

Preservation of Records, Knowledge and Memory (RK&M) across Generations. An Overview of the Eponymous OECD/NEA Project – 14425

Claudio Pescatore, OECD Nuclear Energy Agency (NEA)

ABSTRACT

This paper presents the current status of the NEA's Radioactive Waste Management Committee (RWMC) project on the Preservation of Records, Knowledge and Memory (RK&M) across Generations. The project originated in 2010 with a survey on status and needs in RK&M in NEA member organizations. A number of tools and resources have so far been created and are being developed further. These include a literature review, a glossary of key terms, a catalog of regulatory and legal requirements, several thematic studies and reports and a wiki-based information platform. The project's first phase is scheduled to conclude in April 2014. An international conference on RK&M is being organized in France in September 2014, possibly in connection with a second phase of work.

INTRODUCTION

Experience indicates that Records, Knowledge and Memory (RK&M) need to be actively managed from the start of the waste management programs. Although the question of the long-term is an especially difficult one, it is accepted that future generations will need as much information as practicable in order for them to make their own informed decisions.

RK&M is a management task that spans unprecedented time-horizons and that brings together technical, scientific, societal and cultural information. The project on the Preservation of Records, Knowledge and Memory across generations was launched in 2010 under the aegis of the NEA's Radioactive Waste Management Committee (RWMC). The needs of the waste management agencies in this area – as of 2010 – are documented on the project website¹. The aim of the project is to identify elements which would help national programs put together their own strategy on RK&M preservation. That is, to scope out what the relevant questions are, and consider how to answer them. There are representatives from 16 organizations in 12 countries [1], plus the IAEA, and support from the European Commission. Most organizations provide a financial or in-kind contribution to the running of the project. In the course of the project, a number of external stakeholders from local communities as well as specialists in archaeology, cybernetics, archives, and others have been involved and have greatly contributed to the Project's workshops and internal meetings.

HISTORY

At the start, the project created a vision document and a collective statement on the status and needs in RK&M as of 2011 (based on a 2010 survey [2]). Further resources have been added, such as an annotated bibliography, a glossary, and a catalog of regulatory requirements. In the course of the project, two workshops – Scoping the Issue (October 2011) and Improving Our Understanding (September 2012) – were held (all of these documents, and the yearly progress reports, are available on the project website).

¹ <http://www.oecd-nea.org/rwm/rkm/>

Specific studies were also carried out within the project and were discussed at both workshops and project meetings. Namely, on supranational mechanisms for RK&M preservation, the taxonomy of RK&M loss, an analysis of the project bibliography, the literature on markers, and the role of monitoring. Short reports on relevant topics – such as the use and fate of tsunami stones in Japan – have also been added. These can be consulted on the website. A wiki-based platform is also being developed for accessing more easily the large amount of information that has been generated.

In connection to long-term safety, the project has examined the concept of the “safety story”, a complementary concept to the “safety case”. The project has also formulated and is exploring a novel way to arrive at what would constitute a “set of essential records”, i.e. the reduced set of records without which it would be difficult “to make sense” of the repository. This, as well as other topics, will be developed more in-depth in the next phase of the project. At present, the RK&M project is also preparing the organization of an international conference on RK&M to be held in France, September 2014.

ACHIEVMENTS UP TO NOW

Vision Document

The RK&M Vision document has its origins in the 43rd session of the RWMC (March 2010). A first version was drafted in support of a topical session on long-term memory. It described the motivation and benefits of the project, the modus operandi, established funding arrangements, suggested a way forward and set up the first initiative of the project, an International survey and lessons to be learned concerning the elements of an action plan for long term information and memory preservation in the field of geological disposal. Project goals, a draft schedule for work and initial points of agreement were added after the June 2010 topical session and project advisory group meeting. The current version of October 2011, incorporating updates from the 44th session of the RWMC includes a timeline of ‘the continuity of responsibilities’ identifying the relevant timeframes for RK&M preservation. It describes the role of the RWMC, and the project setup and modus operandi. It outlines an action plan for 2010-2014 and identifies the key deliverable of the project as a “Menu-driven document that will allow people to identify the elements of a strategic action plan for RK&M preservation” (RK&M Wiki, see below).

