

Nuclear Innovation Cooperation

In the Low-Carbon Perspective

**NEA NI2050 Initiative
ADV PANEL JAN 2016**

Marc Deffrennes

Objective of the Adv Panel Meeting JAN 2016:

Agree on details of Objectives, Scope, Methodology , Process for NI2050 Roadmapping; TORs; Organise Expert Groups (who, what, when); and next steps after Experts Meetings

Agenda of the Meeting:

- Recap and State of Play of NI2050, TORs, AP Participants***
- Structure of the Roadmapping, Technical Scope (topics), Existing Roadmaps and Ref Material***
- Agenda and Guidelines for Experts Meetings***
- Next Step by Adv Panel: consolidation and prioritisation***
- Nominations of Chairs and Experts***
- Planning***

Nuclear Innovation Cooperation

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**NEA NI2050 Initiative
OUTCOMES OF ADV PANEL OCT 2015**

Marc Deffrennes

State of Play of the Bottom-Up Survey:

Was sent out on the 23 September...

*Returns: Australia, Austria, Czech Rep, Finland, Germany,
Italy, Netherlands, Poland, UK, US
+ Elements for ES, EC, FR*

Feedback ???

*Categories/details, 2 templates (present/past 5 y, near future plans),
Public/Private, OECD IEA Survey
Open question: « publication »???*

Terms of Reference for the NI2050 Roadmap (Top-Down Step 2) and for the Adv Panel:

DRAFT TERMS OF REFERENCE (ToRs)

For the NEA NI2050 Roadmapping of Nuclear Fission R&D and Advisory Panel

Background

The NEA NI2050 Initiative, launched in July 2015, is aiming at mapping the actual nuclear fission R&D programmes and infrastructures (step 1), defining R&D priorities to enable innovation and foster the longer term role of nuclear fission in the sustainable low carbon energy future (step 2), and evaluating the potential for cooperation to implement some of these priorities, in particular when they are gaps (step 3). See Figure 1.

While step 1 is to be performed via a survey managed by the NEA Staff (NDD), the step 2 will take the form of a high level roadmapping of R&D priorities. It will require the recourse to high level expertise having a far reaching vision, technical knowledge, and experience of similar roadmapping processes. As one of the outcomes of the NI2050 Launching Workshop (7 and 8 July 2015 Paris), the NEA Staff was tasked to draft Terms of Reference for the roadmapping process, including for an Advisory Panel providing the necessary guidance and expertise.

ToRs for the Roadmapping of R&D priorities

Objectives

The aim of the roadmapping (step 2 of NI2050) is to produce nuclear fission R&D priorities (both for programmes and infrastructures) considered important (critical) to foster the role of nuclear energy in the long term low carbon future. For the 2050 perspective, the ETP scenario 2DS serves as the reference. But the necessary long lead times to bring nuclear innovative technologies to the market (from R&D to innovation to commercialisation), combined with the ultimate sustainability goal, in particular in terms of resources and waste management, require looking also to the potential developments beyond 2050. Once (critical) priorities are established, they can then be compared with the outcomes of the survey mapping the actual R&D (step 1), leading to the identification of some gaps which may better be corrected (efficiency, cost, use of resources,...) through cooperation. A concrete outcome, beyond the survey results and the roadmap per se, might therefore be to define a limited number of priorities/gaps, not yet properly taken care of, for which there is willingness to cooperate.

Scope

The roadmapping will be organised along 5 main categories (see Figure2). Each of these five categories will be further elaborated as necessary in the course of the roadmapping. Both R&D programmes and infrastructures will be mapped. Infrastructures cover “physical infrastructures” (facilities, labs and tools) but may also cover “human resources and skills” as appropriate.

ToRs for the Roadmapping of R&D priorities

Methodology

Maximum use will be made of existing roadmaps (GIF, European Technology Platforms, national roadmaps, Owners/Users Groups of facilities,...).

Priorities will first be mapped for the four first categories (see Figure 2). These will then be consolidated, together with priorities for cross cutting topics. The final set of priorities will then be compared with the survey to define gaps.

Process

The roadmapping will be led by an Advisory Panel, supported by the NEA Staff. The first task will be to define more precisely the scope and methodology for the roadmapping (eg which “process and criteria” to use for the prioritization). Following this, specialised expert meetings will be organised, under the umbrella and responsibility of the Advisory Panel, to define R&D priorities for the first four categories of the roadmapping. The Advisory Panel will consolidate the outcomes, cross check with the priorities for the cross cutting issues, and look for duplications and synergies. A final list of priorities should then be elaborated and compared with the outcome of the survey, leading to potential gaps, for which cooperation might be proposed.

