

NEA NI2050 Initiative
ADV PANEL JAN 2016

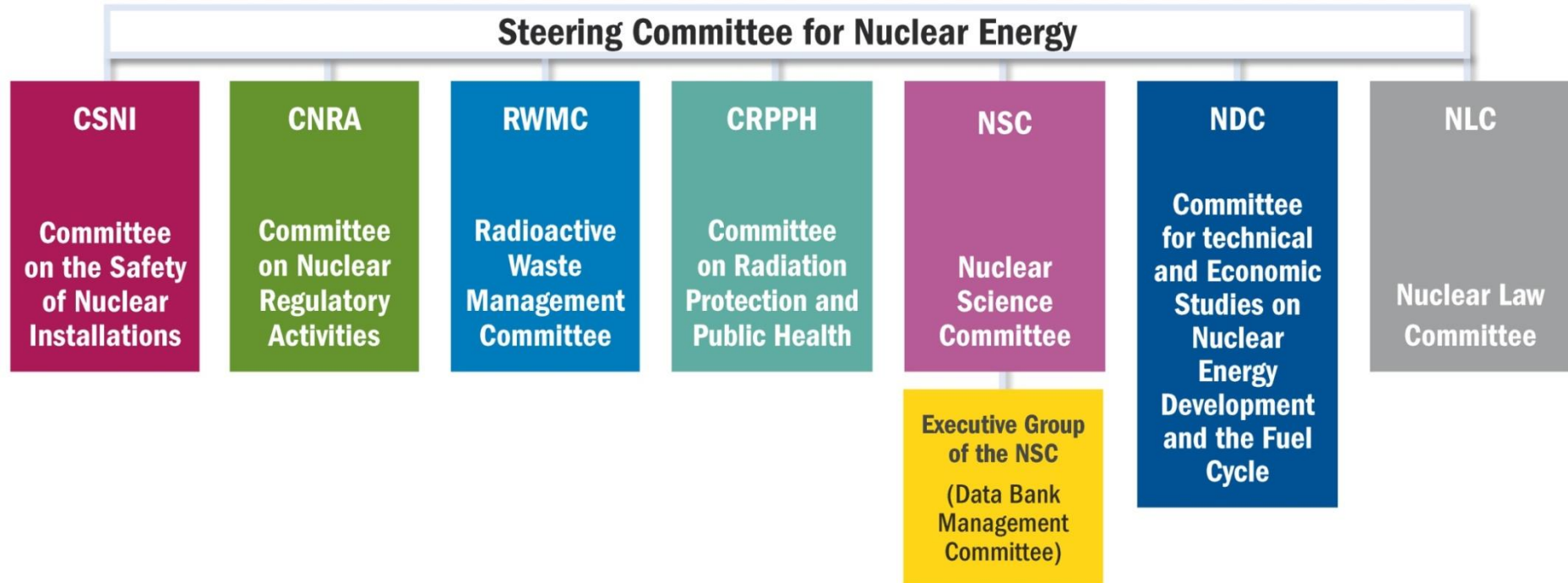
Overview of Nuclear Science Activities related to NI2050