Survey of Status and Needs as of 2010

The intention to carry out a survey of RWMC member’s experience and expectations for the project was identified in the first draft of the Vision document. The questions used were the same as those used to structure the Topical Session on Long Term Memory at the 43rd session of the RWMC.

The NEA document “2010 Survey on Long-Term Preservation of Information and Memory for Geological Disposal of Radioactive Waste”, reports the answers provided by organizations from 12 countries (Belgium, Canada, Finland, France, Hungary, Japan, Korea, Spain, Sweden, Switzerland, United Kingdom, and the USA,) to five questions related to long-term preservation of information and memory in the field of geological disposal. It was released as a follow-up to the November 2010 project meeting. An analysis of the Survey was presented at the October 2011 Workshop.

Collective Statement – Flyer

The Collective Statement, laid out in the form of a flyer, was finalized at the February 2011 meeting of the project and presented at the 44th Session of the RWMC. It is available in English, French and Japanese.

The collective statement summarizes the contemporary understanding of the relevant needs and challenges of RK&M preservation. It underscores the willingness of the organisations that are participating in the NEA RWMC and its international project on the preservation of RK&M across generations to work together and support national programmes to move forward in this area. The Collective Statement identifies the following reasons for preserving RK&M:

- maintaining confidence in the safety and security of the system by allowing for accurate and reliable review by the authorities and providing for visible and transparent oversight of disposal projects across time
- addressing concerns and answer requests from the public, especially local communities
- ensuring that future generations can base their decisions on relevant and pertinent data
- promoting awareness of past activities

It presents the main focuses of research which have been carried out on the topic, and identifies scoping activities and challenges for the RK&M project. The following is its closing statement: “The international community is focusing on work to preserve RK&M across generations. The current position shows initial progress in individual programmes, but there is a need to internationalise the thinking, compare approaches, test potential solutions and share decisions. Future systems for preserving RK&M will need to be flexible and adaptable over time. They should implement the simplest possible techniques and support materials, but should not rely only on technological provisions. A “systemic” approach should be engaged whereby the various components of the system complement each other, provide for redundancy of message communication, and maximise the survivability of a recognizable message. Initiatives being led by the NEA/RWMC will make important contributions to advancing plans and best practices in preserving important records, knowledge and memory across generations.” [3]

Bibliography

The RK&M project is collecting documentation relevant to RK&M preservation for radioactive waste disposal, including papers, reports, articles, books and other materials that bear on the subject matter. A first set of documents has been compiled into a core bibliography of around 60 references. These core references have been analysed according to a set of binary questions (when, why, what, who, where and how), which allows them to be categorized according to a number of keywords. RK&M specific abstracts have also been written for each core reference. Since the subject area is evolving, the list in the bibliography is continually updated. While the dominant language in the documents included in the bibliography is English, a number of relevant documents in French, German and Swedish have also been identified, and documents in these and other languages will continue to be added to the list.

An analysis of correlations among the answers to the questions reveals two separate clusters of questions corresponding to two groups of documents. One group relates to the retention of RK&M for short-term and very-short-term purposes, including information from waste producers, with one of the main goals being responding to unforeseen events. The second group relates to the long-term retention of RK&M, including physical markers, aimed at informing a broad audience including the future general public, with one of the goals being to deter inadvertent

intrusion. The majority of documents in the bibliography deal with one or the other of the two groups, but relatively few documents attempt to cover both areas of interest. The intermediate timescale (medium-term in the project terminology) is insufficiently addressed, considering its importance.

The RK&M Bibliography is available as a project document and also as a searchable and continually evolving database on the RK&M Wiki. [4]

Glossary

Another important tool prepared by the RK&M project is its glossary of terms. It is a living document that evolves with the project. A separate paper on terminology and the glossary will be presented at this symposium [5].

