New NEA project on the management of information/data/knowledge

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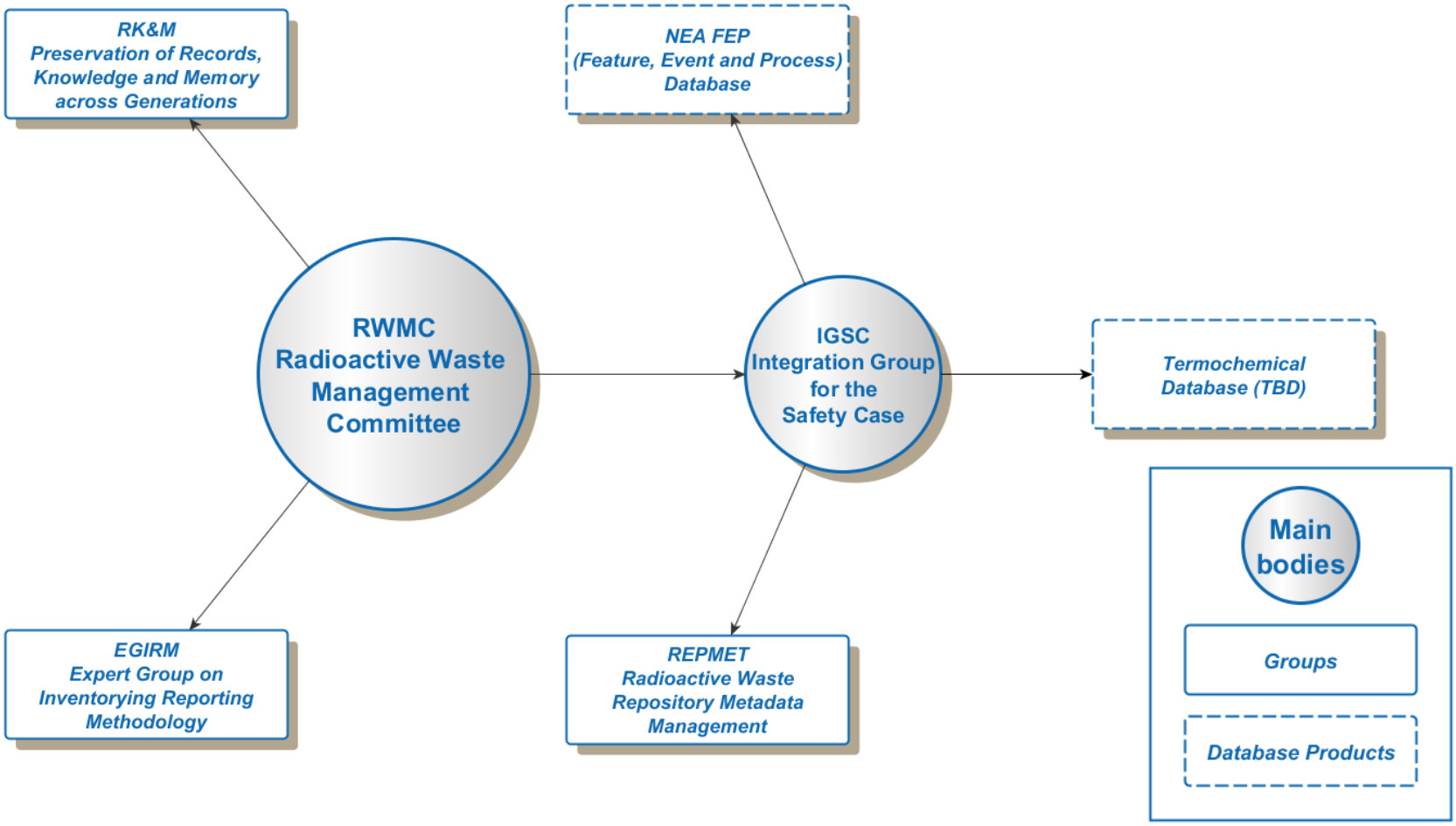
Background