ToRs for the Advisory Panel

Membership and Chairpersons

A list of members for the Advisory Panel, to ensure the proper combination of the necessary high level vision, expertise and experience, will be proposed to the NDC. The list (see list in annex) is based essentially on the list of participants invited by the NEA Staff for the first meeting of October 2015, complemented by an invitation to the chairs of the main NEA Standing Committees, to ensure the necessary coordination for this broad NEA Initiative, and by the IAEA as observer . NDC may propose additional members for the Advisory Panel.

A chairperson will be proposed by the NEA Staff for each meeting of the Advisory Panel and endorsed by consensus by the participants of the meeting.

The specialised expert meetings should be chaired by a member of the Advisory Panel to ensure the global consistency of the overall process. The NEA Staff will call for volunteers and propose the list of chairs (and co-chairs as appropriate) for approval by the Advisory Panel. Members of the Advisory Panel will nominate the experts for the specialised expert meetings (they may also decide to participate themselves). NEA Staff may propose additional experts to the Advisory Panel. The experts will need to have a global long term vision of R&D perspectives and needs in their field in terms of programmes and infrastructures, a deep technical expertise, and a good knowledge of existing roadmaps used as basis.

ToRs for the Advisory Panel

Timeline and location for meetings

Following a first (pilot) meeting of the Advisory Panel of October 2015, a second meeting (to define the mandate, task, methodology, expected outcomes for the expert meetings) was organised in January 2016. The first expert meetings should take place between February and April. The Advisory Panel should further meet in May/June and September/October, to deliver the NI2050 “roadmap” and lists of priorities/gaps for a Final NI2050 Workshop towards the end of 2016/early 2017.

The NEA Staff will provide support for the preparation, recording and reporting of all the meetings. Unless otherwise proposed, meetings should be organised in Paris.

Duration of the Advisory Panel

The Advisory Panel is established until the date of the NDC Meeting mid-2017. The NDC will then decide about the future, upon proposal by the NEA Staff.

Endorsement by the NDC and Information of the Steering Committee

These Terms of Reference will be presented for endorsement by the NDC (Meeting of January 2016). The progress of the NEA NI2050 Initiative will be reported at each meeting of the NDC, and to other NEA Standing Committees as appropriate. The NEA Staff will also inform the Steering Committee on a regular basis.

Participants Adv Panel Meeting Jan 2016

Membership Adv Panel

Fiona Rayment (Chair) UK NNL and NIRAB

Hamid Ait Abderrahim BE SCKCEN and Chair of SNETP

Robert Speranzini CA NCL/AECL

Harri Tuomisto FI Fortum

Pierre-Yves Cordier + Sylvestre Pivet/Marc Delpech + Fanny Bazile FR CEA

Hideki Kamide + Shigeaki Okajima + Tomoyasu Mizuno JP JAEA

Grzegorz Wrochna PO NCBJ and Chair of NC2I

Sergei Vorobyev RF Rosatom

Kemal Pasamehmetoglu + Kathrin McCarthy USA DOE/INL

Invited: Korea (KAERI) and China (CAEA Mrs L Xiao)

Participants Adv Panel Meeting Jan 2016

Membership Adv Panel

Roger Garbil and Said Abousahl EC DG RTD and JRC Euratom
Stefano Monti IAEA

Jean-Paul Minon Chair NEA RWMC (Ondraf Niras)

John Herczeg Chair NEA NSC (DOE)

Jean-Claude Micaelli Rep for CSNI (IRSN)