The aim of the RK&M glossary is to compile a comprehensive, dedicated and internally consistent set of definitions pertaining to RK&M in the field of radioactive waste management. Each definition should not be seen in isolation, but as complementary to the definition of other terms in the glossary. It is crucial, for instance, to have a clear definition of the key terms - or dimensions - of the project, as their definitions can sometimes be overlapping or even synonymous in common usage. In addition to records, knowledge and memory it is necessary to also include data and information in this set of terms. Their definitions for the project are [see 6]:

- **Data:** Facts and ideas in the form originally collected.
- **Information:** Organized data that may or may not be recorded on a medium.
- **Record:** A usually unique and original object or a selected piece of data / piece of information that has been committed to a medium and that is kept, together with the appropriate context and structure, for later uses.
- **Knowledge:** The result of learning processes. Once acquired in a particular field, knowledge provides insights and skills. It results in the ability to understand, interpret and utilize the relevant data, information and records.
- **Memory:** The awareness of events, people, places and levels of knowledge in the past.

The particularly long time horizon of RK&M preservation for radioactive waste makes it necessary to redefine timescales as the entire scope RK&M would fall into what is in other fields defined as long-term, rendering the use of timescales obsolete. The RK&M project has therefore defined the timescales as follows [see 3]:

- **Very-short term:** Period of time consistent with staff stability in role, cycles of organizational change, and regulatory expectations of periodic safety reviews. Typical time scales are 10 to 20 years.
- **Short term:** Period of time that ends with repository closure. This period includes both the pre-operational and the operational phases of the repository. Timescales are of the order of 100 years.
- **Medium term:** Period of time of indirect oversight activities that would follow repository closure. Time scales are of the order of a few hundred years.
- **Long term:** Period of time with no repository oversight. This period extends over the time of concern in the safety regulations, typically in the hundred thousands of years in the case of high-level waste.

In addition to these key concepts, a number of other relevant terms have been added to the glossary in order to facilitate work within the project (e.g.: control, repository, archives, monument,...). For more information consult the RK&M glossary [6] or the paper on terminology presented at this symposium [5].

Regulatory Catalog

Regulation plays a central role for preserving RK&M. In the course of the project, it became clear that legislation and regulation in this field vary greatly from country to country. A catalog of legislation, regulation and regulatory guidance governing the preservation of RK&M for geologic disposal in 12 NEA member states, the EU and the IAEA was therefore created. Maintaining and updating this list will be an ongoing task over the years. This catalog is a factual collection of information, not a normative study. Because of the differences in legal structures and regulatory frameworks among countries, differences are not unexpected. Nonetheless, the most striking feature of the catalog is the lack of similarity among both the terminology used and the actual requirements in different countries, making it difficult to discern trends or perform a thematic analysis of the requirements [see 7].

RK&M Wiki – Menu Driven Document

In 2011, in order to structure the project findings and to give interested actors a tool to identify the elements of a strategic action plan for RK&M preservation, the project decided that a main deliverable would be a “Menu-driven document “. In the following months different options were discussed and a Wiki-based platform was chosen to implement the idea of a menu driven document. A semantic-mediawiki-powered demonstrator structure was set up and presented to group in early 2013. This structure is presently being populated with information from the project. The key element of the Wiki comprises the strategic articles section. It currently consists of 9 articles that cover central topics of the project (Archives, Bibliography, Causes of Loss of Records, Knowledge and Memory, Connection to Safety, Cultural Heritage, Guiding Principles, International Mechanisms, Makers, Regulation). They are being drafted and reviewed by the project members. Further articles will be added in the course of the project. Due to the increasing amount of information generated by the project, the Wiki has been expanded to include a section that compiles a variety of tools, from foundation project documents to a searchable version of the bibliography, the regulatory catalog and the glossary. A collection of profiles about related RK&M mechanisms is currently being set up.

The RK&M Wiki is being developed with the project members and is planned to be opened to the general public in the spring of 2014. It should act as the central source of information on RK&M and the project as well as a place for discussion.

