SAND2017-12105C

Metadata in Geological Disposal of Radioactive Waste

The RepMet Initiative

Presentation for EAFORM 2017
November 2017, Osaka, Japan

U.S. DEPARTMENT OF ENERGY | NNSA National Nuclear Security Administration

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Background

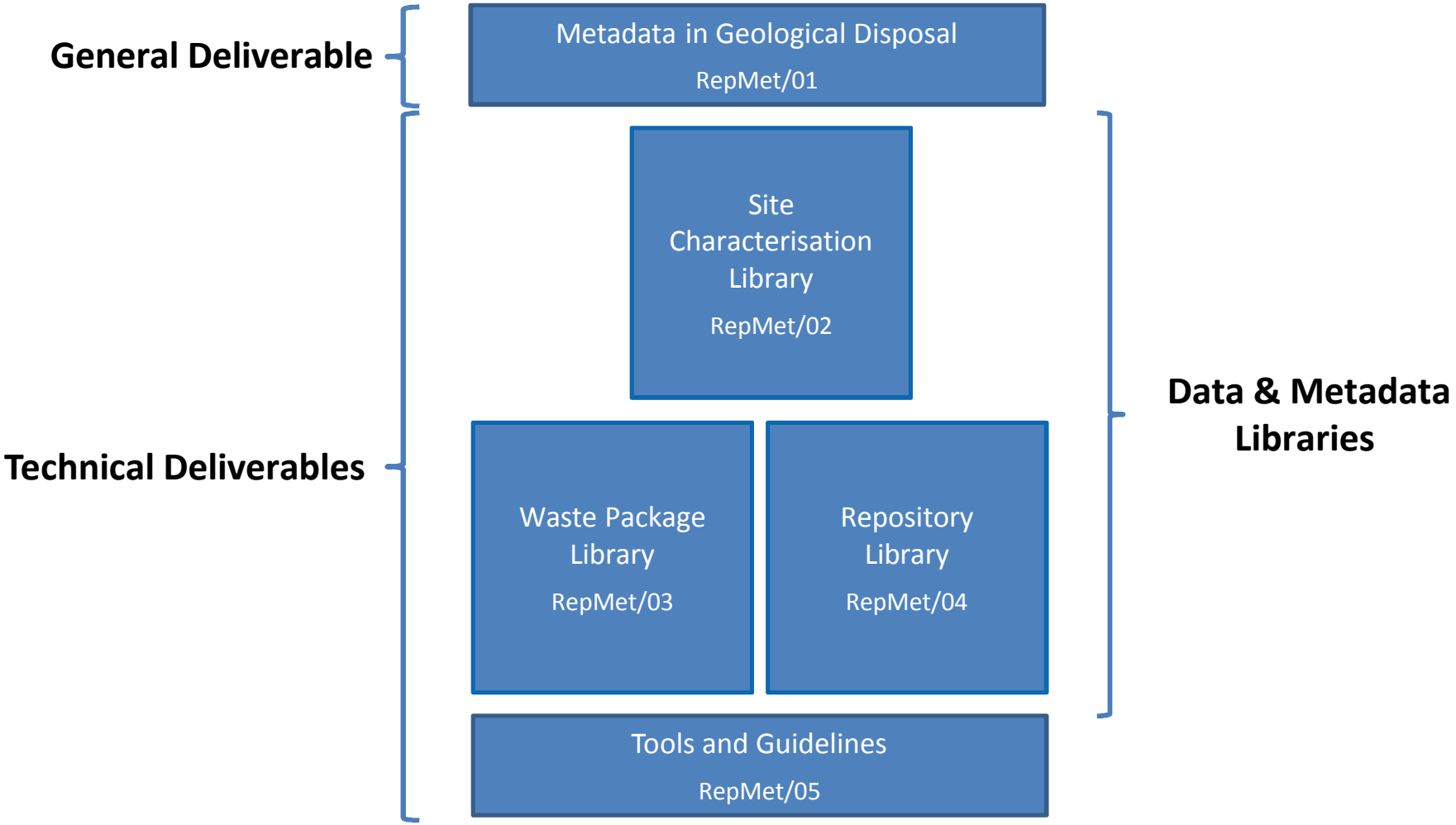
OECD BETTER POLICIES FOR BETTER LIVES — Nuclear Energy Agency — NEA NUCLEAR ENERGY AGENCY