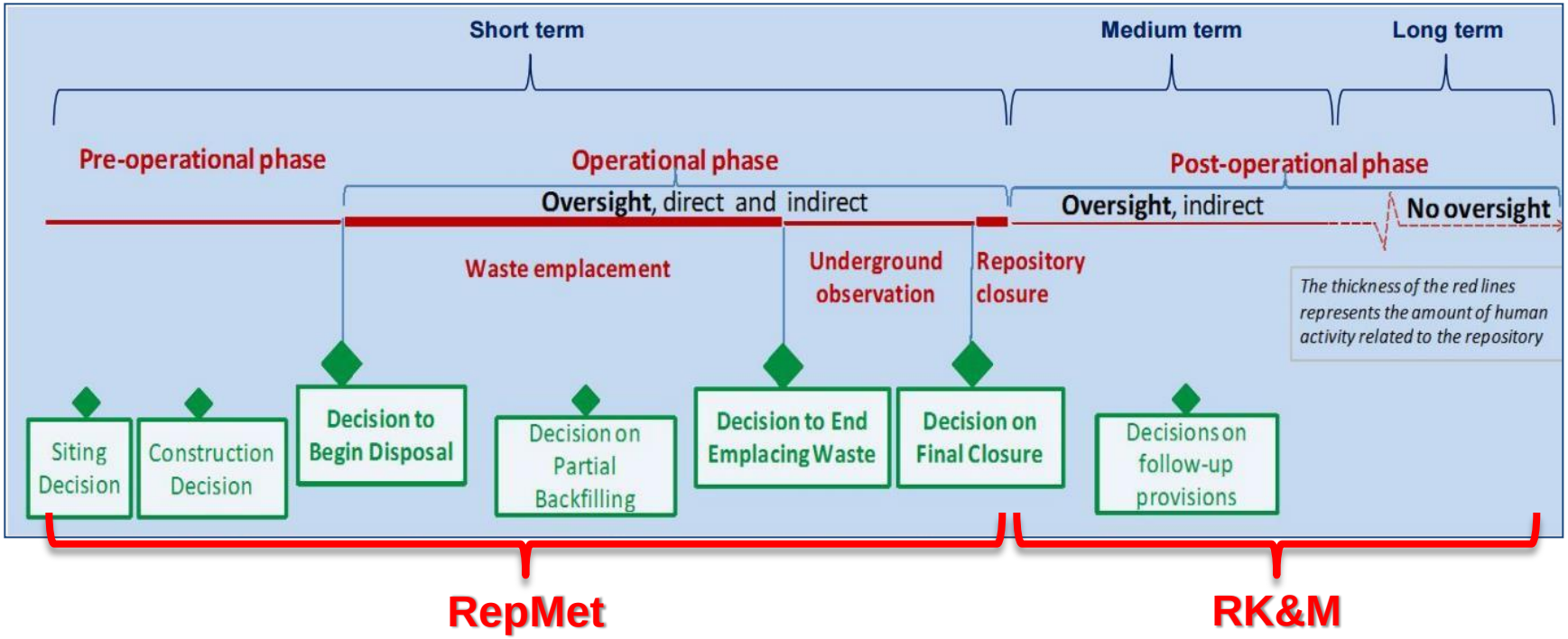
- The entire nuclear sector, including the Radioactive Waste Management (RWM), is highly demanding in Information, Data, Knowledge Management (IDKM) field;
- National programmes for RWM tends to run for decades, and time becomes an additional crucial factor for IDKM:
  - ***Data*** – They increase in number, type and quality as national programmes proceed through the successive stages of the repository commissioning.
  - ***Information*** – Users have to be confident with data and able to access and understand the associated information on long-term.
  - ***Knowledge*** – *Its acquisition is a very expensive process in terms of HR, time and finance. The explicit and implicit knowledge that RWMOs acquires has to be transmitted generations by generations reducing the risk of loss.*

NEA RWMC activities in IDKM



RepMet & RK&M: time framework

- In the overall repository lifecycle, it is fundamental to maintain and preserve IDK related to the repository safety.



