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NUCLEAR ENERGY AGENCY
RADIOACTIVE WASTE MANAGEMENT COMMITTEE

Integration Group for the Safety Case (IGSC)

Summary Record of the First Meeting of the Radioactive Waste Repository Metadata Management (RepMet) Initiative

20-21 January 2014, Issy-les-Moulineaux, France

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JT03356792

RADIOACTIVE WASTE REPOSITORY METADATA MANAGEMENT (REPMET) INITIATIVE

FIRST MEETING
20-21 JANUARY 2014
ISSY-LES-MOULINEAUX

SUMMARY RECORD

Introduction

This is a summary record of the 1st meeting of the Radioactive Waste Repository Metadata Management (RepMet) initiative.

The actions and decisions from this meeting were sent separately to the group after the meeting, but are also included in this document (Annex A). The list of participants is attached as well (Annex B). These and other materials are also are available in the IGSC working area.

Summary Record

1. Welcome

Claudio Pescatore welcomed participants. He informed participants of apologies from Canada, Japan and Germany, which participate in the RepMet initiative but could not attend the meeting.

2. Adoption of the agenda

The participants adopted the agenda.

3. Metadata and data management

3.1. Standards in the field of metadata (József Fekete, PURAM)

There are hundreds of existing metadata standards, both general-purpose and for specific domains. They can be grouped as:

- supporting discovery and access, e.g. Dublin Core, e-GMS
- supporting specific needs e.g. OAIS, PREMIS, Geographical Information Metadata (based on OAIS)

Many standards have defined cross-walks to other standards. For metadata, there are metadata structure standards, metadata content rules, mark-up rules and packaging standards.

One of the tasks of RepMet ought to be to select a standard as a "backbone" and develop it. The requirements on RepMet metadata will include handling local statutory requirements.

OAIS (Open Archival Information System) is a key standard (ISO 14721 and CCSDS 650.0-M-2) for long-term preservation. It includes concepts of Preservation Description Information (such as context).

An EU project, including Pécs University (Hungary) as a partner, has collected standards that could be used around OAIS such as language codes. The general message is that the RepMet initiative should be able to rely upon existing work./standards, which should be adaptable with relatively little effort..

A shortlist of key standards for RepMet is as follows:

- Metadata for records management ISO 23081

- Dublin Core Metadata Element Set

- OAIS

- e-GMS (the UK government metadata standard)

- PREMIS Data Dictionary for Metadata Preservation

- MOREQ: access rights, metadata related to documents

A typical methodology for creating metadata schemas follows the sequence: define scope → select standards as backbone → work down to the details.

DISCUSSION

Are there any common principles between standards? It is probably better to select one as the "backbone" rather than combine disparate approaches. A general guideline is not to add new elements but new sub-elements.

OAIS is available at: http://public.ccsds.org/publications/archive/650x0m2.pdf.

One question the RepMet initiative should ask is: what metadata standards have been adopted already by those who have waste management systems?

3.2. INSPIRE metadata approach (Gordon Appel, Sandia National Laboratories)

INSPIRE (http://inspire.ec.europa.eu/) establishes an infrastructure for spatial information in Europe. Whether or not RepMet adopts INSPIRE specifically, the latter represents an organised approach to defining and structuring metadata in useful ways.

INSPIRE makes a distinction between *discovery metadata* and *evaluation/use metadata*. It also covers data and services.

3.3. INSPIRE overview (Robert Tomas, EC JRC-Ispra)

INSPIRE has been in development for 12 years. It establishes the infrastructure for spatial information for Europe. INSPIRE is a European directive, and is a legal requirement for the European public sector. It is motivated by needs for interoperability.

INSPIRE supports a distributed infrastructure of services. It does not require any collection of new data, but rather to transform existing data holdings to become compliant with its guidelines. The INSPIRE principles are to collect data once and maintain them at the most effective level: free availability where possible, easy to discover, …

INSPIRE includes Implementing Rules for metadata, interoperability of spatial data sets and services, network services, data and service sharing, coordination and measures for monitoring and reporting.