François Storrer GIF Policy Director

Enrique Gonzales SNETP roadmap

Giovanni Bruna ETSO and NUGENIA roadmap

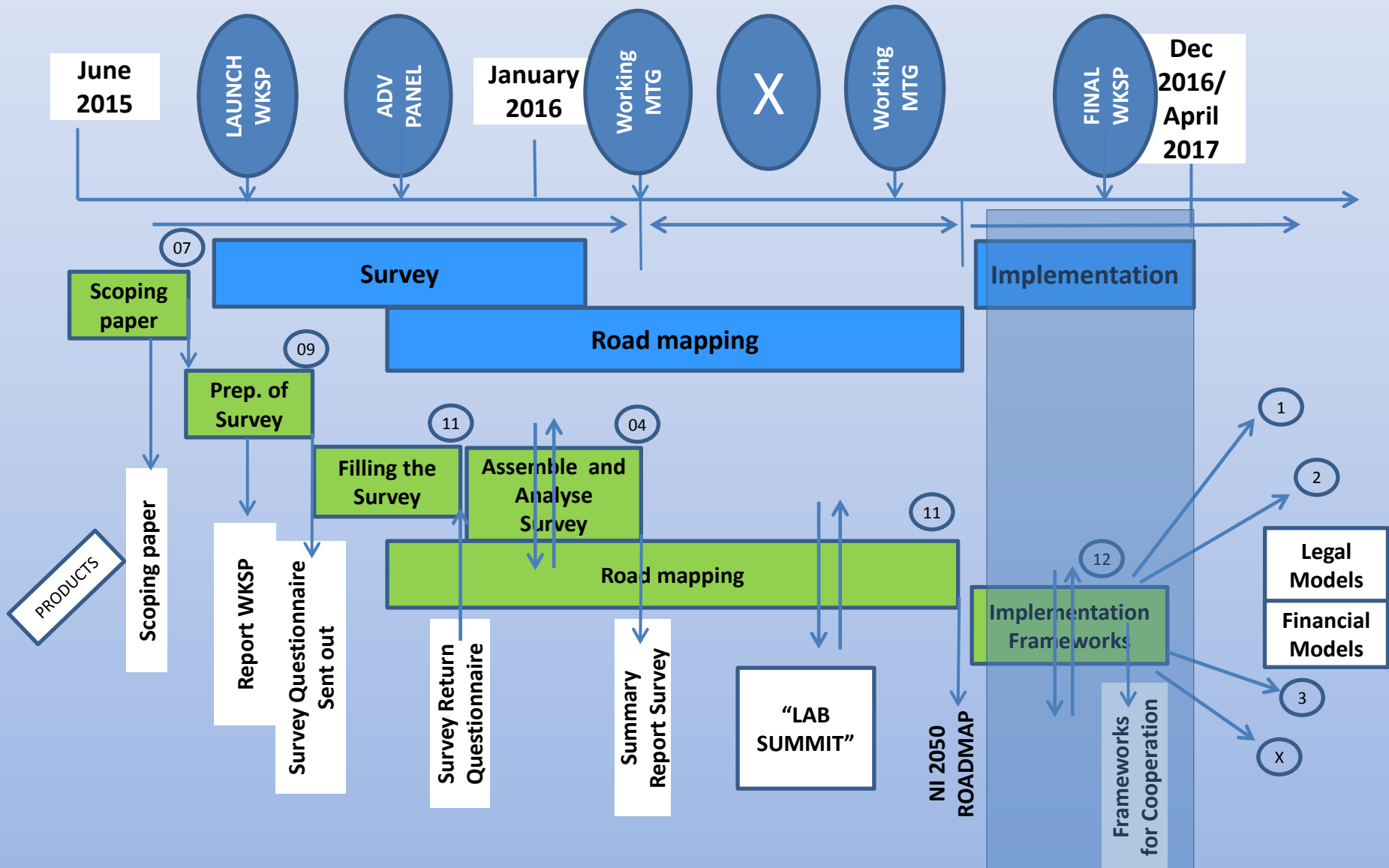
Henri Pelin World Nuclear Association + Abderrahim Al Mazouzi EDF/NUGENIA

Invited: Hervé Bernard CEA/EERA and Noel Camarcat EDF/ESNII

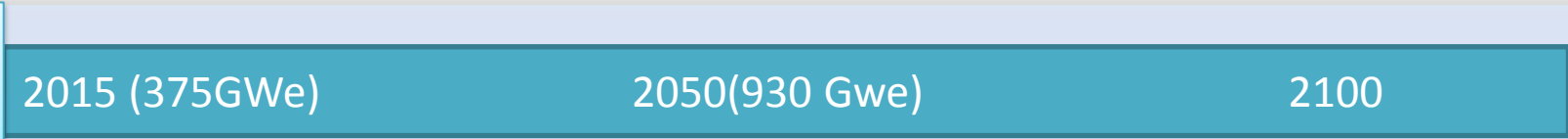
Thierry Dujardin in advisory role

NEA Staff (Divisions Development, Science, Safety, Rad and Waste)