**Jim Gulliford,
Head of Division of Nuclear Science**

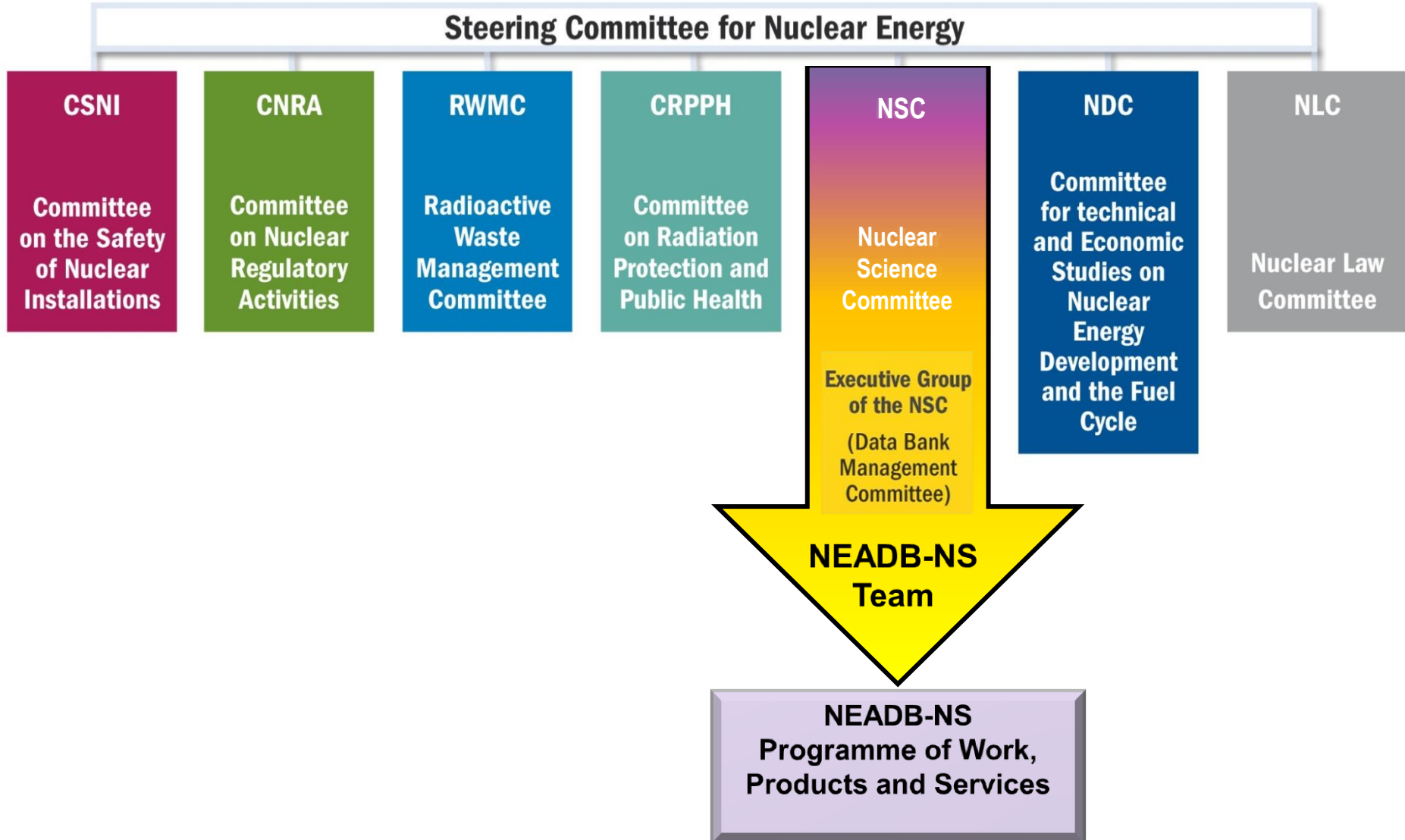
Outline

- Nuclear Science Activities
- New Activities related to Innovation & Future Needs
 - Minor Actinide Management
 - Accident Tolerant Fuels
 - Multi-physics & Multi-scale Modelling
 - Review of Experimental Needs
- Proposal for Multinational Education & Innovation Network