Robert Tomas showed the high-level architecture diagramme for INSPIRE.

The top-level application is European Geoportal, which is accessible to all and contains more than 250000 records. There is an implementation roadmap including when data should become available. The metadata regulations were published in 2008.

There are two tools on Geoportal: a metadata editor for discovery metadata and a metadata validator.

- http://inspire-geoportal.ec.europa.eu/editor – metadata editor for discovery metadata

- http://inspire-geoportal.ec.europa.eu/validator2 – validator

There are only two years left new data to be compliant, and five more for current data. Metadata are already compliant.

The technical guidelines fully utilise ISO 19115/19119/19139 (major ISO metadata standards on geographic information).

Robert Tomas strongly recommends taking INSPIRE as one of the bases for RepMet.

There are metadata elements for data quality. ISO 19157 is used for data quality (a new ISO standard). The data transformation process is captured using the "Lineage" element.

There are 34 "data themes", so the scope is very broad. These are developed by working groups. Some themes are likely to be relevant to RepMet, particularly the utility and governmental services theme.

The aim is cross-theme data interoperability, as some fields such as urban planning need cross-domain combination. The key pillars of data interoperability are conceptual data models, encoding (using GML), harmonised vocabularies, registers.

The INSPIRE Data Specifications define standard structures for content. There are 67 core application schemas and some extended. The core model may be extended for particular communities.

Thinking of INSPIRE for Radioactive Waste Repository Data Management, there are two possible directions:

- fulfilling legal requirement: use INSPIRE metadata profile and extend; take the generic activity complex model as a starting point; relevant data themes

- utilise the INSPIRE process internally

DISCUSSION

Application to RepMet: a geological disposal facility would be a type of environmental management facility, which is a class of facilities already defined by INSPIRE. It would be possible to extend the INSPIRE metadata profile to customise for internal use. The generic "activity complex model" (INSPIRE facilities) is a good starting point.

There is an issue that geographical standards are two-dimensional but safety assessment is four-dimensional! The temporal aspect is partly addressed but not the third dimension.

Is it possible to elevate domain-specific developments to other areas of INSPIRE for reuse? There is a formal process for maintenance of INSPIRE, and also many community forums.

How much participation is there outside Europe? It is followed by North America and Australia.

Have there been any cases outside the EU where implementation of INSPIRE was difficult or contrary to local regulations? In the US there are multiple regulators. Robert Thomas believes INSPIRE is broad enough to handle any local situations.

What about legacy databases with geographical information? This is work that has to be done. It is usually not difficult to map, but does need work. The benefits are high. Either restructure the dataset or use a transformation service.

3.4. Metadata and the CASPAR project (Simon Lambert, STFC)

Sciences and Technology Facilities (STFC) Council was coordinator of the CASPAR project, a project on digital preservation part-funded by the European Commission's Sixth Framework Programme that ran from 2006 to 2009, and has been followed by other projects in the same area. Digital preservation is concerned to "deliver resilient long-term access to content and services, and derive enduring value from digital collections".

A fundamental basis for CASPAR was the OAIS standard (already mentioned above). Some key concepts that are likely to be relevant to RepMet include:

- designated community (for whom the digital material is being preserved

- knowledge base (of the designated community) and representation information (what supplementary information must be provided to enable the community to access and use the material)

- preservation objectives (specific tasks that the designated community should be able to carry out)

- authenticity and provenance

CASPAR developed a set of methods and tools and applied them in diverse areas of scientific data, cultural heritage and performing arts. Some of these have been taken further, for example the APARSEN project's work on interoperability (see www.aparsen.eu).

In general, metadata can be divided into discovery metadata, contextual metadata (the organizational context in which the data was gathered) and detailed (domain-specific metadata). The ideal is to link these layers together.

Another valuable approach arising from CASPAR is "preservation network models", which represent the dependencies of digital objects on the resources needed to render, interpret or reuse them.