NI 2050 Process and timeline



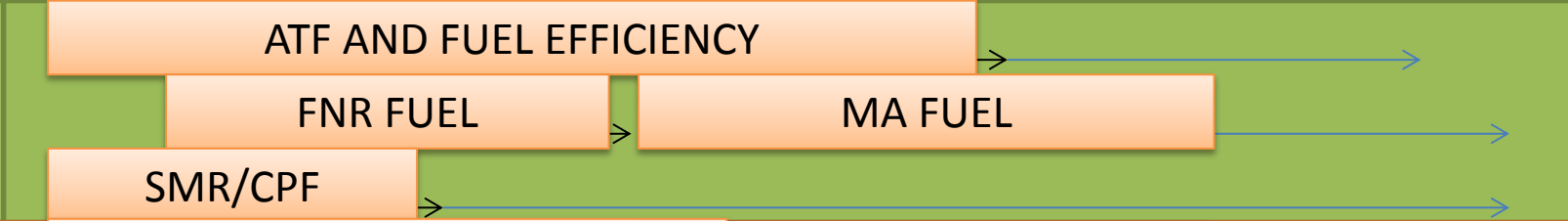
SCOPE



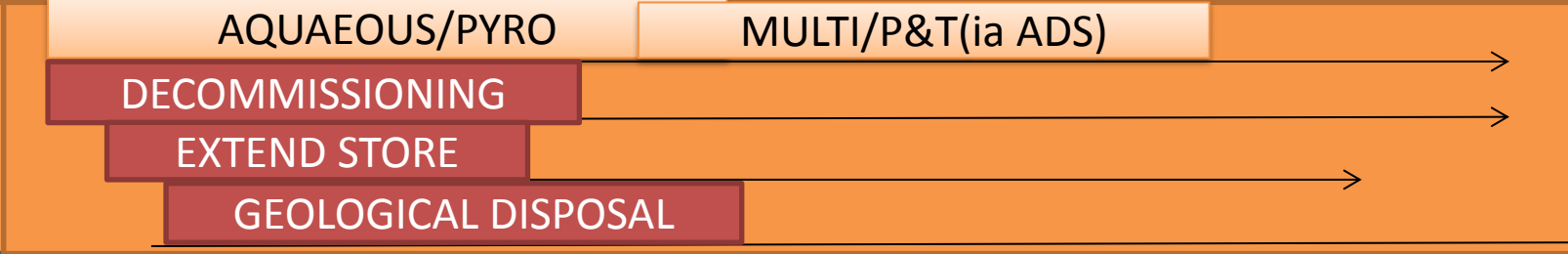
REACTOR



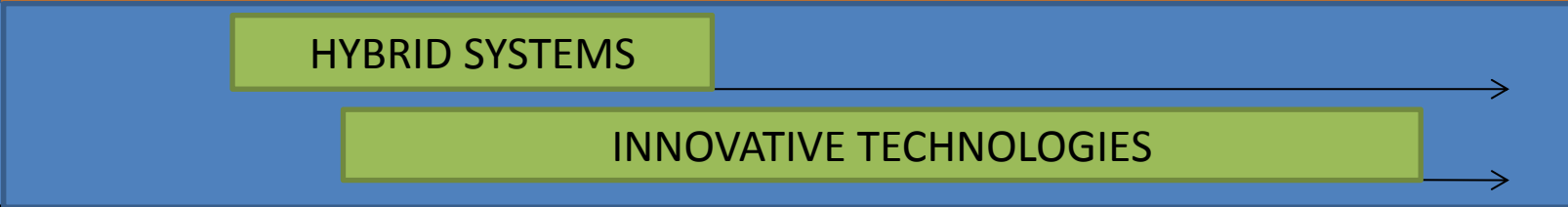
FUEL



RECYCLE/ WASTE/ DECOM



EMRGNG ENERGY SYSTEMS



CROSS C

Timeline is for technology readiness (for commercial deployment)

Elements/questions for the brainstorming

Main Objective: practical organisation of the Phase 2 top down Roadmapping of R&D priorities: work of the Expert Groups/Subgroups; then reassembling the outcomes by the Adv Panel and adding the cross cutting items; then comparing top priorities with outcome of survey to define gaps.