Studies

In order to deepen the groups understanding of a number of key topics, several studies have been commissioned by the project. Topics covered include Markers, Monitoring, Taxonomy of Loss of Records, Supranational Mechanisms, and Tsunami Stones.

FUTURE WORK

The first Phase and mandate of the project will end in April 2014. It is expected that a second Phase and mandate will be approved by the RWMC. An international conference in eastern France in the fall of 2014 is being organized in order to present the findings of Phase-I and to launch Phase-II. It will be entitled “Constructing Memory - An International Conference on the Preservation of Records, Knowledge and Memory of Radioactive Waste across Generations.”

DISCUSSION & CONCLUSIONS

Overall the project findings and its documentation represent good and novel resources to the whole area of RK&M preservation. The project is also becoming, increasingly, a natural meeting point of specialists and non-specialists interested in the RK&M preservation.

Four main observations from the project are: (a) The context has changed greatly since the 1980s, when RK&M was thought to serve the sole function of deterring intrusion into a repository. Today, the goal is to preserve information to be used by future generations while maintaining technical and societal oversight of the repository for as long as practicable; (b) There are a number of mechanisms, outside radioactive waste management, that can foster RK&M preservation. They constitute a potential resource for waste management organizations and governments; (c) The period of time of a few centuries that will follow repository closure – defined in the RK&M Glossary as the medium term – is rarely specifically addressed in the literature. Yet, this is an important period for RK&M preservation and for preparing the future; (d) The regulatory aspects of long term RK&M preservation are much in need of formulation and systematization.

REFERENCES

1. OECD/NEA: "Progress Report of the Project on Preservation of Records, Knowledge and Memory (RK&M) Across Generations - March 2012-March 2013", NEA/RWM/RKM(2013)1, Paris, 2013
http://www.oecd-nea.org/rwm/rkm/documents/rwm_rkm_2013_1_progress-2012-2013.pdf
2. OECD/NEA: "2010 Survey on Long-Term Preservation of Information and Memory for Geological Disposal of Radioactive Waste", NEA/RWM(2010)7/REV, OECD/NEA, Paris, 2010
<https://www.oecd-nea.org/rwm/docs/2010/rwm2010-7.pdf>
3. OECD/NEA: "Preservation of Records, Knowledge and Memory across Generations - An International Project of the NEA/RWMC (RK&M Flyer)", OECD/NEA, Paris, 2011
<http://www.oecd-nea.org/rwm/rkm/documents/rkm-collective-statement-en.pdf>
4. OECD/NEA: "Preservation of Records, Knowledge and Memory Across Generations - Reference Bibliography within NEA RKM Project, NEA/RWM(2011)13/REV2, OECD/NEA, Paris, 2013
<http://www.oecd-nea.org/rwm/docs/2011/rwm2011-13-rev2.pdf>
<http://www.oecd-nea.org/rwm/rkm/wiki/index.php/bibliography>, publication upcoming
5. S. Hotzel, C. Pescatore, A. Claudel, Ph. Raimbault: "When dealing with the long-term, care on how terms are used ", 14437, WM2014 Conference, Phoenix (AZ)
6. OECD/NEA: "Glossary of Terms - NEA Project on Long-term Preservation of Records, Knowledge and Memory (RK&M) Across Generations", NEA/RWM(2011)14/REV3, OECD/NEA, Paris, 2013
<http://www.oecd-nea.org/rwm/docs/2011/rwm2011-14-rev3.pdf>
7. OECD/NEA: "Catalogue of Legislation, Regulation and Guidance Governing the Preservation of Records, Knowledge and Memory for the Geological Disposal of Radioactive Waste", OECD/NEA, Paris, 2014, publication upcoming

ACKNOWLEDGEMENTS

The author thanks the OECD-NEA RWMC and its Secretariat, the RK&M project members and the external RK&M Project Meeting and Workshop contributors for their support and valuable contributions to this research.