DISCUSSION

For work originating in a different domain (like digital preservation), it is important to have an agreed terminology to avoid confusion.

Robert Tomas suggested it would be possible to combine OAIS with INSPIRE.

The CASPAR results themselves might be more relevant to the RK&M project.

Kevin McMahon pointed out that Oakridge National Labs are doing something similar to CASPAR. Extracting information from old data is certainly important. The problems can be as basic as no longer having devices to read the data. The temporal aspect of repository management is significant.

Certification of repositories over the long term could be important. But repository certification requires a "stake in the sand", declaring this is how things are done now—but everything changes.

However it often happens that the requirements are always translated into "save everything" because the alternative—throwing some information away—is not considered acceptable.

4. The RK&M project (Claudio Pescatore, OECD NEA)

RK&M = Records, Knowledge and Memory. The project is approaching the end of its first phase after four years, and is now planning the second phase. It is concerned with post-closure, and has looked at how memory can be preserved. Timescales are short term (decades), medium term (hundreds of years) and long term.

The project is looking at other projects which are attempting to preserve knowledge and a bibliography is available.

The "set of essential records" was examined. There are Strategic Articles on nine topics, and two more coming. A key resource is the wiki for information sharing.

The guiding principles include separating oversight from post-closure safety.

A glossary has been published, a peer-reviewed set of terms and definitions, which is important for consistency of usage. Some words are used loosely in many ways, and the glossary defines one particular way.

There glossary is available online at: http://www.oecd-nea.org/rwm/docs/2011/rwm2011-14-rev4.pdf

Feedback would be appreciated.

DISCUSSION

Should offsite links from the glossary (e.g. to PDF files) be allowed? What if they disappear?

How would the members use the glossary? Would everyone adopt it? It's a good basis but we can't oblige its use.

Robert Tomas recommended using a standard vocabulary for non-domain-specific terms. So *metadata in INSPIRE is about datasets, not physical objects*.

The RK&M project has created a bibliography, with core and non-core references. It is now on the wiki as a database. The latest version of the bibliography can be downloaded here: http://www.oecd-nea.org/rwm/docs/2011/rwm2011-13-rev2.pdf

Every single wiki page has a discussion page to allow users to submit feedback on that page.

Claudio Pescatore emphasizes that this is not a service of NEA to the world; it is a project working for itself and, at the same time, doing something useful for a wider audience.

There will be a high-profile conference on "Constructing Memory" in September in Verdun, just before the September RepMet meeting.. There will be presentations and discussion in subgroups, plus site visits.

5. Metadata for whole Waste Packages ready for disposal: national reports

5.1. ONDRAF/NIRAS, Belgium (Chris De Bock)

ONDRAF/NIRAS is the only organisation responsible for radioactive waste management in Belgium. There are three levels of waste as per the IAEA classification. The exact amounts are not well known, as the reference scenario is that all fuel will be reprocessed. ONDRF/NIRAS takes "ownership" of waste, and the producer pays a fee to cover management costs.

The system rests on three pillars: Waste Acceptance Criteria; system of Qualifications; Acceptance Procedure. Waste Acceptance Criteria are set up for specific subdivisions of radioactive waste.

There is a waste tracking tool within ONDRAF/NIRAS that manages all documents related to waste, ownership transfer etc. throughout the entire lifecycle. *The list of what is requested in the "collection request" form might be useful to RepMet.*

DISCUSSION

Claudio Pescatore asked whether the preservation objectives and target audience have been analysed in this case? The purpose is to keep as much as possible or information will be lost. It is very difficult to say what will be needed in future. However, at some point in the future it might be desirable to discard information—is there an analysis of what can be lost? Is there contextual information on why information is gathered?

5.2. SURAO, Czech Republic (Dmitry Lukin)

In practice it is difficult distinguish data from metadata.

Richard repository: low/intermediate level waste, operational 1964–2070. Older documents are only on paper, then on Excel; now dedicated information systems are used (ZISS and WTS).