OBJECTIVES for Experts

- Need concrete explicit wording elements for the task of the Expert Groups/Subgroups to ensure “common understanding” – in support of role of the Chairs/Cochairs (Adv Panel Members)
- Explain the “added value” of this NI2050 compared to what exist

Overall ORGANISATION

- Outcome of the last Adv Panel with 4 Groups + cross cutting
- Evolution since then into Groups+Subgroups – link with existing roadmaps and other reference documents/communities – make a list, ensure access and availability of “the expert(s)”
- How to add “new vision” – thinking out of the box ? in each Group or Group 4 vs the 3 others ?

DETAILED SCOPE for each Group/Subgroup

- List of topics to be defined by the Adv Panel
- How “deep” to go in the technical scope/exhaustivity ?
- Review existing Roadmaps/Ref Documents to extract elements of detailed scope
- Use Categories of the Survey ?

Elements/questions for the brainstorming

METHODOLOGY

- How to make best use existing roadmaps for prioritisation while avoiding “simple copy/paste” or “national biases”
- Thinking in advance to the comparison with the outcome of the survey – categories of survey
- How to set priorities – concrete elements of guidelines for the expert groups/subgroups
- Is TRL an element to consider to set priorities ? Linked with “financing” potential – valley of death
- Start by focussing on “programme priorities”, then for each of them define needed “infrastructures”, then consolidate a list of necessary essential infrastructures (get from experts info on existing/available, not existing/not available – to be cross checked later with survey).

PROCESS

- Timeline, number meetings (start with one for each Group but may need a second ?)
- Nomination of chairs and co-chairs (2 subgroups for each Group) (volunteering from Adv Panel) and experts participants for Subgroups
- Next Meeting of the Advisory Panel – June: analyse outcomes of Expert Groups (to be presented by the chairs/cochairs with support of NEA Staff, selecting the higher level priorities (how?) and integrating cross cutting items (how?) – decision on next step for Experts if needed.

Proposed overall organisation of Expert Groups/Subgroups

Expert Meeting Reactors – 2 Rooms reserved for 17 to 19 February:

Subgroup 1: GEN II and III Reactors, Water Cooled, large and SMRs (water cooled)

Subgroup 2: GEN IV Systems: FNRs, (V)HTR, MSR, including SMRs for these technologies

Expert Meeting Fuels – 2 Rooms reserved for 2 to 4 March:

Subgroup 1: Fuel for GEN II and III Reactors, Water Cooled, large and SMRs (water cooled) – mainly issues of front end of the cycle, ia ATF

Subgroup 2: Fuel for GEN IV Systems: FNRs, (V)HTR, MSR covering both front end (ia new fuel technologies) and back end issues (ia recycling and P&T)

Expert Meeting Decommissioning and Waste Management – 2 Rooms reserved for 16 to 18 March:

Subgroup 1: Decommissioning

Subgroup 2: Waste Management, mainly High Level Waste, ia extended intermediate spent fuel storage, final disposal of spent fuel (as waste) and vitrified waste

Expert Meeting Emerging Energy Systems – 2 Rooms reserved for 6 to 8 April:

Topics to be further discussed: Innovative Energy Systems (flexible electricity systems, non electricity applications, hybrid systems,..) + Innovative Technologies (non nuclear technologies of interest for nuclear energy)

Open Questions: SCWR, ADS, Thorium,...

To be prepared for the each Expert Meeting (at group and subgroup level)

“Overall Objective” (NI2050 generic + specific with broad definition of technical scope)

“Background Material” (specific – existing roadmaps and other ref materials)

*“Technical Scope: List of R&D Topics and Template” (specific list, generic template):
Question: level of flexibility and exhaustivity/detail ?*

Generic Template to fill for each R&D topic:

1. Title of Topic/objective of the associated R&D – what to obtain
2. Technical description of the R&D tasks – how to obtain/what to do
3. Correspondence with Survey categories (to be used for comparison with survey)
4. Timeline/planning (steps) for reaching the objective/implement the tasks
5. Necessary infrastructures: existing + access/availability, new
6. Estimated necessary resources: finance (including for infrastructures), manpower
7. Reference materials (roadmaps, documents, websites,...)

...

To be prepared for the each Expert Meeting (at group and subgroup level)

“Methodology and criteria for Setting priorities among list of topics” (generic)

TRL (death valley effect), expected timeline to results, unique nature of the programme/infrastructure, necessary replacement of old infrastructure, necessary element in a “chain of actions” – complementarity with other/ critical path, cost of programme/infrastructure, multidisciplinary/multiusage nature of the programme/infrastructure – crosscutting nature, potential difficulty of financing/cost-benefit analysis, regulatory aspects (safety and security, transport), potential for cooperation, programme vs infrastructure,...