- **RepMet** and **RK&M** are **complementary projects** since the set of records handled on medium-long term by the RK&M is derived from data and information handled by RepMet on short term.

RepMet profile

- **Acronym**:
  RepMet (Radioactive Waste Repository Metadata Management).

- **Objective:**
  Investigation of the role of metadata in IDKM within the national programmes for the realisation of radioactive waste repositories.

- **Time**: 2014-2017

- **Participation –** 12 organizations from 12 countries:

***Belgium**: ONDRAF/NIRAS*
***Canada**: NWMO*
***Czech Republic**: SURAO*
***Finland**: POSIVA*
***France**: ANDRA*
***Hungary**: PURAM*
***Japan**: JAEA*
***Spain**: ENRESA*
***Sweden**: SKB*
***Switzerland**: NAGRA*
***UK**: NDA/RWM*
***USA**: DoE Sandia National Laboratory*

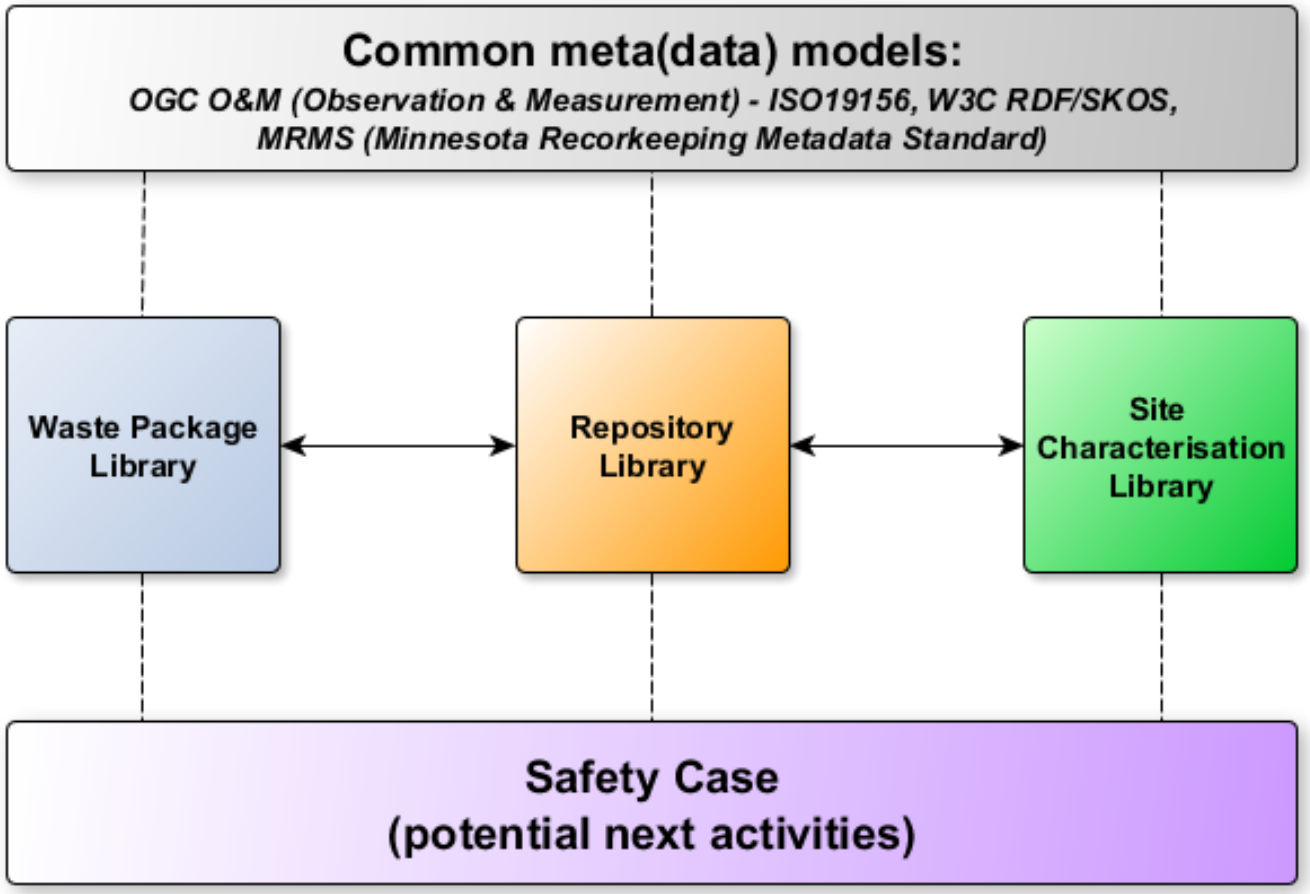
What are metadata?

