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SaND
Safety of Nuclear
Waste Disposal
Open Access

Supplement of

IAEA compiling state of knowledge and developing high level guidance in radioactive waste management

Stefan Mayer and Rebecca Robbins

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IAEA
International Atomic Energy Agency

IAEA Waste Technology Section

Capturing State of Knowledge and developing high level guidance in Radioactive Waste Management

Rebecca Robbins & Stefan Mayer

IAEA – NE Department - Waste Technology Section

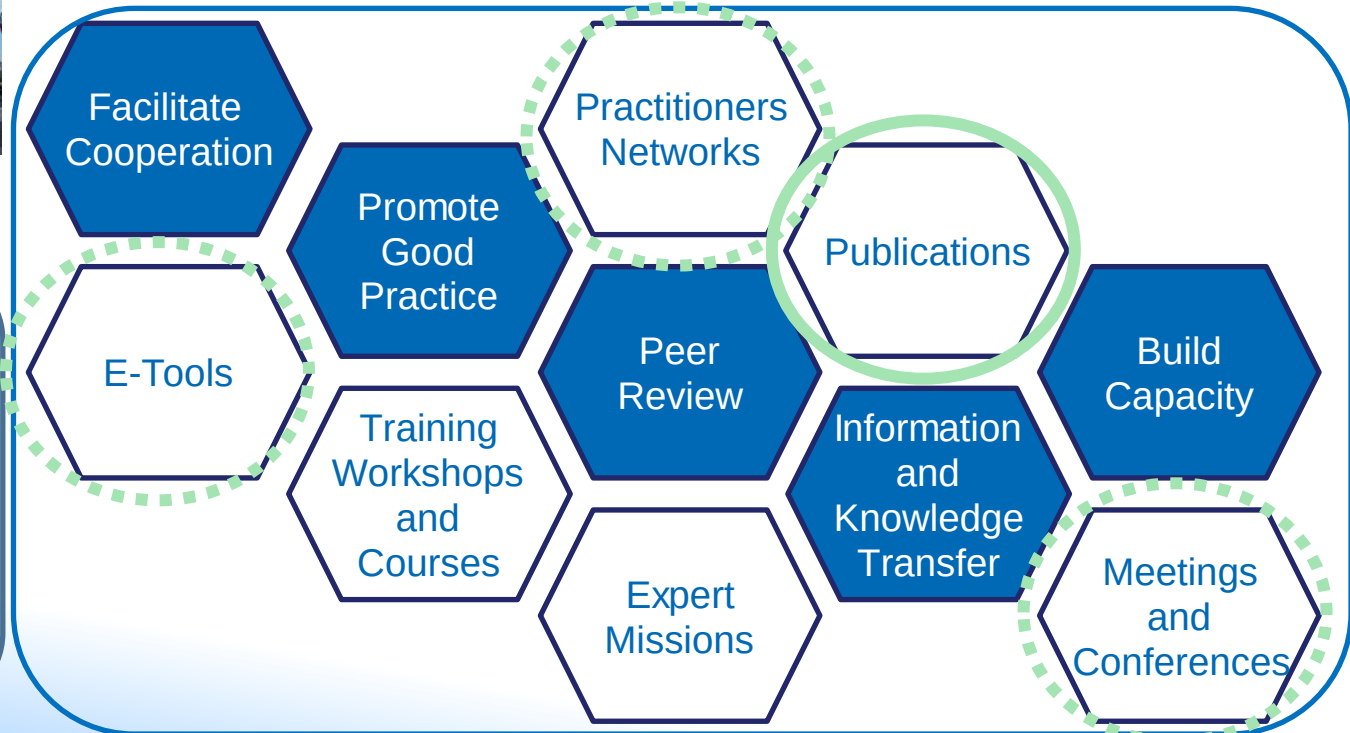
safeND Research Symposium, November 2021

IAEA activities that support global cooperation in RWM

Established in 1957 - 172 Member States

~ 2,560 multidisciplinary professional and support staff from more than 100 countries

Range of mechanisms to elicit, capture, assess, synthesize, structure and transfer knowledge



Prior to focusing on KM of RWM - …

… - What is it?

- ✓ Depends on scope & purpose
- ✓ Tool for consistency & continuity including transfer of knowledge
- ✓ Elicit and synthesize good practices on the overall strategy, programmatic needs, the various steps and associated technologies of RWM
- ✓ Elicit the framework that allows to capture all relevant K-topics for RWM in a structured and comprehensive manner