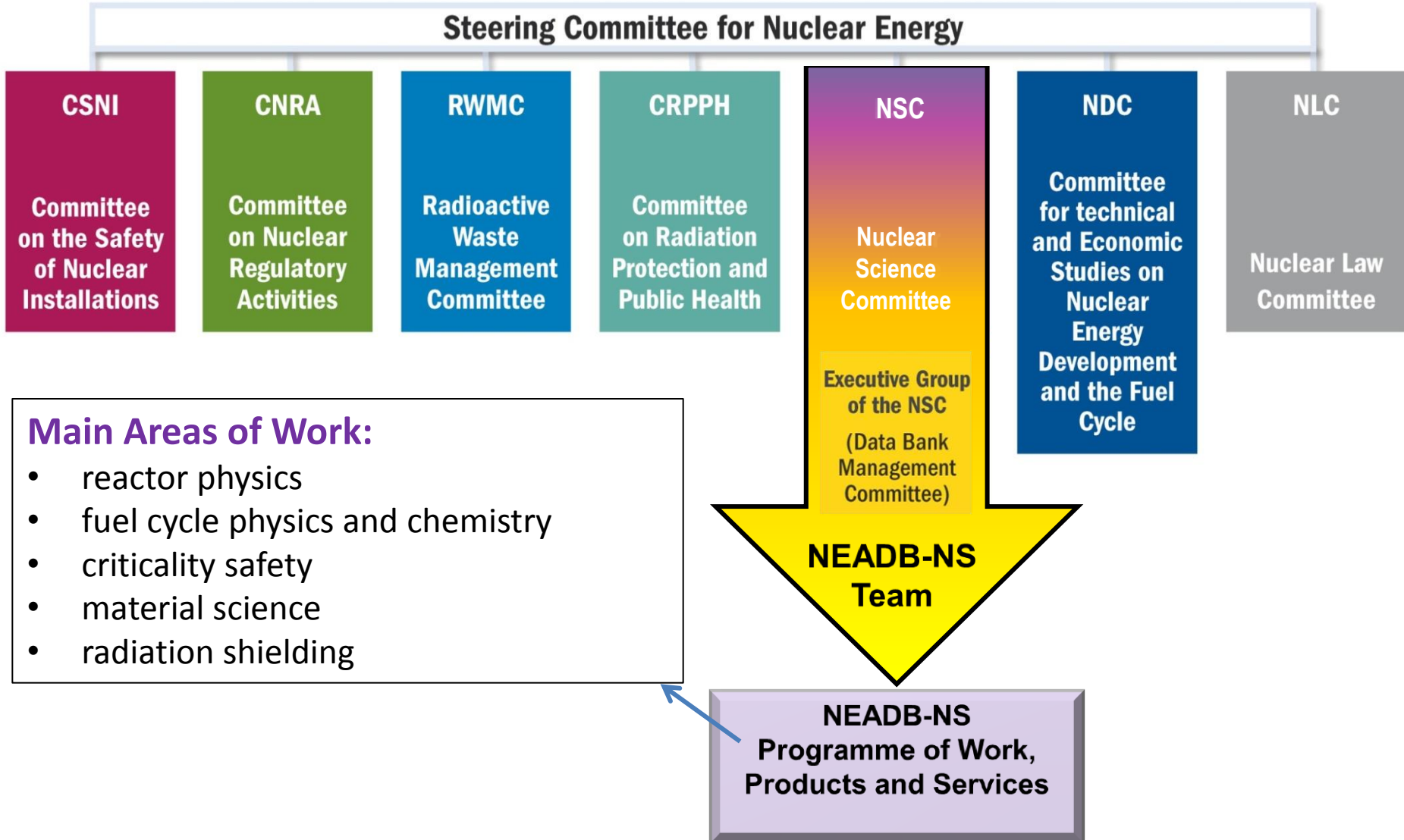
NEA Committees

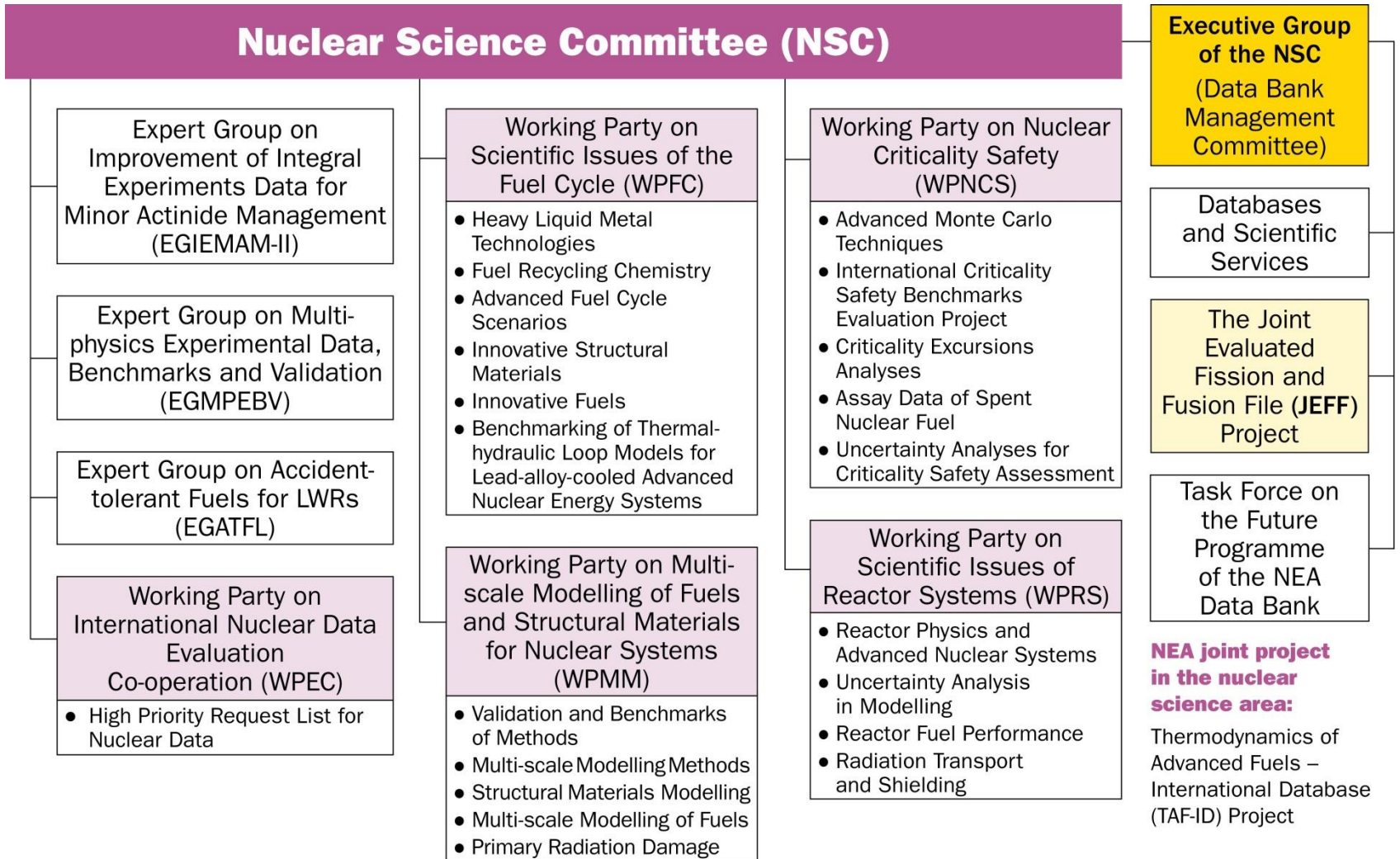


Nuclear Science-Data Bank Products & Services



Nuclear Science-Data Bank Products & Services (1)





Nuclear Science Committee (NSC)

Expert Group on Improvement of Integral Experiments Data for Minor Actinide Management (EGIEMAM-II)

Expert Group on Multi-physics Experimental Data, Benchmarks and Validation (EGMPEBV)

Expert Group on Accident-tolerant Fuels for LWRs (EGATFL)

Working Party on Scientific Issues of the Fuel Cycle (WPFC)

- Heavy Liquid Metal Technologies
- Fuel Recycling Chemistry
- Advanced Fuel Cycle Scenarios
- Innovative Structural Materials
- Innovative Fuels
- Benchmarking of Thermal-hydraulic Loop Models for Lead-alloy-cooled Advanced Nuclear Energy Systems

Working Party on Multi-scale Modelling of Fuels and Structural Materials for Nuclear Systems (WPMM)

- Validation and Benchmarks of Methods
- Multi-scale Modelling Methods
- Structural Materials Modelling
- Multi-scale Modelling of Fuels
- Primary Radiation Damage

Working Party on Nuclear Criticality Safety (WPNCs)

- Advanced Monte Carlo Techniques
- International Criticality Safety Benchmarks Evaluation Project
- Criticality Excursions Analyses
- Assay Data of Spent Nuclear Fuel
- Uncertainty Analyses for Criticality Safety Assessment

Working Party on Scientific Issues of Reactor Systems (WPRS)

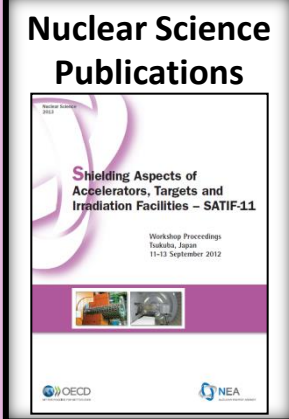
- Reactor Physics and Advanced Nuclear Systems
- Uncertainty Analysis in Modelling
- Reactor Fuel Performance
- Radiation Transport and Shielding

Executive Group of the NSC (Data Bank Management Committee)

