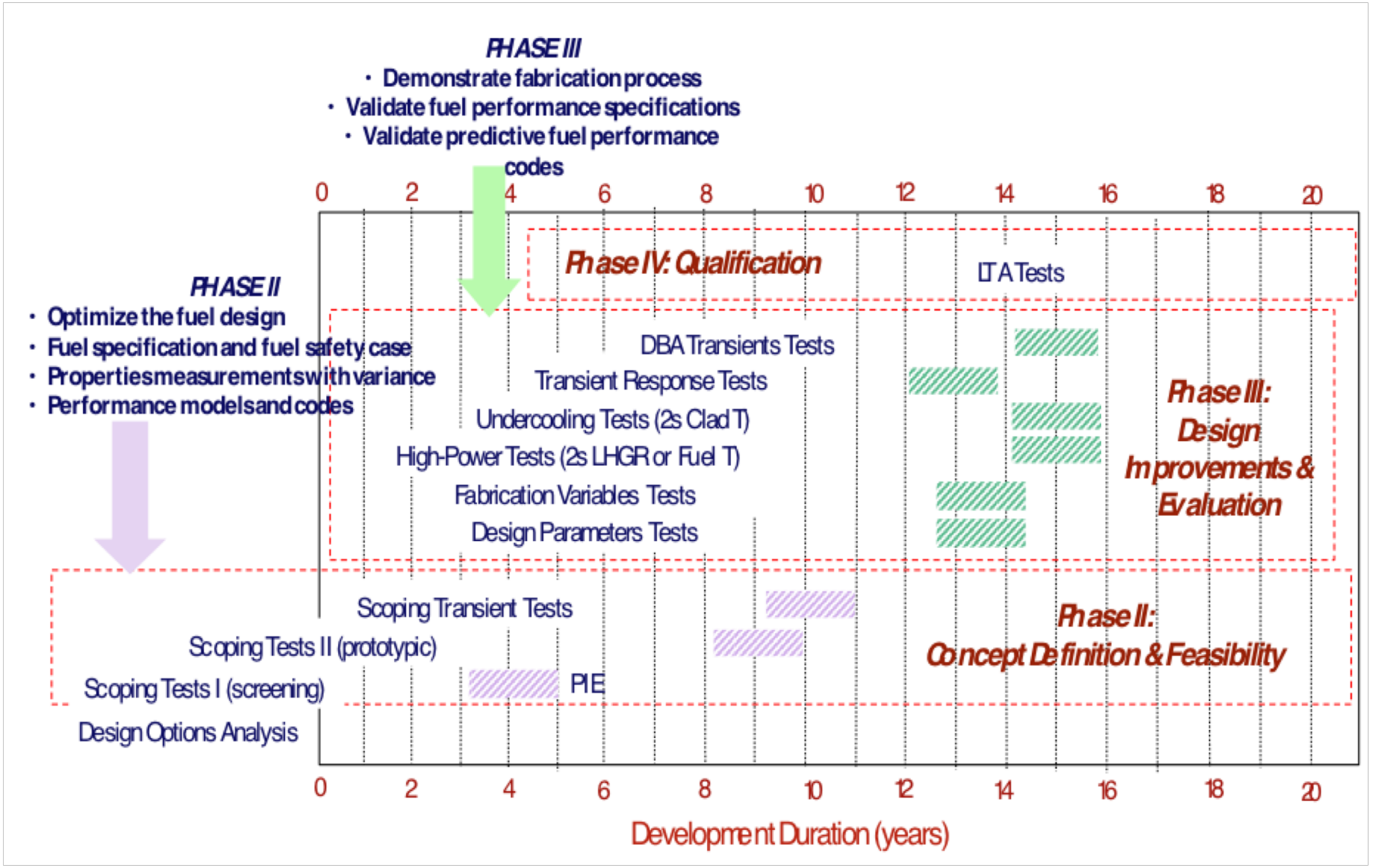
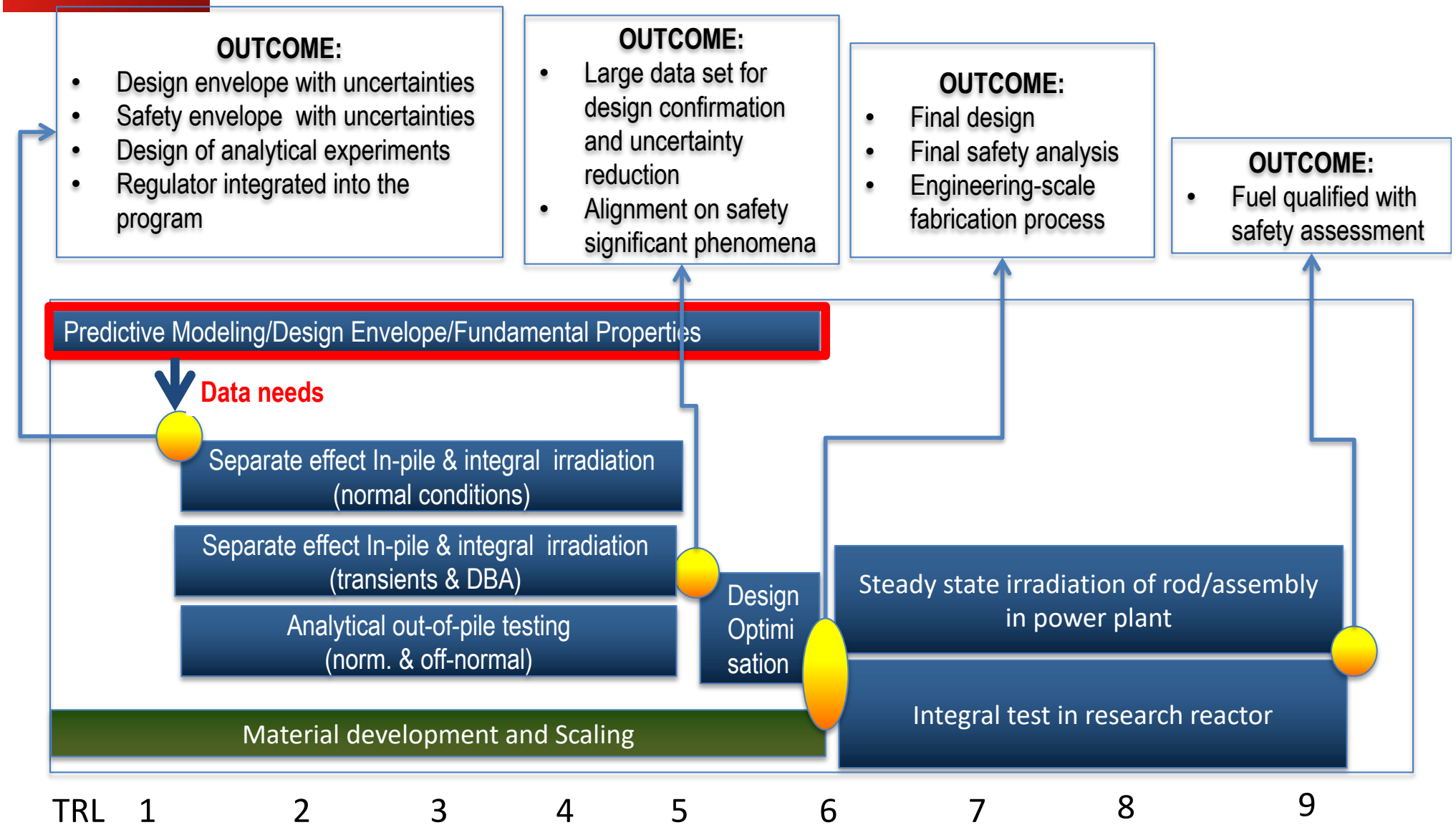
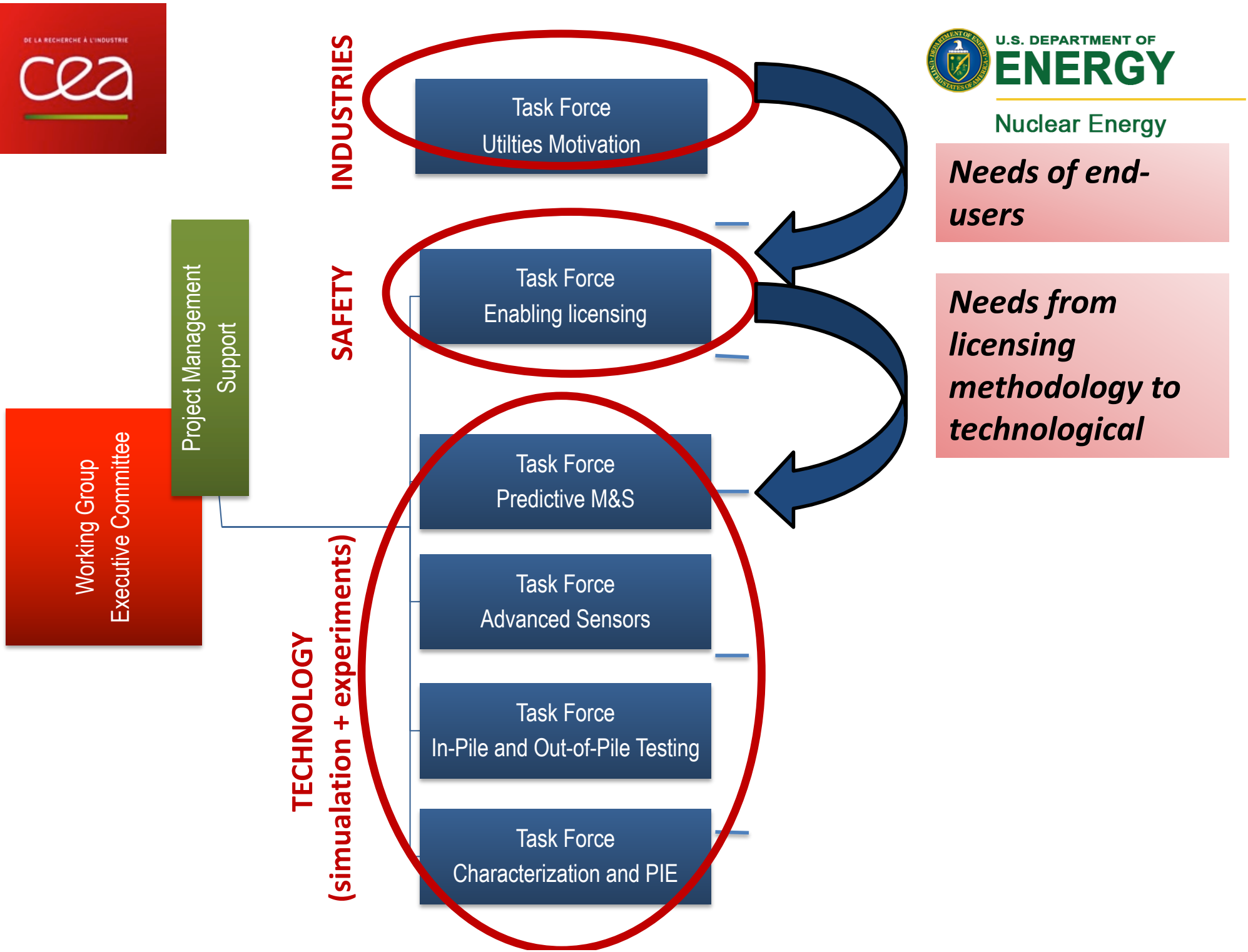
TRADITIONAL QUALIFICATION APPROACH

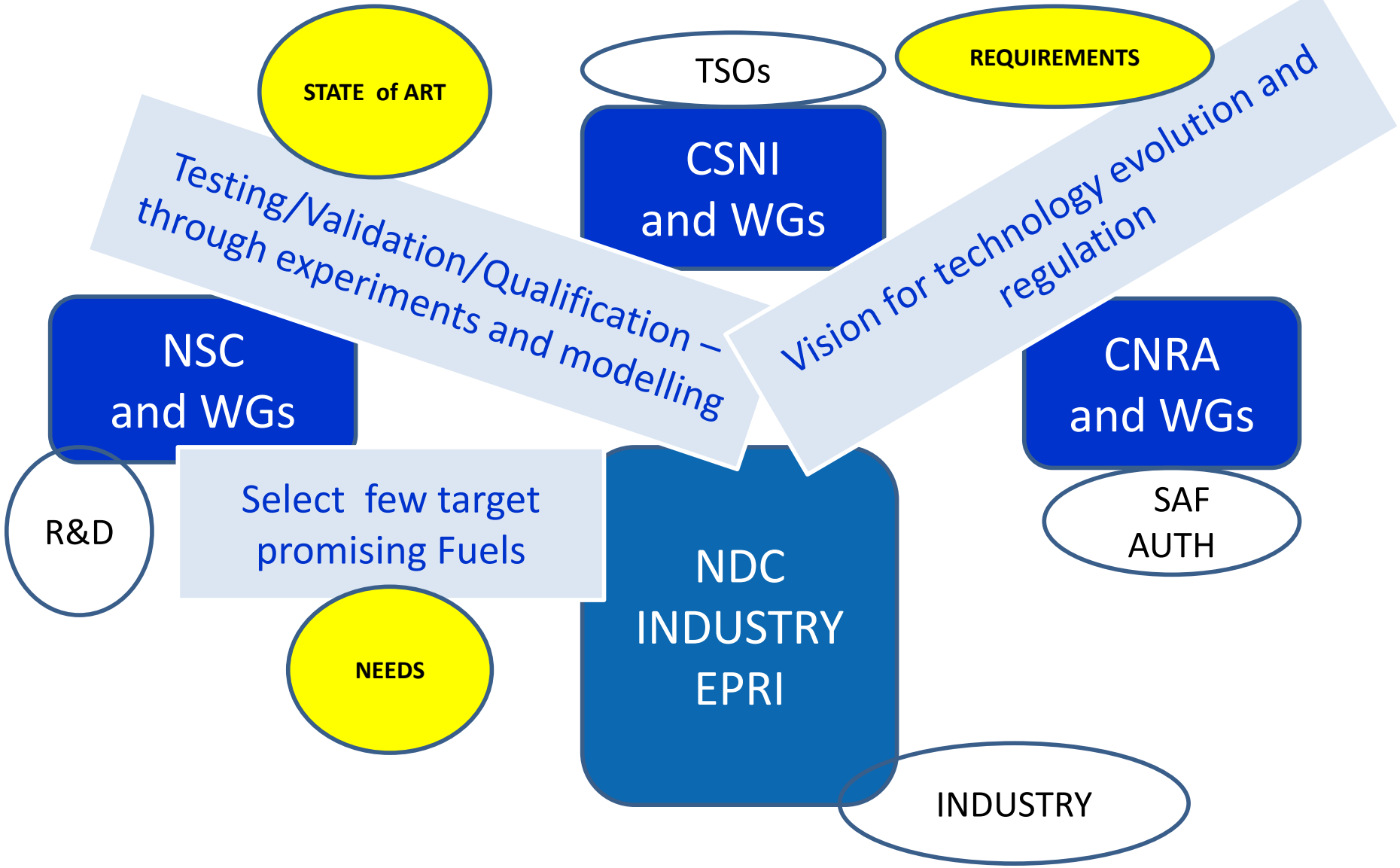


NOTIONAL NEW PARADIGM




INDUSTRIES
Task Force
Utilties Motivation
SAFETY
Task Force
Enabling licensing
Project Management
Support
Working Group
Executive Committee
Task Force
Predictive M&S
Task Force
Advanced Sensors
Task Force
In-Pile and Out-of-Pile Testing
Task Force
Characterization and PIE
TECHNOLOGY
(simulation + experiments)
U.S. DEPARTMENT OF
ENERGY
Nuclear Energy
Needs of end-users
Needs from licensing methodology to technological

« NI2050 Fuels » and existing NEA Groups



Thank you for your attention!