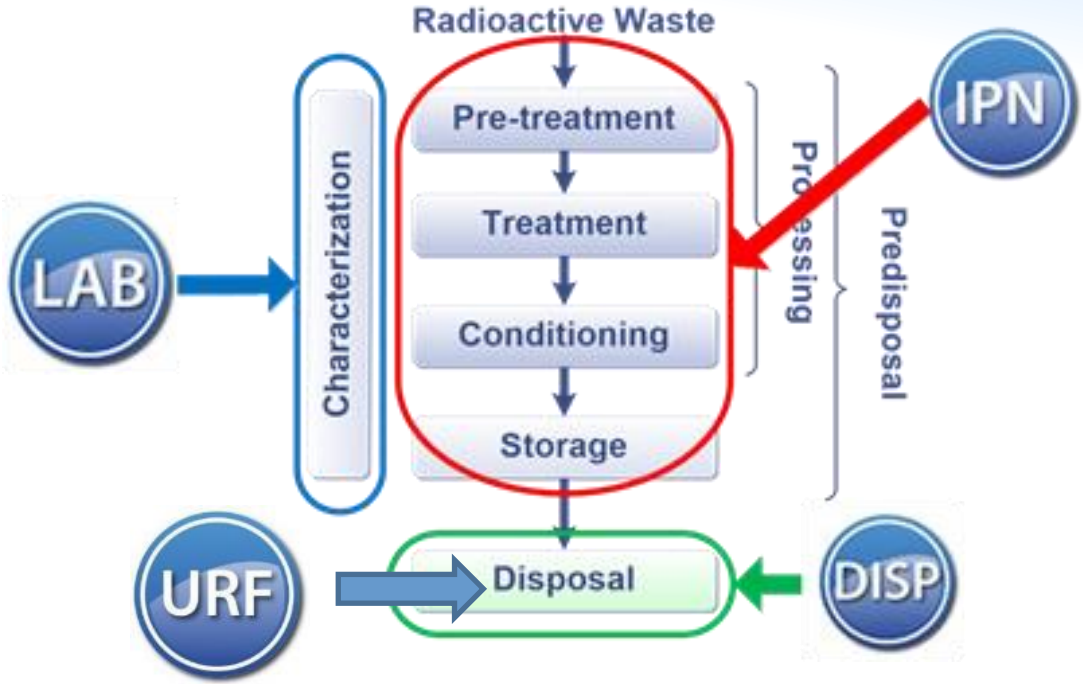
… - What is it for?

- ✓ To effectively transfer to peers & ”the future”
- ✓ To work with a reference base of knowledge
- ✓ A starting point for innovation & optimization

… - What is specific to RWM-KM?

- ✓ No “industry reference” for RWM framework
- ✓ Limited experience with “full” national RWM
- ✓ Unusual time scales of disposal programs

Capturing Knowledge – Sustained interaction with "where K is"
Professional Networks - link



Noting also the specifics of RWM for Disused Sealed Radioactive Sources

Capturing Knowledge – Comprehensive global status

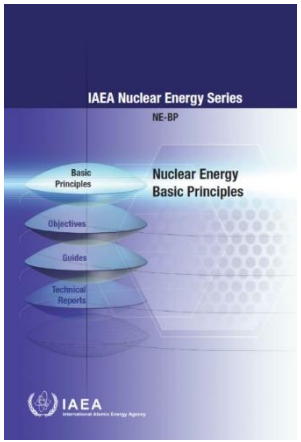
Conference Website:

www.iaea.org/events/international-conference-on-radioactive-waste-management-2021

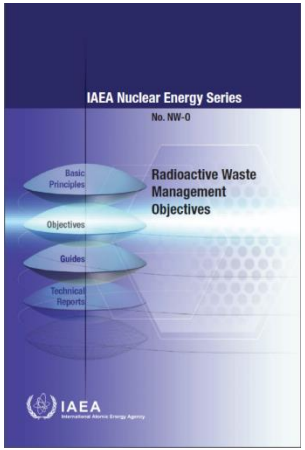
- ✓ Thank you for the many contributions!
- ✓ Session recordings available through www!
- ✓ Proceedings under development!