ZISS is a client/server application, not flexible architecture, uses IE as front end, not all data management requirements were implemented.

WTS was designed to improve data management, also to have compatibility with RAWIS, the biggest waste generator. Data import from XML, stored in Oracle database. Not all data management requirements implemented – new version to fix this at end of 2014. Export of data to NEWMDV (IAEA).

Another repository is managed by the power company's own system and SURAO gets exports of the data.

Data is based on the Atomic Act and recommendations by IAEA.

The "accompanying sheet" details radioactive waste generator information, repository information, waste unit information. One function of the ZISS system is to generate the accompanying sheets.

Current systems are not sufficiently compatible with each other, so it would be valuable to have a metadata specification to aid interoperability.

5.3. ANDRA, France (Hervé Bienvenu)

The La Manche disposal facility (CSM) is now closed and it provides valuable experience. 1 470 000 packages were delivered and 920 000 later disposed of. At first paper documents were used, then information systems from the 1980s. All historical papers have been scanned with Optical character recognition (OCR) software. The old paper documents do not provide much information by today's standards. Sometimes they were transposed by hand in the delivery register, sometimes using different words.

In the CSM system new sets of metadata were defined and implemented. The metadata has evolved over the years, for example change of units. The documentation maps cryptic identifiers to meanings.

Some metadata comes from the producer (transport, packaging), some from Andra (receipt, waste container, activity info).

They also need document metadata to tell what the waste database metadata means. They must keep a link between the two, and have good traceability in metadata. Links to find information will take more and more time to rebuild. People forget earlier names that were used.

More recent is the Centre Aube Disposal Facility. A tracking system passport is used, with barcodes for unique identification. Certification of the container is verified. There is a central Oracle database used for many purposes. It is not clear what it is necessary to preserve long-term and how to make it intelligible.

There have been nine releases of the PROCOM system and documentation—links must be kept.

DISCUSSION

Which metadata is useful for long the term? Details such as transport and names of people etc. will not be very useful, but have a cost.

Each facility has its own needs; this is a recurring problem.

Have they considered using QR codes instead of barcodes? Yes, but it won't happen soon.

How often are the systems queried for information? For Manche, never. The new system is constantly used by managers of waste.

Claudio Pescatore state that it could be useful to have an automatically generated summary/"story" for ease of understanding. Different story formats for licensing, inspection, … or for different audiences (including the public).

5.4. PURAM, Hungary (Zoltan Nagy)

There are two disposal facilities for low and intermediate waste in Hungary, and some research facilities for \high-level waste. There are "historical" packages from before 2007, before Waste Acceptance Criteria were introduced.

PURAM assigns a bar code and seals the drum with lead, and is then the owner. The WIRKS system creates "paperwork" (tracking system).

The aims of metadata are to identify, authenticate, describe, locate and manage records about the waste disposed of in the Bátaapáti repository in a precise and consistent way.

Preservation standards in the system are based on CASPAR, but procedures on how and why are not yet in place.

DISCUSSION

Why does PURAM need metadata? To improve sharing/interoperability.

Completeness can never be guaranteed for metadata: the best to do is reach consensus within the community.

The group of ISO standards for record management ISO 23081 were mentioned. We should look at these to see if important.

5.5. JAEA, Japan (Slides, no oral presentation)

Extract from slides:

JAEA does not have a role to satisfy all information requirements for waste package. However, it is expected to study what information structure is needed for making a repository safety case and/or for long-term record keeping. As a part of the study, information and data of glass dissolution is discussed for various conditions.

Discussion on the "Database on Glass Dissolution" on the previous slide would imply that examination of items, types, contents and preservation methods of information and data in the databases developed in the R&D works so far can help find out commonalities and differences among these databases and also help obtain insight(s) concerning expectations and requirements for metadata.