Radioactive Waste Management Committee (RWMC)
Integration Group for the Safety Case (IGSC)
Radioactive Waste Repository Metadata Management (RepMet)

- **Objective:**
  Investigation of the role of metadata in data, information and knowledge management within the national programmes for 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 Laboratories*

RepMet Deliverables



Metadata in Geological Disposal

Goals:

- To introduce metadata and RepMet to a decision maker in a WMO

Contents:

- What is metadata?
- What is RepMet and what has it done?
- How can metadata help geological disposal? (context, search, administration etc.)
- Who are our designated communities?
- Guidance on metadata policy in waste management organisations
- What recommendations does RepMet make to WMOs?

Tools and Guidlines

Goals:

- To introduce and describe in a separated document the tools and the techniques used for the development of the RepMet libraries.

Contents:

- What is data modelling?
- Conceptual data models (ERD diagrams)
- Dictionaries and controlled vocabularies (SKOS, RDF)
- Common metadata standards used in multiple libraries:
  - OGC Observation & Measurement
  - Minnesota Record Keeping
  - 'INSPIRE'

RepMet Libraries

Goals:

- To introduce, at a suitable level, the data and metadata relevant to geological disposal
- Each uses a common chapter template

Contents:

- Review of existing standards (as applicable)
- Conceptual data model development and methodology
- Data and metadata attributes and high-level justifications (why collect ?)
- Domain specific dictionaries
- Library level versioning
- Web-product output format

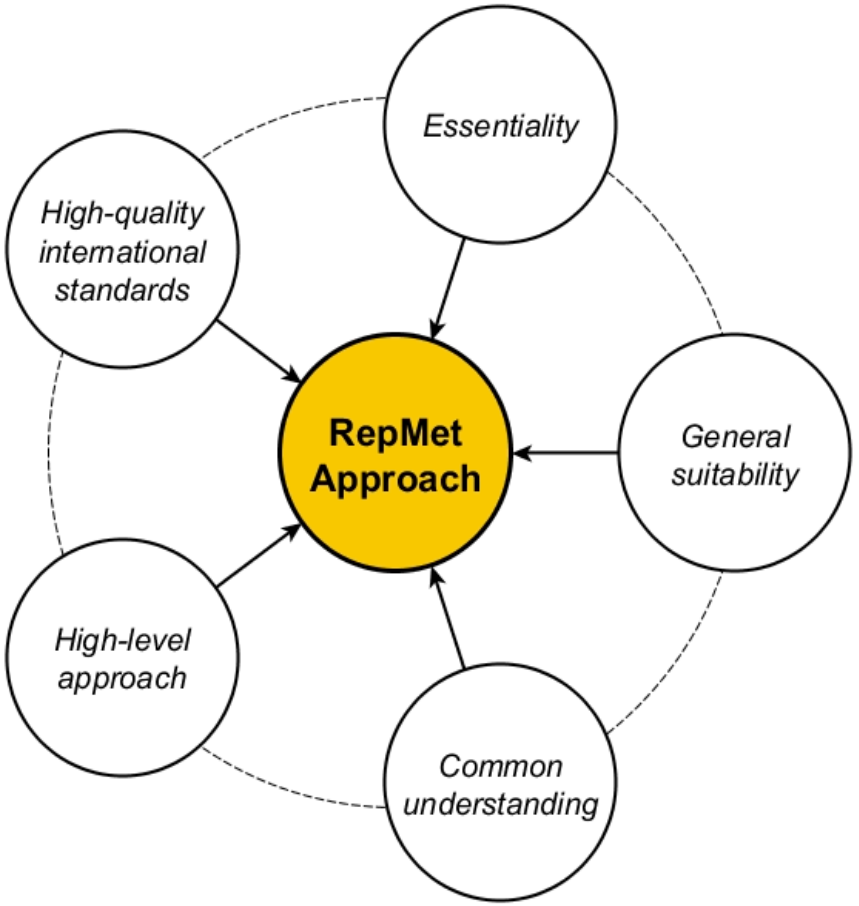
RepMet Libraries

Disciplines & Topics Covered

Disciplines	RepMet Libraries	Topics
Geoscience	*Site Characterisation Library*	Geological and geophysical characterisation of the repository site.
Radioactive Waste Management	*Waste Package Library*	Packaged waste and spent nuclear fuel ready for final disposal at the repository.
Engineering	*Repository Library*	Repository requirements and structures at the closure.