“Generic Draft Agenda for Experts Meetings”

1. Background information on NI2050. Mandate/objectives/methodology for experts meetings. Technical scope of groups/subgroups. *Chair and co-chair (from Adv Panel) and NEA Staff. 1hr*

Separation in 2 subgroups.

2. Existing Roadmaps and Ref Documents. *Presentation by selected experts. 2 hrs*

3. Brainstorming: List of topics – Structuring of the list/priorities. 6 hrs

4. Drafting Templates for selected topics. 3 hrs

5. Consolidation of Outcomes: Report/PPT preparation. 3 hrs

All together

6. Cross presentations – discussion on cross cutting issues. 3 hrs.

Overall Generic Objective (same for all Expert Groups)

- *Ensure same common understanding (Chairs + Secretariat)*
- *NI2050 on front webpage of NEA – which R&D in fission to support nuclear role 2050 and beyond (2DS and ETR) – step 2 top down roadmapping of priorities*
- *Tasking Experts:*
 - based on existing roadmaps and expertise*
 - establish a list of R&D topics*
 - use generic template for each topic*
 - prioritise topics*

Overall Specific Objective for each Expert Group/Subgroup

Group 1 R&D (and demonstration) on Reactors

- Subgroup 11 on Water cooled reactors, Gen II and III, large and SMRs, + Gen IV SCWR (?)

What R&D to ensure highest safety levels/reduce or eliminate consequences, to support ageing and LTO, to support cost reductions in construction and operation, to enhance flexibility,...

- Subgroup 12 on Advanced reactors and systems, Gen IV (ia FNRs, ADS, (V)HTR, MSR), large and SMRs

What R&D to ensure highest safety levels/eliminate consequences, to timely support the phases viability/performance/demonstration, flexibility and modularity,...

Overall Specific Objective for each Expert Group/Subgroup

Group 2 R&D (and demonstration) on Fuel(s) Cycle(s)

- Subgroup 21 on Fuel for Water cooled reactors, Gen II and III, large and SMRs

What R&D to improve the safety and performance of fuels, mainly issues of front end of the cycle, ia ATF,...

- Subgroup 22 on Fuel for Advanced reactors and systems, Gen IV Reactors: SCWR (?), FNRs, (V)HTRs, MSRs, large and SMRs, ADS

What R&D covering both front end (ia new fuel technologies – M, O, C, N, coated particles) and back end issues (ia recycling – aqueous and pyro; and P&T – MA bearing fuels for FNRs and ADS),...

Overall Specific Objective for each Expert Group/Subgroup

Group 3 R&D on Waste Management and Decommissioning

- Subgroup 31 on Waste Management

What R&D to improve HLW, ILW, (V)LLW ? management, waste minimization, volume reduction and treatment, temporary storage (ia extended spent fuel storage), final disposal (ia Geological Disposal of spent fuel considered as waste and vitrified waste),...

- Subgroup 32 on Decommissioning (D&D Decontamination and Dismantling)

What R&D to improve characterisation of contamination, organisation and planning of D&D, D&D techniques for different types of materials and contamination levels (ia robotics),...

Overall Specific Objective for each Expert Group/Subgroup

Group 4 R&D on Emerging Energy Systems and Emerging Technologies

- Subgroup 41 on Emerging Energy Systems

What R&D to foster the integration of nuclear energy technologies in future low carbon energy systems, flexibility, hybrid systems (coupling issues), multi usage of nuclear energy,...

- Subgroup 42 on Emerging Technologies

Looking to R&D outside the nuclear environment and even outside the energy environment, from what R&D could nuclear energy benefit: materials (ia nanotechnologies), modellisation techniques and tools (multiscale-multiphysics), IT and artificial intelligence, instrumentation and control, biotechnologies (for waste management),...

Could also benefit from a coordinated interface with startups active in open innovation.

This last subgroup is linked with the “*Group 5 Cross Cutting*” which is supposed to be handled by the Advisory Panel.