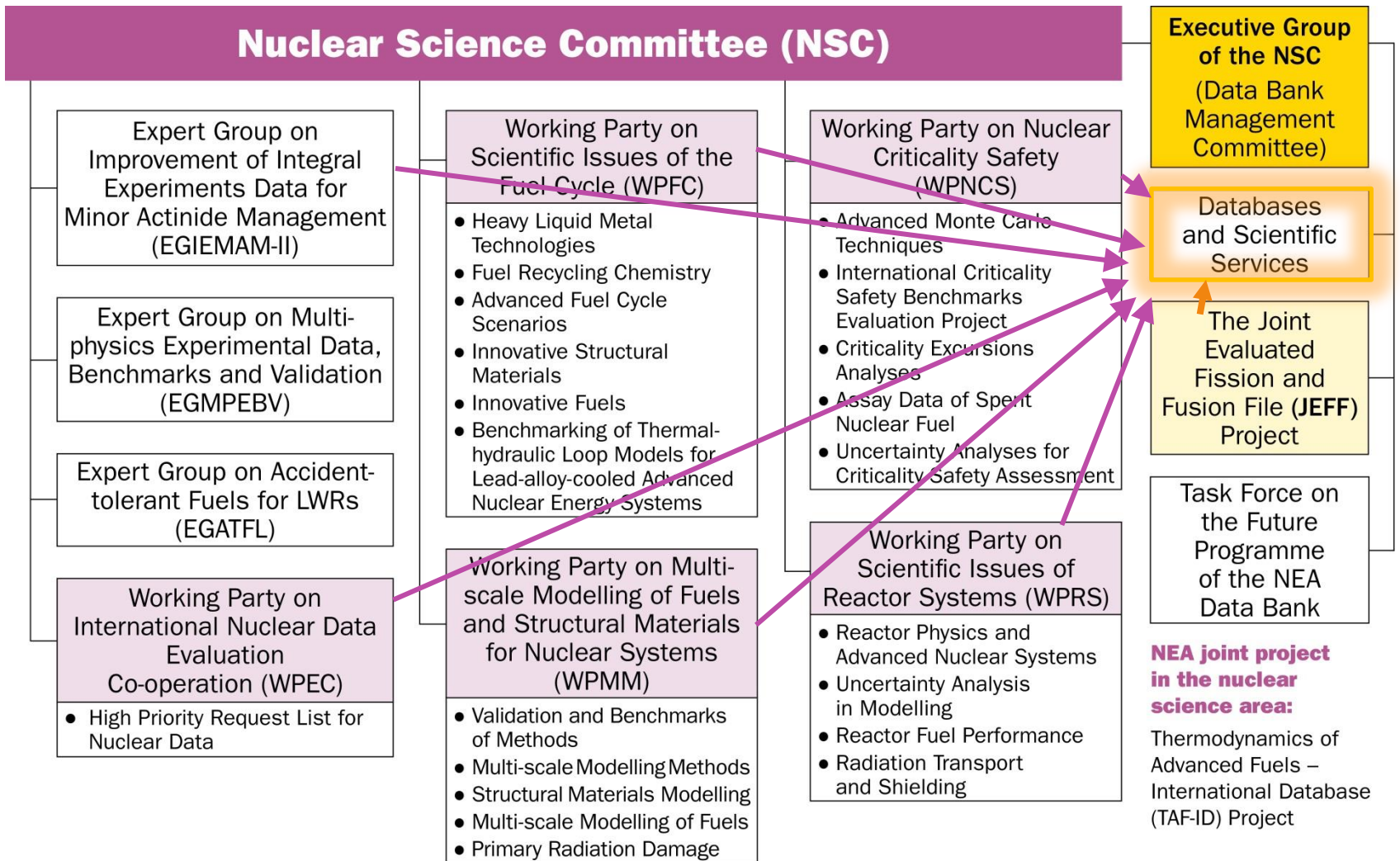
Databases and Scientific Services

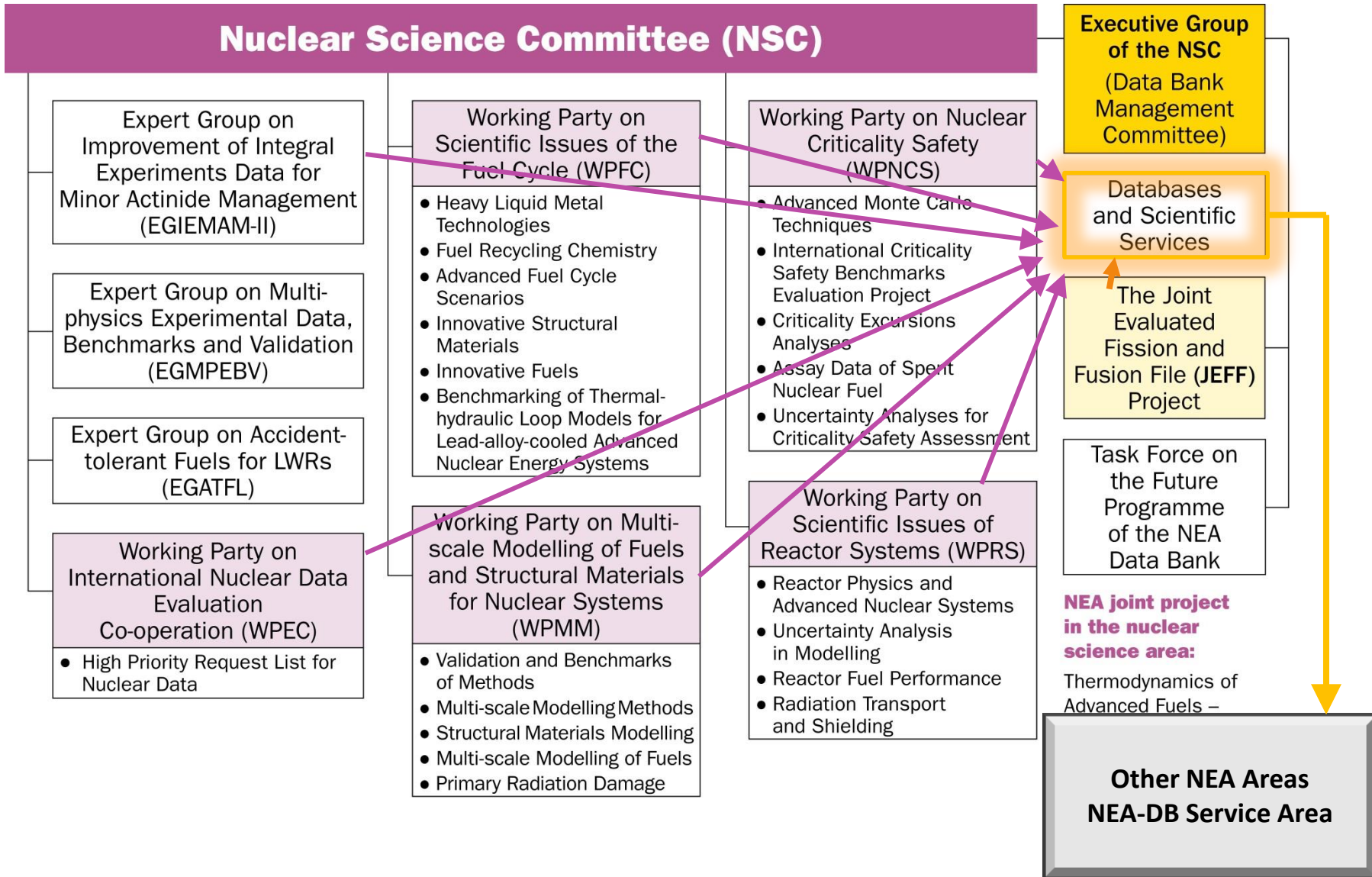
The Joint Evaluated Fission and Fusion File (JEFF) Project