- «Data about data»...
- Metadata let users <u>be confident with data</u> in the future:
  - *provide provenance to the data: who, what, when, where, why and how;*
  - *provide context to facilitate the accurate interpretation, and (re)use of data;*
  - *describe and maintain the original data quality;*
  - *add additional information about the data in a structured and detailed way;*
  - *help users to quickly find the data that they are looking for and support the search for information.*
- Metadata provide structure allowing **data to become information!**

What RepMet is doing? Why?

- Develop guiding principles and recommendations for the **implementation of metadata** in national programmes.
- Develop the **conceptual design of databases** ("*RepMet Libraries*") across the main disciplines involved in RWM programmes:
  - It includes meta(data) models that the RepMet group originally created or adopted from several and consolidated international standards.
- **Why metadata are useful?** Why a common conceptual design?
  - *Metadata structure data, maintaining the information understandable and completed, preserving the confidence in data for future users (any kind).*
  - *Common and shared design of databases can promote the international harmonization and interoperability among national IDKM systems.*

RepMet High Level Picture



RK&M profile

- **Acronym**: RK&M (Preservation of Records, Knowledge and Memory across Generations).

- **Objective:**
  The RK&M initiative of the NEA RWMC assembles an international group of RWM specialists to reflect on how best we can enable future members of society to make their own informed decisions regarding a radioactive waste repository after it is closure, decades, centuries and millennia from now…

- **Time**: 2011-2014 (Phase I), 2014-2018 (Phase II)

- **Participation** – 21 organizations from 14 countries + 2 observers (EC, IAEA):

***Belgium**: ONDRAF/NIRAS, SCK*
***Canada**: NWMO*
***Czech Republic**: SURAO*
***Finland**: STUK*
***France**: ANDRA*
***Germany**: BFS, GRS, KIT*
***Hungary**: PURAM*
***Japan**: JAEA, RWMC*
***Russia**: Rosatom*
***Spain**: ENRESA*
***Sweden**: SKB, Riksarkivet, SSM*
***Switzerland**: NAGRA, SFOE*
***UK:** NDA/RWM*
***USA**: DoE*

What RK&M is doing? Why?

- Develop an integrated set of mechanisms and techniques ("systemic approach") for the preservation and transmission of the RK&M about radioactive waste repository.
- As matter of fact, once closed, the repositories are to remain safe for from hundreds of years to millennia.
- RK&M preservation of repository and contained waste for:
  - *Preventing inadvertent human intrusion;*
  - *Favouring the recoverability of disposed waste;*
  - *Keeping the oversight;*
  - *Allowing future generations to make their own informed decisions.*

"Systemic Approach" components

Components of the RK&M Systemic Approach

- To prevent repository from inadvertent human intrusion:
  - *Markers*
- To keep the society aware of the repository:
  - *Cultural Heritage*
  - *International Mechanisms (e.g. UNESCO)*
  - *Archiving*
  - *Time Capsules*
- For knowledge management:
  - *Key Information File (KIF)*
  - *Set of Essential Records (SER)*