Background and Reference Material (ia existing Roadmaps)

NEA/IEA 2015 Nuclear Technology Roadmap

GIF 2014 Technology Roadmap

GIF SSC Programmes

SNETP 2013 Strategic Research and Innovation Agenda

SNETP 2015 Deployment Strategy

NUGENIA 2013 Roadmap

NUGENIA 2015 Global Vision

ESNII Roadmap and Implementation Plans

IGDTP Roadmap

Synthetic Consolidated Reports on Euratom Framework Programmes and Infrastructures

IAEA 2012 Status of Fast Reactor Research and Technology Development

IAEA 2013 Status of Innovative Fast Reactor Designs and Concepts

Background and Reference Material (ia existing Roadmaps)

**IGORR/ICERR frameworks – consolidated information on Research Reactors
NEA 2007 French R&D on P&T of long-lived Radionuclides (International
Peer Review CEA 2005)**

**NEA 2009 Independent Evaluation of the MYRRHA project (International Peer
Review)**

UK 2014 NNL Small Modular Reactors Studies

UK NIRAB Roadmap

**US Fuel Cycle Evaluation Study (INL – as presented at NI2050 Adv Panel Oct
2015)**

***Note: a number of members of the NI2050 Advisory Panel have been closely
connected to or even been leading the production of reference documents above (ia
IAEA 2012 – A Stanculescu (now GIF TD) and S Monti; SNETP 2013 H Ait Abderrahim
and E Gonzales; NUGENIA 2015 G Bruna; UK NIRAB F Rayment;...). This should
facilitate their effective use for the NI2050 roadmapping.***

Background and Reference Material (ia existing Roadmaps)

NEA 2015 Introduction of Thorium in the Fuel Cycle, short and long term considerations

NEA 2014 State-of-the-Art Report on Innovative Fuels for Advanced Nuclear Systems

NEA 2014 R&D and Innovation Needs for Decommissioning Nuclear Facilities

NEA 2013 Status Report on Structural Materials for Advanced Nuclear Systems

NEA 2012 Main Benefits from 30 years of Joint Projects in Nuclear Safety

NEA 2009 Research and Test Facilities required in Nuclear Science and Technology

NEA 2009 Nuclear Fuel Cycle Scenarios

NEA 2009 Strategic and Policy Issues Raised by the Transition from Thermal to Fast Systems

NEA 2007 Innovation in Nuclear Technology

NEA 2007 Nuclear Safety Research in OECD Countries, support facilities

NEA 2006 Advanced Nuclear Fuel Cycles and Radioactive Waste Management

NEA 2005 Fuels and Materials for Transmutation

NEA 2003 R&D Needs for Current and Future Nuclear Energy Systems

NEA 2001 Nuclear Safety Research in OECD Countries

“Technical Scope - (preliminary) List of Topics” per Group/Subgroup – for each one fill generic template

Adv Panel to establish preliminary list of topics ?

Each Group to further define/refine its list of topics (and level of detail) based on its best expertise (chairperson to lead).

As a starting point for discussion one might consider building on the categories of the Survey (see next slides). This would help the further comparison between the top-down priorities resulting from the roadmapping with the outcomes of the survey, allowing to better define gaps.

FOR THE GROUP “REACTOR”:

“2. R&I Programmes on Reactor Technology”

2.1. Large GEN II and III reactors and SMRs:

(define which reactor technology/type is concerned by the reply)

2.1.1. Core Physics and Thermal Hydraulics

2.1.2. Design optimisation/performance improvements of Systems, Structures and Components

2.1.3. Optimisation of operation and maintenance

2.1.4. Design Basis Safety Analysis (ia Deterministic/Probabilistic/Best Estimate and uncertainties)

2.1.5. Beyond Design Basis Safety Analyses and Severe Accidents (ia phenomena, consequences PSA Level 1/2/3, Emergency Management)

2.1.6. Other *(qualify)*

2.2. Gen IV reactors and advanced SMRs:

(define which reactor technology/type is concerned by the reply)

2.2.1. Core Physics and Thermal Hydraulics

2.2.2. Development and verification of systems concepts

2.2.3. Design of Systems, Structures and Components

2.2.4. Safety Analyses

2.2.5. Other *(qualify)*

2.3. Advanced Power Conversion Systems

2.4. Other *(qualify)*

FOR THE GROUP “FUEL”:

3. R&I Programmes on Fuel Cycle

(define which fuel cycle and fuel technology/type is concerned by the reply)