Task Force on the Future Programme of the NEA Data Bank

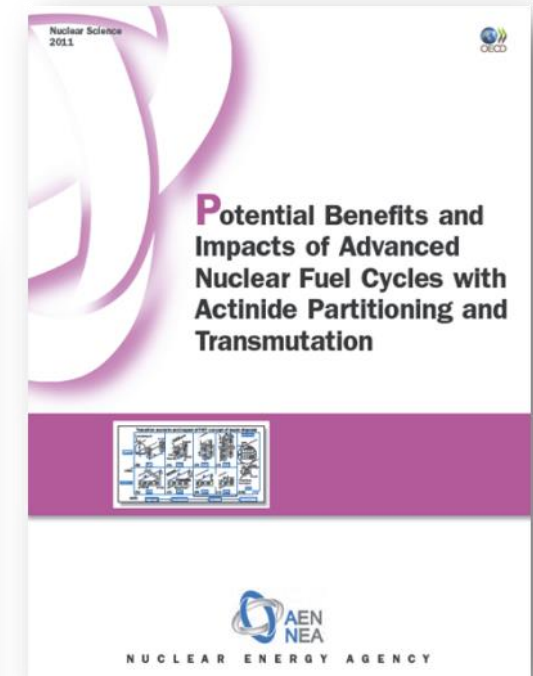
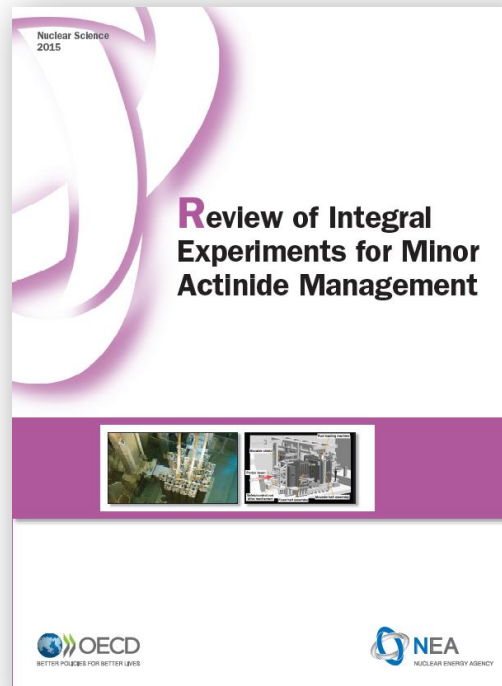
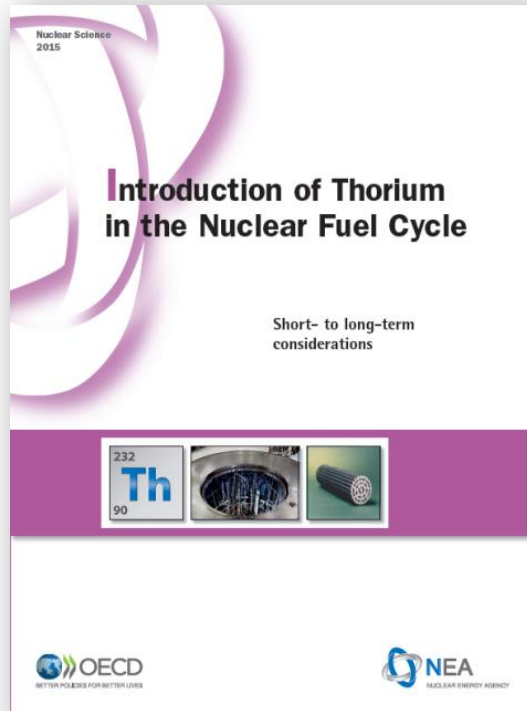


NEA joint project in the nuclear science area:
Thermodynamics of Advanced Fuels – International Database (TAF-ID) Project