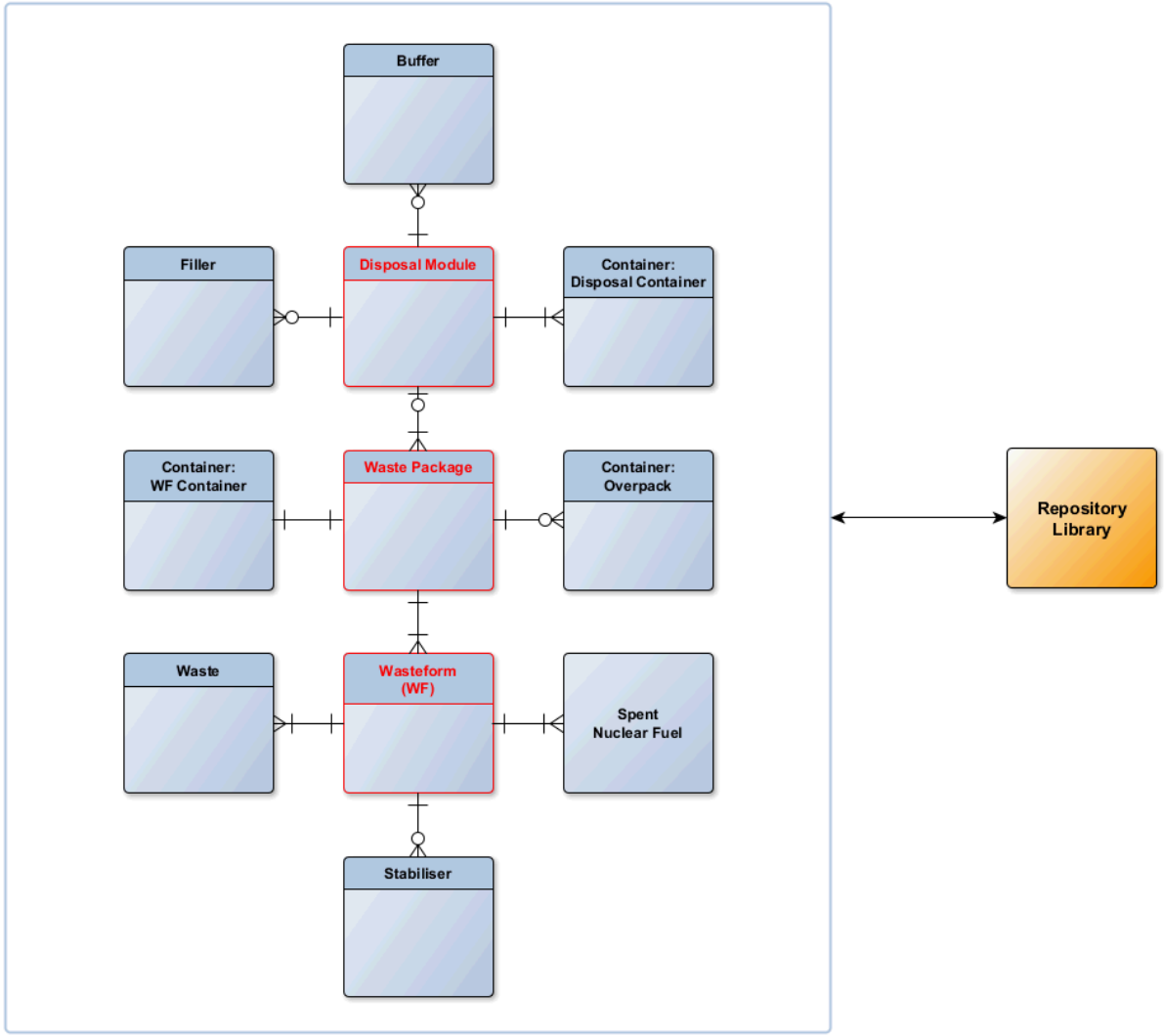
The RepMet Approach

- **High-level -** did not consider IT systems explicitly;
- **Essentiality** - library content not exhaustive or universal…minimum needed;
- **General suitability** - applicable to all rad waste management orgs;
- **Common understanding** - controlled vocabularies for library contents such as entities, data, metadata, properties, etc.;
- Use of **international** well-consolidated and high-quality **standards**.