3.1. Fuel Cycle Strategies and Policies

3.2. Front End Technologies (Mining, Processing, Conversion, Enrichment)

3.3. Fuel/Cladding design and fabrication (ia improvement of existing and new (innovative) fuel development)

3.4. Fuel irradiation and PIE (ia analysis of Fuel/Cladding behaviour)

3.5. Back End Technologies (Spent Fuel (when not considered as waste) Storage, Reprocessing and Recycling *(provide details on the nature of reprocessing and recycling: ia aqueous vs pyro, single vs multiple, partitioning and transmutation of Minor Actinides,...)*)

3.6. Others *(qualify)*

FOR THE GROUP “WASTE AND DECOMM”:

4. R&I Programmes on Waste Management and Decommissioning

4.1. Decommissioning (decontamination, dismantling processes and tools, land and environment restoration,... but excluding waste management)

4.2. High/Intermediate/Low Level Waste Management and Storage (including SNF considered as waste) before final disposal

4.3. Final Disposal

4.4. Other (*qualify*)

FOR THE GROUP “EMERGING SYSTEMS AND TECHNOLOGIES”:

1. R&I Programmes on Energy Scenarios and role of nuclear

6. R&I Programmes for Non Electricity Applications (*qualify*)

ia Radioisotopes for medical and industry, Cogeneration, Process Heat for industry uses, Hydrogen,...

FOR THE CROSS CUTTING ASPECTS (All groups + Adv panel):

5. Crosscutting R&I Programmes

- 5.1. Simulation (ia multiphysics/multiscale modelling and validation/benchmarking)
- 5.2. Existing materials ageing (except fuel covered above) (ia understanding degradation processes, testing and prediction of behaviour, in-service inspection – for metal, concrete, polymers, others)
- 5.3. New (innovative) material development (except fuel covered above) (*define which material, what objective pursued: ia thermal properties, mechanical properties, nuclear properties,...*)
- 5.4. Coolant technologies and chemistry
- 5.5. Equipment manufacturing and assembling (ia modular construction)
- 5.6. Instrumentation and Control (ia digital)
- 5.7. Harmonisation, Codes and Standards, pre-normative research
- 5.8. Regulatory aspects and Licensing
- 5.9. Health Effects of radiation and Radiation Protection, Shielding and Transport
- 5.10. Human factors and Man-Machine-Interface
- 5.11. Virtual Engineering
- 5.12. Robotics and remote handling
- 5.13. Environmental Impact Assessment EIA
- 5.14. Others (*qualify*)

FOR ALL GROUPS: after having defined the “needed programmes” – specify which infrastructure is necessary, available/accessible and which are missing

8. Large Research Infrastructures (hardware tools of generic nature/multipurpose in support to R&I Programmes - use of existing, upgrade and/or new build (ongoing or planned))

(give details on the nature, type, scope and usage of the facility, as well as the associated timeline)

8.1. Critical Zero Power Facilities

8.2. Research Reactors

8.3. Large Demonstrators/Prototypes

8.4. Accelerators

8.5. Large test loops and benches, integral and/or partial experiments

8.6. Fuel Fabrication facilities

8.7. Hot Cells

8.8. Fuel Reprocessing facilities

8.9. Large calculators/super computers

8.10. Others (*qualify*)

“Methodology for prioritisation”

List of possible criteria:

To be further discussed and complemented. Each criteria to be quantified for each topic: 1 to 3 (highest priority).

- Expected timeline to results/TRL
- “Double Death Valley” effect
- “Unique” nature of the programme/infrastructure
- Necessary element in a “chain of actions” – complementarity with other/on critical path
- Multidisciplinary/multi-usage nature of the programme/infrastructure – crosscutting nature
- Cost of programme/infrastructure, potential difficulty of financing/cost-benefit analysis
- Regulatory aspects (safety and security, transport)
- Programme vs infrastructure
- Necessary replacement of old infrastructure
- Potential for cooperation

...

Nomination

***Chairs/CoChairs for the Expert meetings
(Groups/Subgroups)***

Experts (Groups/Subgroups)

Next Meeting of the Advisory Panel

- **Presentation and Analysis of the returns of the Survey (NEA Staff)**
- **Presentation and Analysis of outcomes of Expert Meetings (Chairs and CoChairs, support NEA Staff)**
- **Handling Cross cutting issues**
- **Towards the consolidation and setting of the Adv Panel top NI2050 priorities**

Date? June?

Open Question: Planning of Expert Groups ?