Databases for Safety Assessment

FEP (Features, Events and Processes) Database:

- It assemblies FEPs for geological disposal to aid national programmes to identify, classify and screen FEPs in their safety assessment studies.
- Two main parts:
  1. ***International FEP (IFEP) List*** *- a comprehensive and structured list of factors relevant to the assessment of long-term safety of RW repositories.*
  2. ***Project FEP (PFEP) Lists*** *- a referenced collection of FEP lists and DBs that organisations compiled during repository safety assessment studies.*

TDB (Thermochemical DataBase):

- Chemical and thermodynamic DB of selected chemical elements (e.g. inorganic compounds and complexes of U, TRU, Tc, and many others): comprehensive, internally consistent, internationally recognised and QA.

NEA RWMC Expertise Areas in IDKM

- ***EGIRM*** *– Development of an innovative presenting scheme and methodology for SF/RW national inventories and management strategies;*
- ***RepMet*** *– Implementation of metadata in national programmes for RW management to keep confidence with data in future;*
- ***RK&M*** *– Development a systemic approach for preserving RK&M about a radioactive waste repository;*
- ***FEP*** *– List of FEPs for the post-closure safety assessment of the repository (e.g. scenarios identification, models development, etc.);*
- ***TDB*** *– Chemical and thermodynamic database for elements of interested in radioactive waste disposal system.*

IDKM @ RWMC: what is next?

1. Assembly of the outputs from the current groups in a common framework that can be the basis for the…

2. …establishment of a new initiative for the creation of an **integrated system (IS) for IDKM** tailored to the RWM needs for national implementation.

   The IS-IDKM has to be:

   – Able to manage IDK about waste “from cradle to grave”;

   – Designed and based on modern IT tools, best practices and procedure.

For the development and the implementation of such IS-IDKM, the new group to be established has to pursue the following objectives….