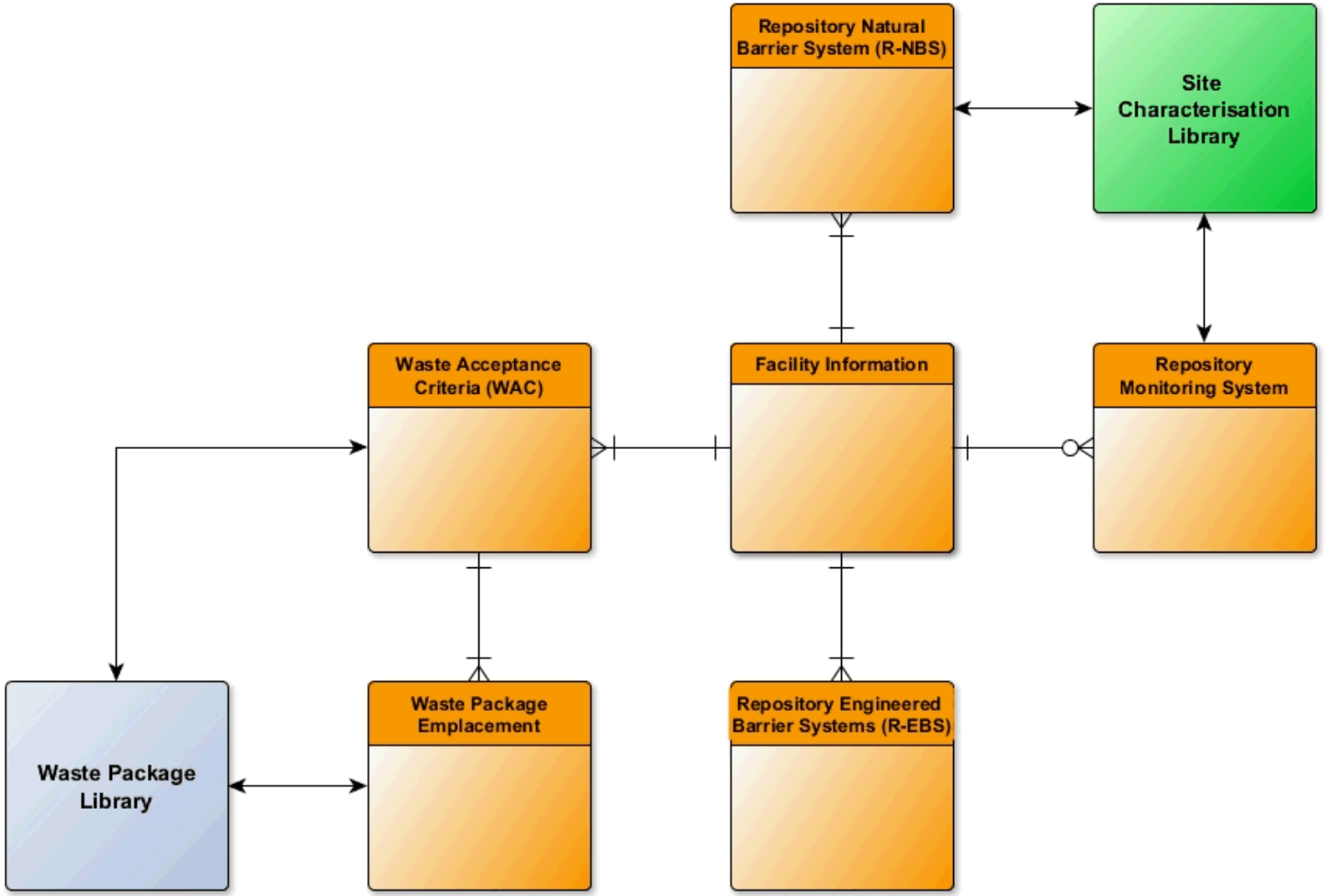


Waste Package Library

Conceptual Data Model

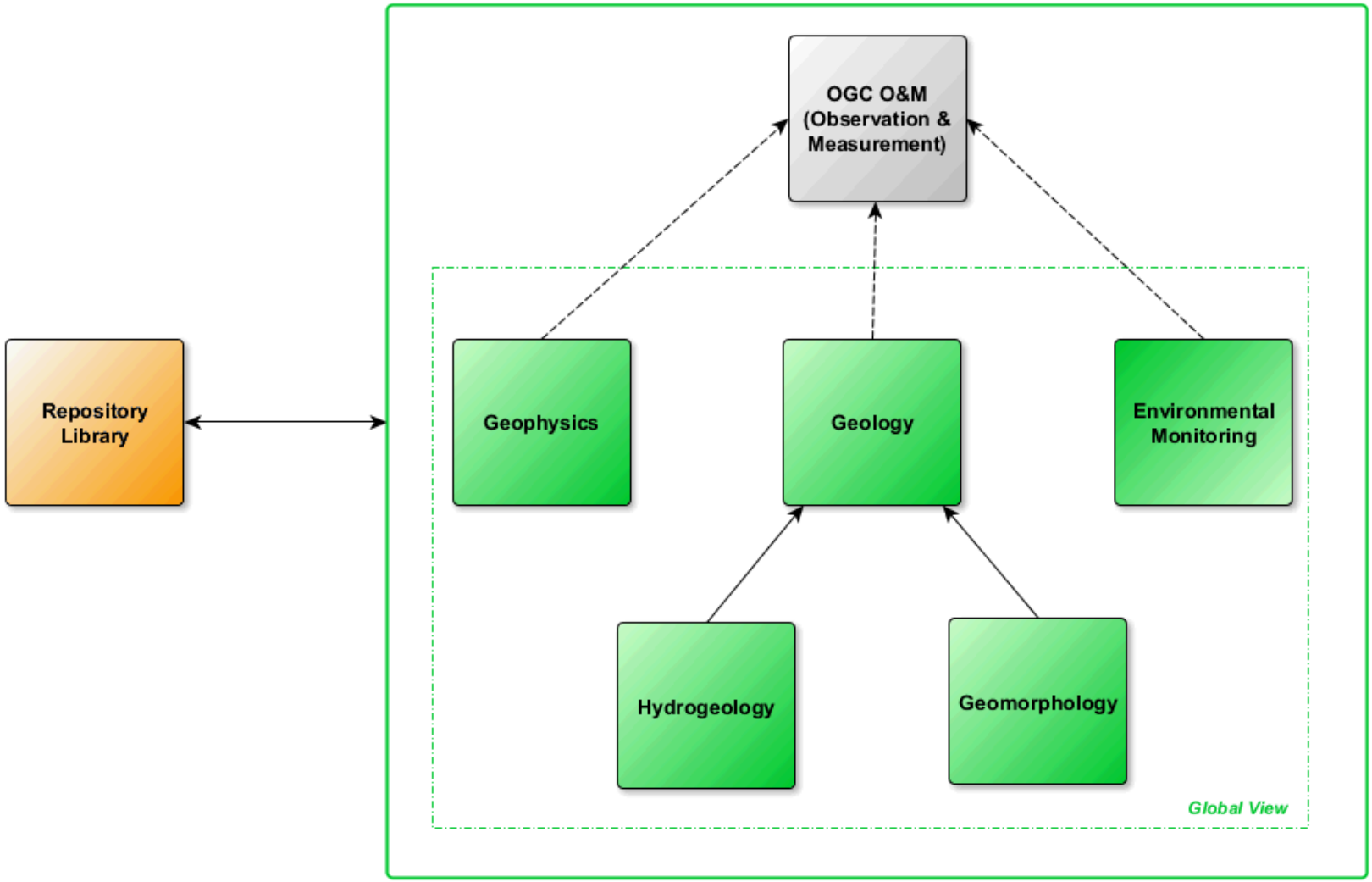


Repository Library
Conceptual Data Model



Site Characterisation Library

Conceptual Data Model



RepMet Web Based Products

Future Enhancements

Clicking on a box of the high level picture, it will be possible to access to the contents of the single piece of the RepMet work.

