

## IGD-TP Position Regarding Knowledge Management in EURAD - Input for the EURAD meeting on Knowledge Management

Feedback from the Waste Management Organisation (WMO) College representatives after the first EURAD Bureau Meeting and General Assembly (GA) was discussed at the recent meeting of the IGD-TP Executive Group. With regard to the knowledge management activities to be undertaken in EURAD the following WMO College positions and statements are provided for consideration at the next Bureau meeting on this topic.

- Scope of EURAD “knowledge management” activities – It needs to be agreed as soon as possible what is understood under “knowledge management” in the EURAD context: this needs to define what will be covered but also what falls outside the scope envisaged in EURAD. A list of common terminology needs to be developed to ensure that discussions are focused.
- Focus on RD&D – It is pointed out that within EURAD the “RD&D” part of knowledge management needs to be the focus; it needs to capture the “state of knowledge” supporting the implementation of repository programmes.
- Objectives – From an IGD-TP point of view key objectives of the knowledge management in EURAD are to ensure:
  - Transfer of experience due to personnel changes and retirements.
  - Mapping of information acquired across different programmes to avoid duplication of work and to allow less advanced programmes to take stock of what has been acquired.
  - Make visible which areas are considered to be mature and where additional RD&D would no longer contribute to significant reduction of safety relevant aspects.
  - Make visible which pieces of science are missing or where there are gaps in knowledge required to further reduce uncertainties.
  - Preserve information and ensure its transfer between generations over the long timescales of geological disposal.
- Integration of IAEA/NEA – The NEA and IAEA already carry out the main components of knowledge management for geological disposal. As pointed out in the proposal stage, the IGD-TP advises that EURAD seeks to develop knowledge management structures and tools complementary to, and making full use of, the relevant guidance, knowledge management tools and structures already developed and published by the IAEA and the NEA. To avoid overlap or divergence between the EURAD work and IAEA/NEA activities, a plan needs to be made on how this integration can be guaranteed at a very early stage. The benefit to be provided by EURAD relates both to the methodology to develop a scientific programme in accordance with the steps in disposal development (derived from PLANDIS) and to the framework of how to access the scientific and technical knowledge and know-how in a structured way.
- Roadmap development – The IGD-TP understands the desire for EURAD to develop a roadmap but points out that each programme is very much determined by its history, national context, inventory size and geology. This makes developing a Europe-wide generic RD&D roadmap challenging and will only allow for a certain level of detail in the description of the RD&D supporting this. With mature safety cases available, the development of additional safety cases can take a large stock of the state of knowledge available and only very specific issues need to be assessed in depth. Typical examples include bentonite erosion in the case of higher-strength fractured rocks or consequences of gas generation in low permeable L-ILW inventories. When developing a roadmap for planned RD&D, the top level describing in a generic way the different programme stages

should as far as possible be based on what has already been developed as part of IAEA and NEA/OECD documentation. The PLANDIS guide will also be a useful input. The intermediate level can be developed for different examples (large diverse versus small inventories; weaker-strength rock based concept versus higher-strength rock based concept) as this affects major choices to be made in a programme and the concepts on which it is based. The RD&D lower-level roadmaps then need to be based on these examples reflecting different programme and concept choices. Several examples could be developed to test using this branched architecture. It should be possible to trace back the RD&D priorities to the respective safety cases. This needs to be done in a generic manner as each specific safety case assigns safety functions and indicators/criteria slightly differently.

It is suggested that KM in EURAD is considered in two parts:

- Firstly, starting from a reference schedule of the phases of geological disposal development over time (including pre-disposal activities), establish the objectives at each milestone and the scientific and technical knowledge needed to support them.
- Secondly, establish a structured tree of themes, topics and sub-topics (e.g. see the tree structure presented by Tara Beattie at the first EURAD GA which showed seal > bentonite core, concrete support mass...> bentonite > type of swelling clay, permeability, hydro-mechanical properties, thermal properties etc...) that finally refers to documents (reports, articles, European project deliverables, national reports...) that already exist, are accessible and are defined as synthesis documents by the three Colleges. The tree must be structured according to the components of the disposal system and directly link with the arguments that support the safety case; this can be visualised by a matrix in which the components of the disposal system are represented on one axis and the necessary safety and technical functions on the other axis. The safety case could be a tool to identify whether the component of a disposal system can fulfil its safety function. The topics could be represented in a hierarchical system and in a structured way in the different positions in this matrix. At each branch/node simple explanations should be provided. Exceptionally, if a lack of documentation for a topic/sub-topic is identified, this could lead (with limited resources) to development of specific documents within the EURAD KM WP.

Work is required to connect the first part (phases) to the second part (themes and topics). An important role of the safety case is to evaluate the effect of the uncertainties at a given milestone in the implementation of a geological disposal facility. The need to reduce uncertainty connected to a given topic at one milestone could be a way of prioritising R&D needs for the period, which lasts till the next milestone. Therefore, this could be the link between the two parts (but as mentioned above it needs be considered if this requires the selection of a few examples in order to be meaningful).

The training within the EURAD KM WP must concern the two parts described above.

- Flexibility – The knowledge management structure needs to be flexible in that updating and adjusting it can be done by a wide group of people to avoid it becoming obsolete and outdated very quickly. It is essential that before developing software tools, or populating data systems, the needs and scope must be defined and the end-users need to approve of the approach. After that a test case or mock-up can be developed.
- Existing knowledge – The IGD-TP considers that the principle is not to establish handbooks in EURAD, but to provide access to existing scientific and technical knowledge in a structured, clear and accessible manner. The architecture of how to structure and access the information should be developed by those involved in the WP, but it is the responsibility of all those working in geological disposal to help populate it – technical work should not be repeated but existing work incorporated with an explanation of how to access it. There

is numerous and rich existing documentation (e.g. WMO reports, open literature, international organisations); for example, WMOs have published reports over more than 20 years that summarise the state of knowledge of particular components and aspects of geological disposal in the scope of their respective safety cases.