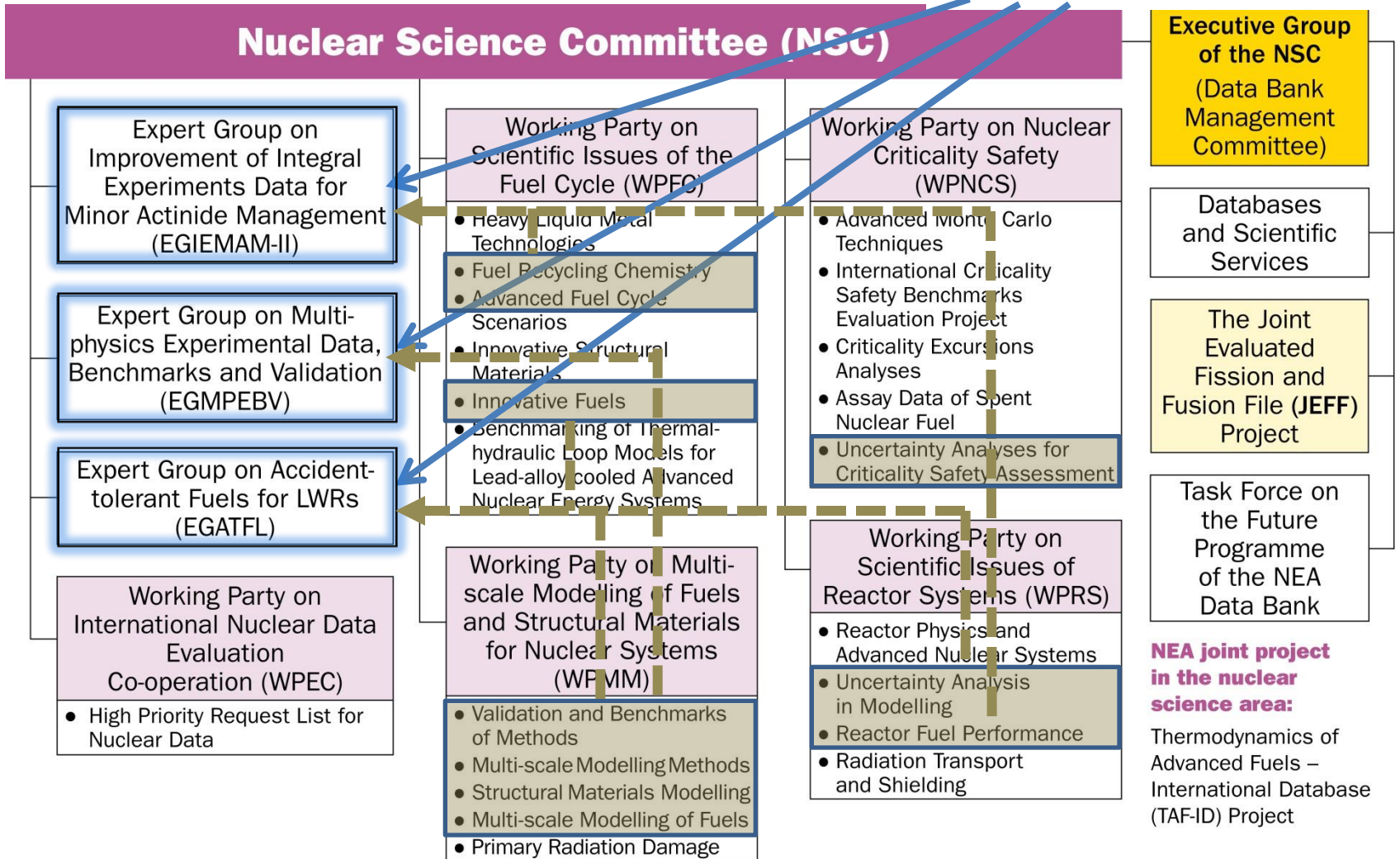




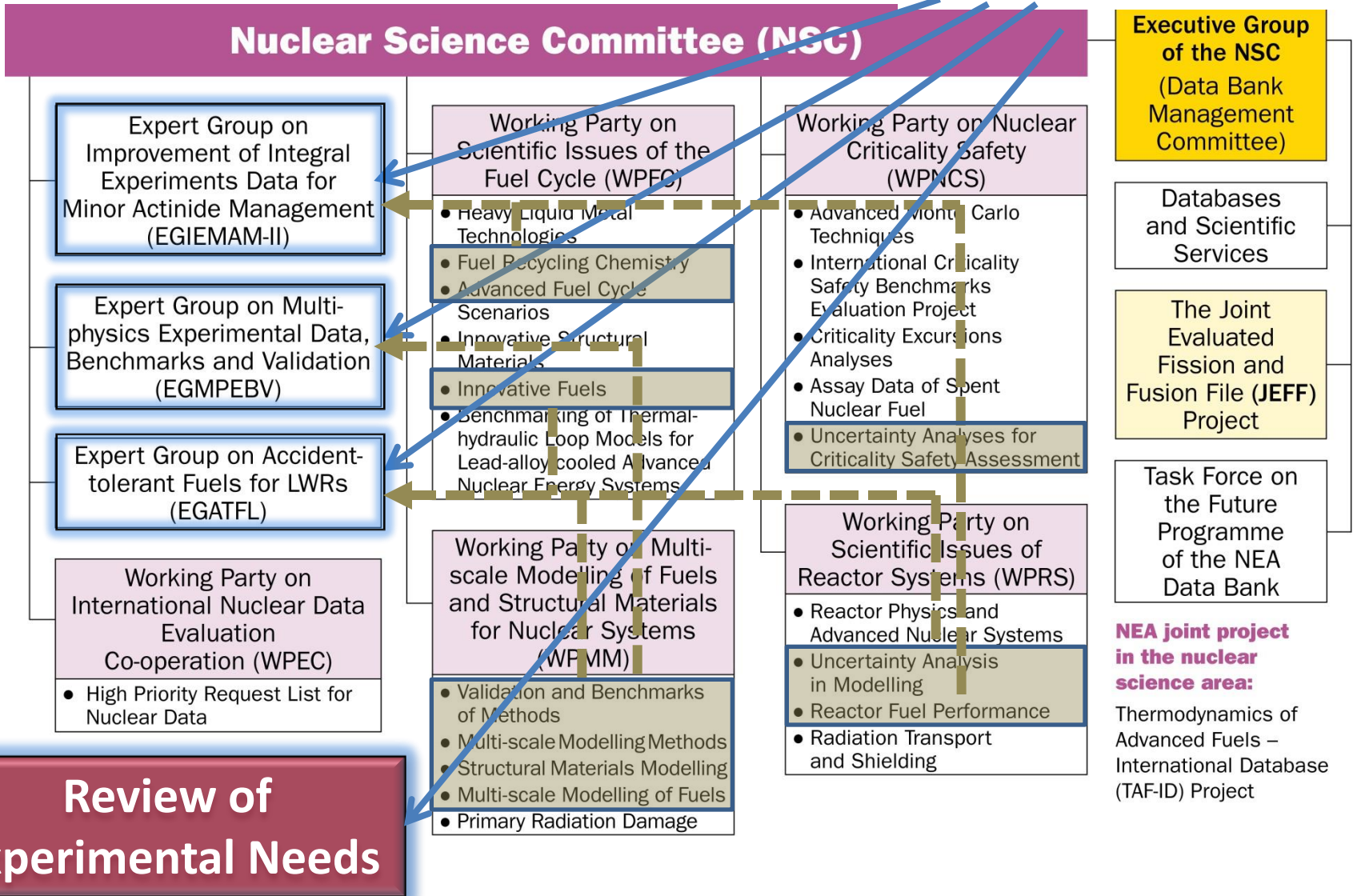
Examples of Nuclear Science Publications related to Innovation