OGC Observation & Measurement Standard (**grey box**);

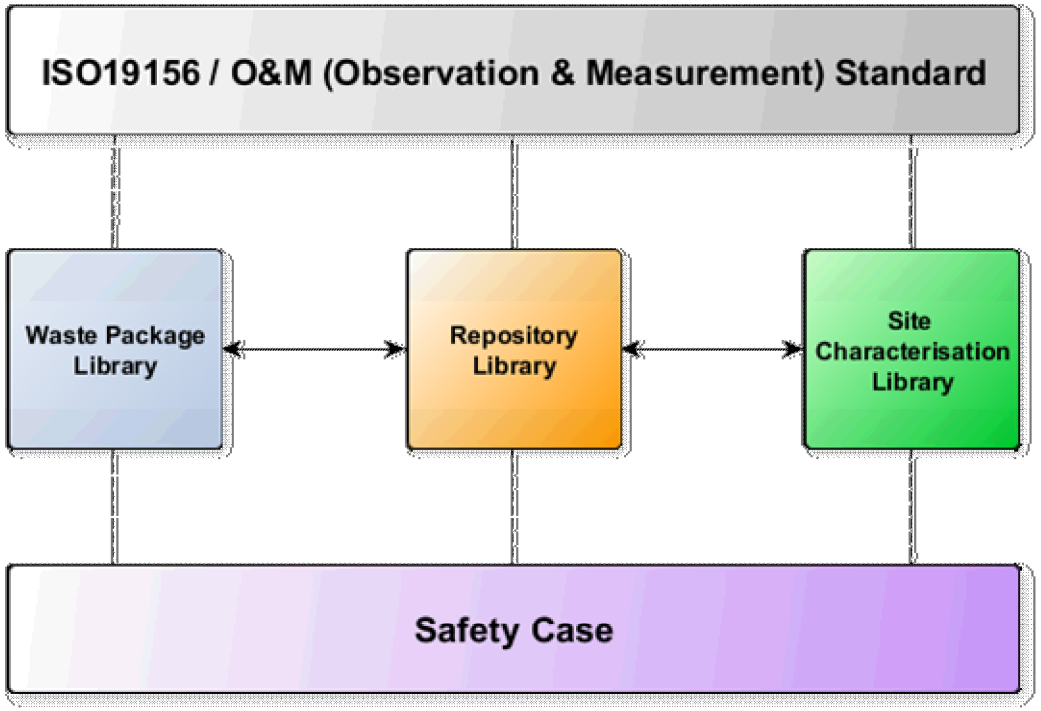
Waste Package Library (**blue box**);

Repository Library (**orange box**);

Site Characterisation Library (**green box**);

Safety Case (**purple box**) (future work).

RepMet High Level Picture



RepMet Proposed Future Work

- Develop complete metadata structure/database for Safety assessment tailor-made for the needs of the nuclear waste industry.
- Create new RepMet Libraries involving different topics for waste management pre-closure, e.g. “waste treatment and conditioning”, “plant operations”, “interim storage of the waste package”;
- Extend the current RepMet Libraries (Conceptual → Logical data models);
- Apply the O&M standard that RepMet has adopted to support safety assessment process chains and for the development of the safety case
- Define SKOS controlled dictionaries for the IGSC FEP Task Group;
- Define conceptual requirements for the creation of a central metadata database to allow data from multiple databases (e.g. commercial off the shelf [COTS] offerings) to be extracted and combined from a single query. These requirements should consider the possible conflicts for different interests with handling of metadata.
- Formulate data dictionaries for RWMO modelling.

Thank you…ありがとうございました

Upcoming Workshop…

NEA Workshop on Implementation of the Methodology for Presenting National RW and SF Inventories in National Management Programmes

NEA Headquarters, Boulogne-Billancourt, France
28 February – 1 March 2018

https://www.oecd-nea.org/download/rwm/egirm-public/workshop2017/index.html

MCMAHON, Kevin A
Manager, Nuclear Waste Disposal Research & Analsyis
Sandia National Laboratories
Albuquerque, New Mexico USA

kamcmah@sandia.gov
Mobile: +1 505 944 6511