5.6. ENRESA, Spain (Miguel Angel Cuñado)

As is typical, there are major and minor producers of waste. There are four stages of workflow. On inventory/acceptance ENRESA issues a "process book" to verify the process proposed. The waste package info includes: id number, management type, conditioning, …. Packaging type is then authorised by ENRESA, no packaging can proceed in the absence of this. After this a batch is produced by ENRESA for testing by ENRESA – if OK package type is accepted. Radionuclide content of packages is tested and if OK packages are classed as disposable. Visual inspection is done at the producer's site. After collection of packages ownership passes to ENRESA.

ENRESA has a software application for waste package management.

DISCUSSION

RepMet should look at ISO 19115 (metadata for geographic information) and ISO 19119.

Simon Lambert pointed out that the relationship between metadata and workflows seemed important: metadata supports the workflow in the short term - will the workflow produce the metadata needed in long term?

Claudio Pescatore indicated that why some data is kept and other not is an interesting question.

SUMMARY OF DAY 1

What are the main messages? Add ISO 19115/9 to list of key standards (but not INSPIRE itself). INSPIRE is fundamentally about spatial data, so how relevant is it? On the other hand, it is also a legal requirement in EU.

INSPIRE models finish at the level of facilities/installations, not containers (which are community-specific). Also activities, permissions, …. But the higher-level is well defined and will be useful.

Robert Tomas stated that the INSPIRE community uses Enterprise Architect for UML modelling

The APARSEN project report on interoperability might be relevant.

Simon Lambert underlines that it seemed clear that the *relationship to workflows* will be a big issue for everyone.

Kevin McMahon referred to a useful resource: http://curie.ornl.gov (Oakridge project, Centralized Used Fuel Resource for Information Exchange). This has a huge list of documents with a powerful search engine. The intention is not format preservation but gathering image files and docs. This work came out of the recommendations of the Blue Ribbon commission.

5.7. NDA, UK (Alex Carter)

NDA is the strategic authority in the UK, which employs Parent Body Organisations to manage sites for decommissioning. There are also Site Licence Companies (SLCs). RWMD is part of NDA responsible for geological disposal. RMWD will become a wholly owned subsidiary of NDA.

RWMD has a Disposability Assessment Process.

Package Record = index + "as-made" records (archived) + storage records (live).

Alex Carter has a list of possible sources of waste package metadata or guidance. The SLC company standards are owned by the companies themselves so not freely available. There are various tools/online sources. It would be worth looking at commercial software products such as EMWaste.

Alex Carter advocates a metadata library for waste packaging. It would introduce a common syntax for tagging waste package records across different SLCs, and allow multiple package records to be consolidated. This aids searching of package records for information on specific topics.

He suggests using FEP (Feature, Event, Process) as a starting point (though later there were opinions that FEP is probably not the best starting point).

DISCUSSION

Claudio Pescatore asked whether the RepMet initiative should record other than safety data, for instance resource value in future (copper). When we think of the longer term, what is the purpose for keeping data? If to inform, then wider than just for safety purposes.

Kevin McMahon stated that the ideal is to *inform future generations as fully as possible*.

5.8. Sandia National Laboratories, USA (Kevin McMahon)

There are no uniform national metadata requirements across waste types. Metadata is generally determined by regulations on storage, transportation or disposal facility requirements.

There are different sources of waste package metadata, and manifests from different organisations.

Many screenshots showing metadata – could be very useful to review these.

Claudio Pescatore argued that the *bibliography on metadata for waste packages should be expanded*.

5.9. SKB, Sweden (Lena Morén)

Sweden uses the KBS-3 system for spent nuclear fuel and the Loma system for low/intermediate-level waste.

Metadata according to ISO 23081-2.

There are regulations about content, listing what the records should contain such as identifier, type, amount, …. There are regulations about filing: how long to keep, what must be preserved, ….

There are various databases with info on waste (Triumf, Draak, Gadd, Pluto, Dark). There are no common rules, strategies or routines for selection of metadata. There is a national coding system for identification of waste packages.