New Activities

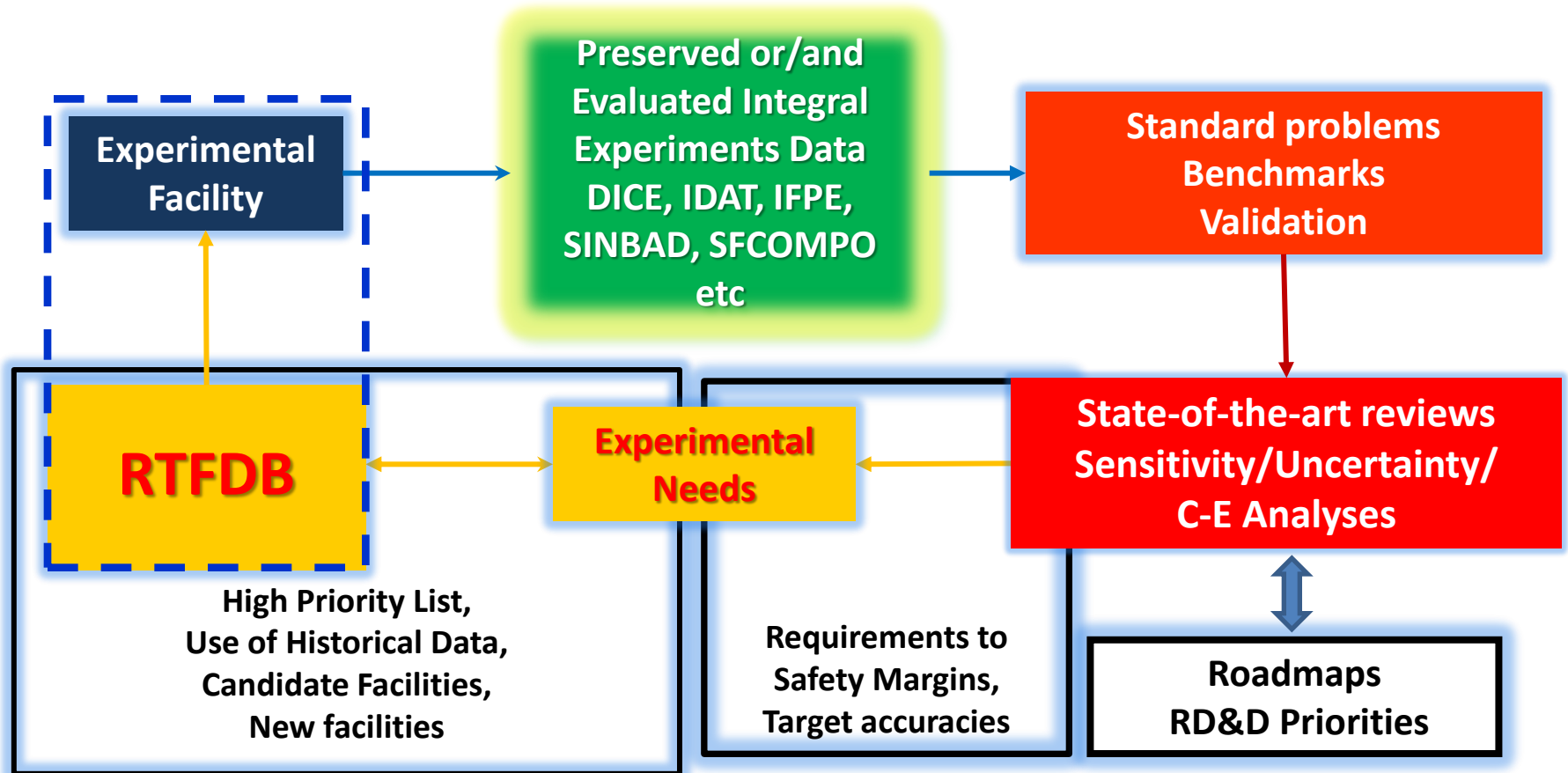


New Activities



Experimental Needs and NEA Databases of Integral Experiments Data

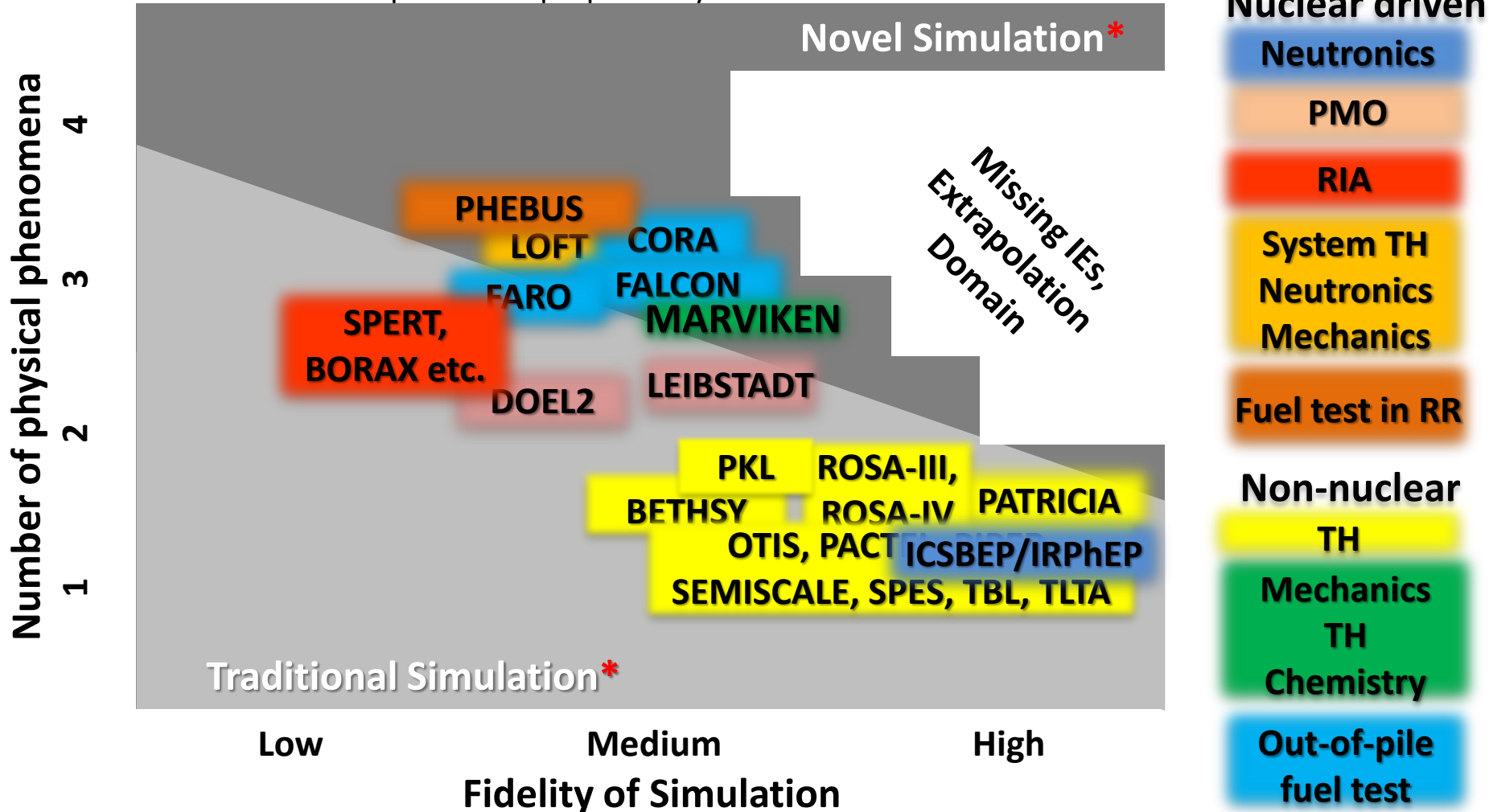
Experiment, Experimental Data, V&V&Q and UQ, Feedback