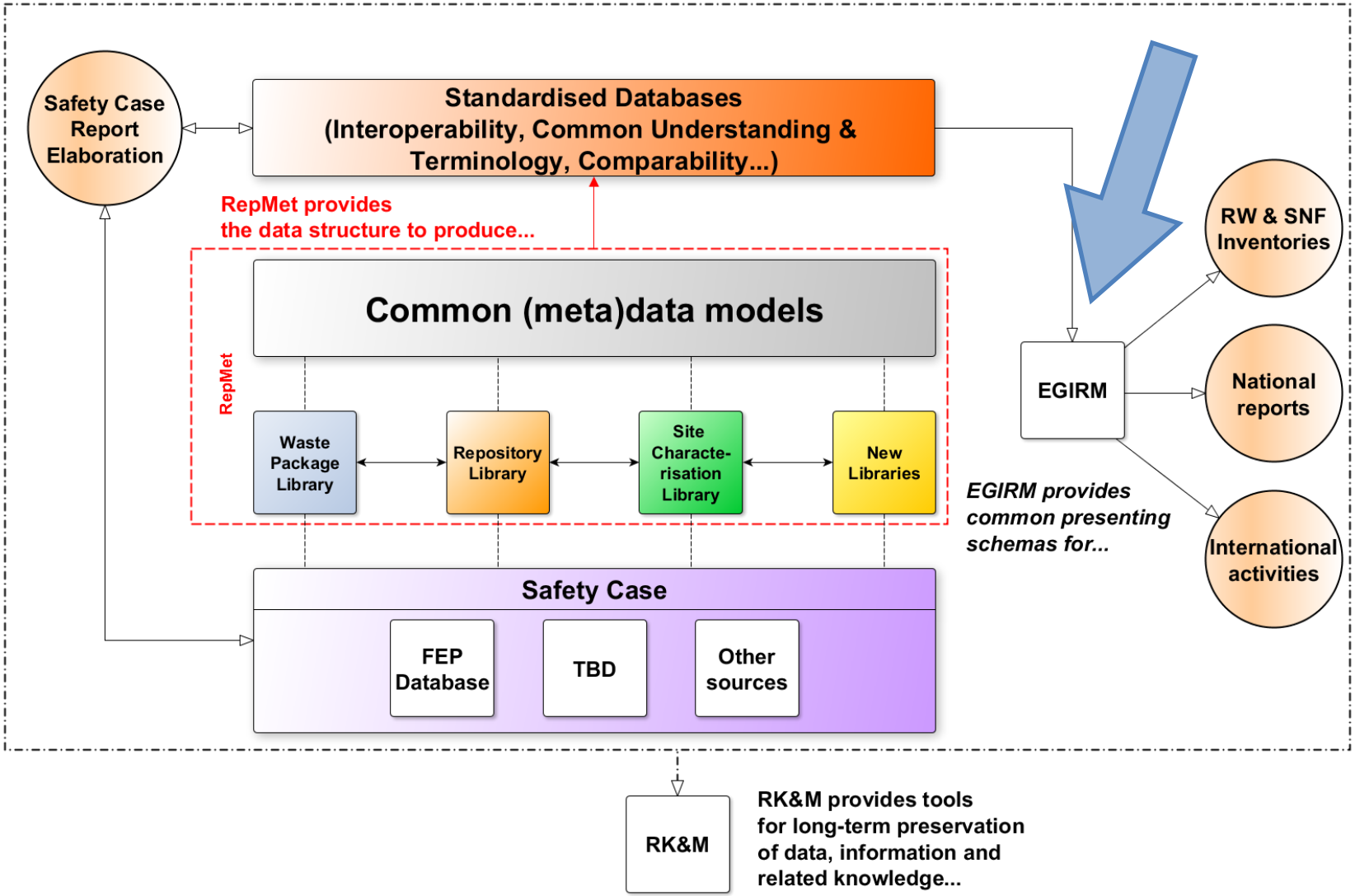
Objectives for the proposed group

- Forum for the identification and the analysis of the ***major innovations***, ***emerging trends*** and ***best practices*** in IDKM to assist RWMC in their understanding and application into the RWM field. For example:
  - Semantic contents and search,
  - (Explicit and implicit) knowledge codification for transmission and use;
  - Hardware and software technology advances.
- Support the ***exchange*** among the RWMOs of experience, new approaches, lesson learnt, emerging needs, current issues for the development of IDKM systems;
- Design and comprehension of ***shared models*** for the development of the IS-IDKM to be implemented, first of all, in the national programmes and then, eventually, in international activities.