DISCUSSION

What are the priorities for metadata? Uncertainty about which data needed to keep, apart from those obliged to keep because of regulatory requirements.

6. Possible relationship with INSPIRE (Robert Tomas)

http://inspire.jrc.ec.europa.eu

All members states must now provide metadata about datasets under INSPIRE.

The relevant part of INSPIRE is the "utilities and government services" theme (in Annex III of INSPIRE).

Annex III legislation would be relevant to us (last link in legislation section) There are data specifications on the website, containing guidelines and data models.

The Technical Guidelines document gives a description and feature catalogue. There is a generic process "extending INSPIRE models" for particular domains. There is guidance (examples of other types of extensions) but it is not simple.

7. Summary

Simon Lambert produced an initial summary of the main points emerging from the preceding presentations and discussions. Key questions/issues are:

- What existing standards are relevant and how?

- What existing standards do we need to know more about?

- The role of metadata for discovery and access, enabling (reliable) use, detailed description (domain terminology)

- Ideas and approaches from digital preservation include the designated community, preservation objectives/"stories", representation information

- National commonalities and differences

- The relationship between workflows and metadata

- "Completeness" of metadata

- Interaction with existing information systems and other parties

- Evolution over time and problems of forgetting

- Discarding information deliberately as it becomes less relevant

- Handling documentation as an aspect of metadata

DISCUSSION

Claudio Pescatore pointed out that we need not only an inventory of available standards but also to understand the relationships between them.

Robert Tomas suggested that the safest way to start is analysing relevant legislation in the field. Kevin McMahon agreed with this proposal. The first step is the "logical data model" based on legislation/regulations. But not all presentations have provided that background.

Legislation that is on the wiki so can be checked, though it will be in different national languages.

Regulations could be checked against ISO standards – start of a completeness check.

Not all data comes from regulatory requirements, though.

Are the IAEA documents also relevant?

It would be useful to have a full list from INSPIRE and elsewhere. Example of metadata for describing a container—start with a global description and refine. So the participating organisation should provide information about what kind of data they collect and why.

It is probably best to match bottom-up (as above) and top-down approaches. Look at projects etc. for principles, tools etc. they can offer.

Bottom-up will give an inventory of what is gathered because of regulations.

We could do a gap analysis on standards to show what else we could collect.

Claudio Pescatore underlines that the designated community should be considered in order to inform global principles. Also discussion of interplay between workflow and metadata – this concept could be developed at the next meeting. Regulations may also provide guidance on what not to keep. Stories for different timescales and different audiences should not be forgotten. We should write down and discuss principles such as designated community and representation information. If we know what stories[1] are of interest then we can identify metadata which is not necessarily regulatory: policy, community, how decisions were made. Reconstructing decisions is difficult.

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[1] On the idea of presenting records as a "story" se also http://www.youtube.com/watch?v=1mE9v-46pPs#t=239 . In short the video highlights that people think differently than computers and this should be taken into account upon designing computer (or metadata for that matter) architecture. The video's first 1,30 minutes minutes pertain to the webinar and can be skipped. The essence is in the presentation.

Annex A – Decisions

1. As of today, all RepMet current members will be granted access to the RK&M Wiki. The address of the wiki is as follows: http://www.oecd-nea.org/rwm/rkm/wiki/

   The password is the same as the one that is currently used for accessing NEA password-protected pages. If you do not have a password yet, or if you cannot remember it, you may retrieve it at: https://www.oecd-nea.org/tools/account/retrievepassword
   It is understood that,

   - members can provide comments and suggestions, e.g., additional references, at any time.

   - when visioning the Wiki, the RepMet colleagues will embed comments in the discussion section of the wiki page but will not make changes to the actual texts.

   - RepMet members will familiarize themselves with the RK&M glossary and implement it as much as practicable. This is the glossary that will be used in project documents. Special attention is called to the difference between "data" and "record".