Experiments for Validation of MS MP Simulations

Simulation diagram by T. Valentine*

List of experiments prepared by EGMPEBV**



Concept of new Nuclear Science Initiative on Education & Innovation

Joint Projects to address/contain following key components

- Skills Capability, transfer of knowledge, innovations
- Support of nuclear educational environment
- Sustain key educational and experimental programmes, of the type needed to provide a fertile and sustainable environment for innovative R&D
- Relevance to national energy strategies, impact on current and future NPP fleet
- Support of key experimental programmes/facilities
- Mentoring of young researchers/students by recognised international experts

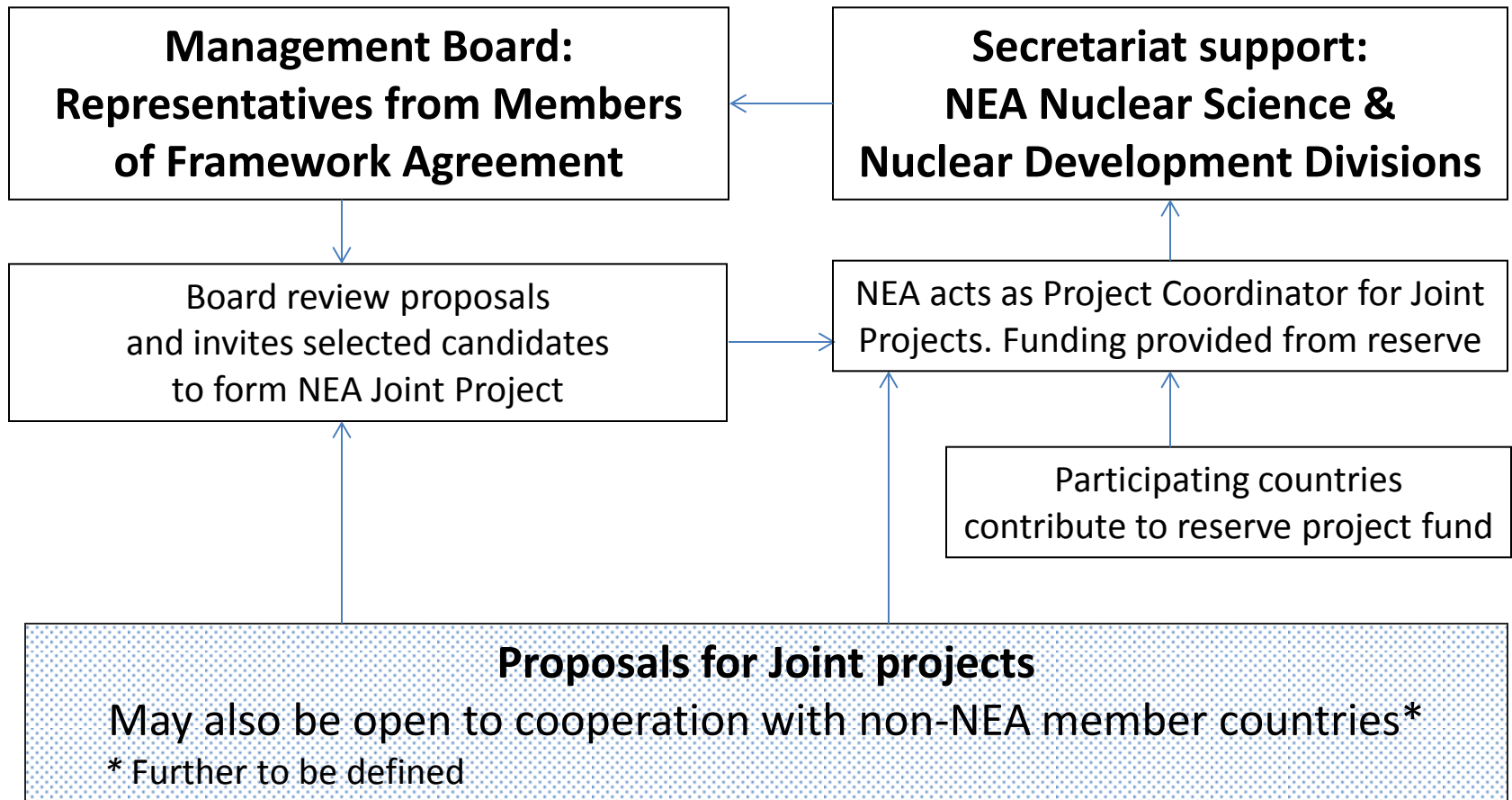
Joint Projects should also be well matched to the research priorities derived from strategic plans in various countries and regions planning to include nuclear power as part of their energy mix.

In this context input from studies such as the NEA NI2050 activity is of high relevance, particularly where a common R&D priority has been identified.

Potential Additional Outreach Activities

- Summer/winter schools/workshops for advanced education & training and other educational events
- Educational and training courses including but not limited to education on the NEA Data Bank computer codes application
- Joint E-learning programs and courses
- Lectures at participating universities
- Exchange and dissemination of information, including joint publications

Proposed Organisational Structure



Conclusions

- Strong linkage between Nuclear Science Programme of Work and NI2050 cooperation
- Many active NS projects are innovative in nature
 - advanced reactor systems
 - advanced simulation methods
 - Innovative fuels, structural materials
- Several new/proposed activities relate to infrastructure issues:
 - experimental facilities
 - experimental expertise
 - skills capability building, knowledge transfer, next generation of scientists/engineers



**Thank you for
your attention**

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