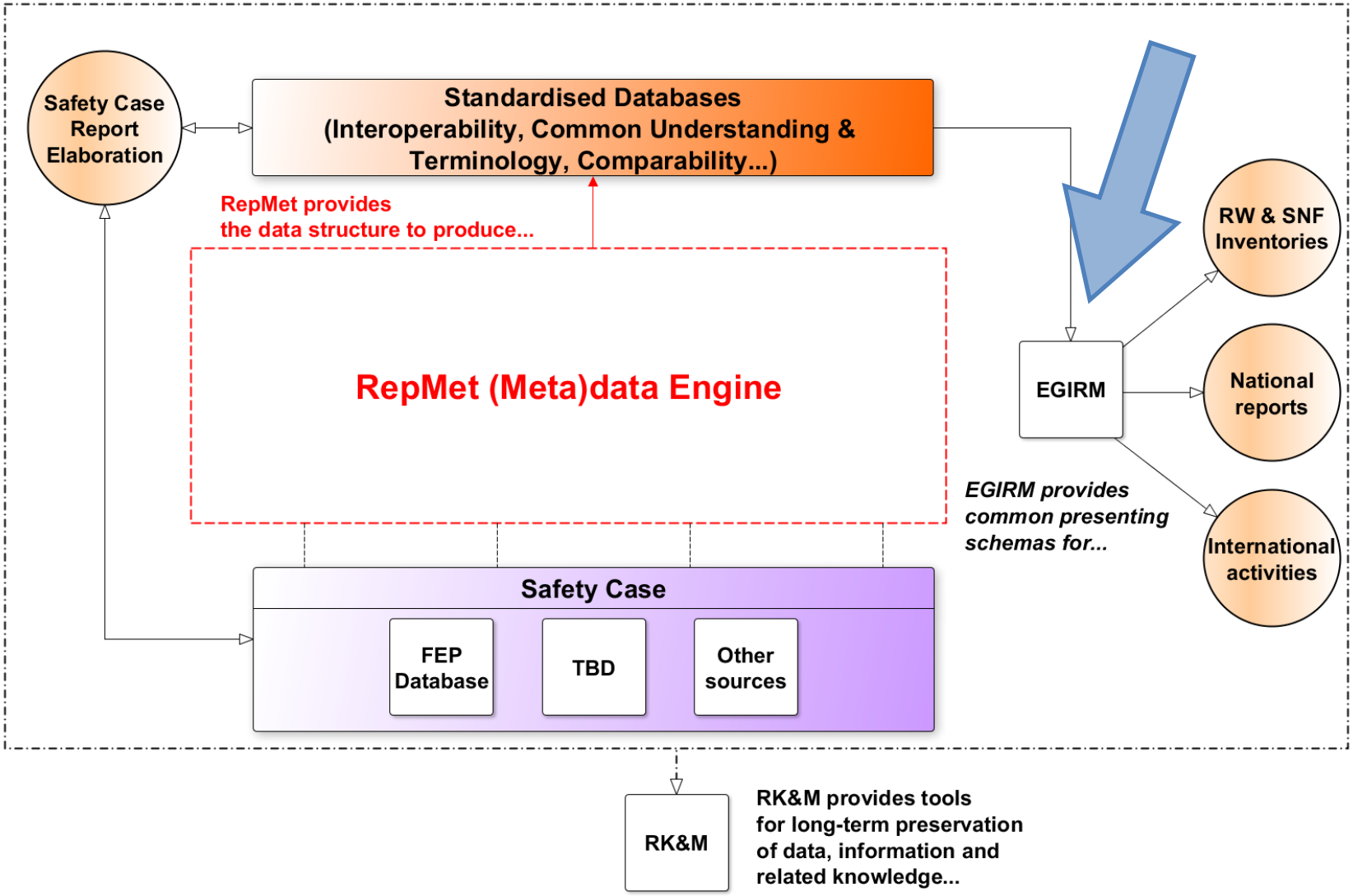
Structure of the proposed group

- **Members**
  - EGIRM, RepMet and RK&M people interested in continuing the activities;
  - IT technical experts (i.e. database managers and developers), knowledge transmission/transfer experts;
  - Experts in RWM.
- **Modus operandi**
  - TBD – The new group can be organised as:
    - *Expert group/working group within the RWMC;*
    - *Open joint project with free participation and contribution;*
    - *Joint project under the confidentiality agreement with fixed contributions;*
    - *Other requested format.*
- **Funding**
  - TBD - The type of possible funding will depend on the final format of the initiative.

IS-IDKM Schema



IS-IDKM Simplified Schema



Conclusions

- The NEA RWMC has been very committed in the IDKM field applied to the radioactive waste management in the last years:
  - *Time to focus the efforts following the holistic approach («from cradle to grave);*
  - *Outcomes of the recent expert groups and initiatives (i.e. EGIRM, RepMet, RK&M) have to be integrated in a common framwork defining the basis of an IS for IDKM about RWM.*
- The NEA Secretariat prepared a drafted Terms of Reference for the new initiative to the RMWC Bureau Meeting (January'18):
  - *The RWMC Bureau Members supported the idea and asked for a deeper discussion at the next Bureau meeting in March'18.*
- Time for new ideas, common needs, future views…

Merci, Grazie, Grazia, Takk, Danke, Tack, Gracias, Arigatô, Спасибо and Thank You

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