2. Starting 28 January 2014, a password-protected web page will be available where all documents from this and future meetings will be stored. The link will be communicated to participants.

3. By 31 January 2014, all speakers shall provide an abstract of their presentation to be included in the minutes of the meeting. The Secretariat will provide the official minutes afterwards.

4. By 31 January 2014, all shall provide further comments, if any, on the *VISION DOCUMENT FOR THE RADIOACTIVE WASTE REPOSITORY METADATA MANAGEMENT (RepMet) PROJECT*. Claudio will add to the text the possibility of in-kind contribution as a form of support for the project.

5. During the second half of March 2014, all organizations are invited to send grant letter to the NEA. Copy letter to Mrs. R. Philippe (rosa.philippe@oecd.org).

6. By 2 May 2014, all shall provide a document that includes the metadata that are kept on "waste packages ready for disposal" as well as the various regulatory requirements that led to the selection of those metadata. A template will be prepared by the Secretariat in February in order that all provide information based on the same format.

7. During May-July 2014, the NEA will compile the metadata information file and will propose an analysis of the information through a consultant. These information will be discussed at the 2nd RepMet meeting

8. By mid-May, an informal group composed of Jozsef FEKETE, Raymond MUNIER, and Robert TOMAS, will propose a short survey on INSPIRE principles, regulations, tools, applications and recommendations and its implications for RepMet. The survey will be distributed to RepMet members in advance of the 2nd RepMet meeting for discussion at the meeting.

9. By mid-May, the NEA will generate a document on the definition, principles and applications of metadata and a short survey of the metadata standards that were shortlisted at this meeting. The short survey will look at the standards and their interrelations with a view to understand better their implications for RepMet work. A consultant will be tasked with producing these documents. This information will be discussed at the 2nd RepMet meeting.

10. The 2nd RepMet meeting is scheduled to be held at the NEA Headquarters on 18-19 September, 2014. All RepMet colleagues are also invited to participate in the international conference and debate on "Constructing Memory" that will take place in Verdun 15-17 September 2014.

Annex B– List of participants

Belgium/Belgique

Mr. Chris DE BOCK   *ONDRAF/NIRAS*

Czech Republic/République tchèque

Mr. Dmitry LUKIN   *RAWRA/SURAO*

France

M. Dominique LE MASNE   *Conseiller*
                                 Permanent Delegation of France to the OECD

M. Hervé BIENVENU   *Chef du service gestion des connaissances*
                                 Agence nationale pour la gestion des déchets radioactifs

Hungary/Hongrie

Mr. József FEKETE   *Chief Information Officer*
                                 Public Limited Company for Radioactive Waste Management

Mr. Zoltan NAGY   *Leader Geologist*
                                 Strategy Development and Engineering Office
                                 PURAM

Spain/Espagne

Mr. Miguel Angel   *ENRESA*
CUÑADO PERALTA

Sweden/Suède

Ms. Lena MORÉN   *Swedish Nuclear Fuel and Waste Management Co*

Mr. Raymond MUNIER   *Geoscientific Research Coordinator*
                                 Swedish Nuclear Fuel and Waste Management Co

United Kingdom/Royaume-Uni

Dr. Alexander CARTER   *Post Closure Safety Specialist*
                                 Nuclear Decommissioning Authority (NDA)

Mr. Simon LAMBERT   *STFC Rutherford Appleton Laboratory*

United States/États-Unis

Mr. Gordon APPEL   *Enterprise Information Systems*
                                 (for Sandia National Laboratories)

Kevin MCMAHON   *Sandia National Laboratories*

EU/UE

Mr. Gunnar BUCKAU   *JRC-ITE / Waste Management Policy Support*
                                 European Commission

Dr. Robert TOMAS   *Scientific / Technical Project Officer*
                                 DG Joint Research Centre
                                 European Commission

OECD/OCDE

Mr. Rong-Huei HOU   *Consultant*
                                 NEA/PR

Mr. Philippe MAUPAI   *Assistant*
                                 NEA/PR