Capturing Knowledge – Publications remain central

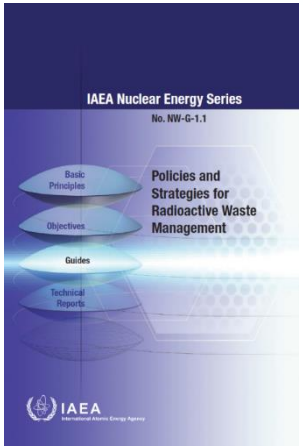
Principles



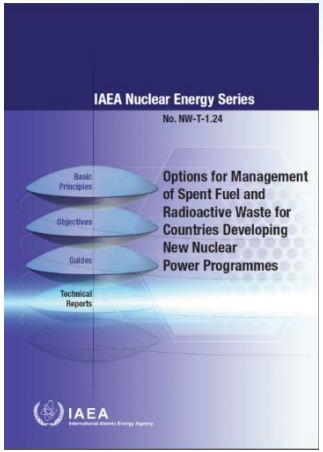
Objectives



Guides



Technical Reports

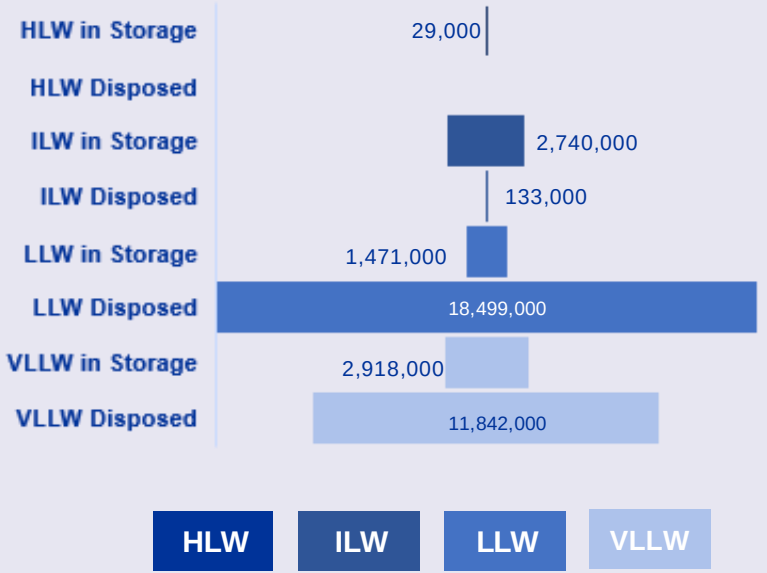


These documents reflect and build upon international experiences and good practices on how radioactive waste management and spent fuel management can be implemented.
The Knowledge captured is presented by way of guidance and examples.
These need to be understood and if necessary adapted to a specific situation, to ensure they can meet all required protection goals (safety, security, safeguards) in a sustainable manner.

K on RW: Inventories – Characterization – Waste Acceptance Criteria

Radioactive Waste – A Global Issue

Global Volume of Solid Radioactive Waste in Storage and Disposal (m3)



Reported data from 2016 in Status & Trends in Spent Fuel and Radioactive Waste Management in publication 2021

National Inventories – Large/Small/Simple/Complex

Spent Fuel and Radioactive Waste Information System

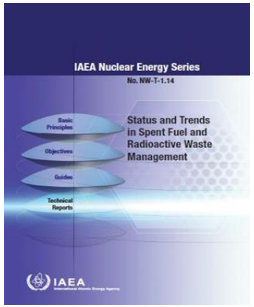
What is the RWM responsibility – nationally, regionally and globally?

SRIS – Launched January 2020

Developed in collaboration with EC and OECD/NEA

(https://sris.iaea.org/#/home)

Status and Trends in SFM&RWM



- ✓ Provides an international overview of SF & RW inventories, global status and trends
- ✓ **Prepared in collaboration with MSs, EC, OECD NEA & WNA**
- ✓ 2nd Revision currently in publication

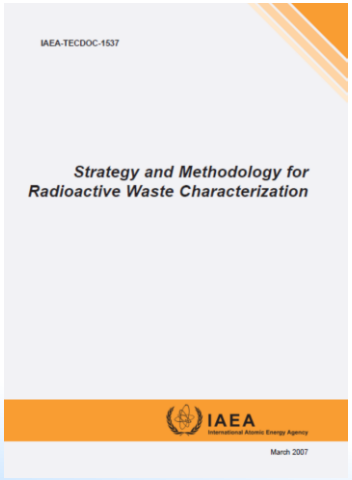
Provides visibility of shared challenges & proven solutions

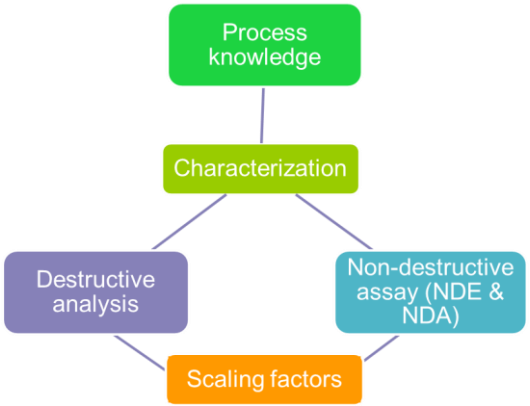
SWIFT – an associated information tool.

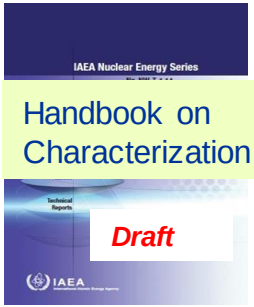
K on RW: Inventory – Characterization – Waste Acceptance Criteria

CHARACTERIZATION: The determination of the physical, chemical and radiological properties of the waste to establish the need for further adjustment, treatment, conditioning, or its suitability for further handling, processing, storage or disposal.

The characterization of radioactive waste is the first basic step for waste classification and is important to select appropriate disposal concepts.







Handbook on Characterization

Draft Handbook for publication:
Characterization of Radioactive Waste, Waste Forms and Waste Packages

Comprehensive Update

International Network of Laboratories for Nuclear Waste Characterization LABONET

- Peer network of characterization professionals
- Forum to share knowledge and exchange information
- >150 Members world-wide

Established 2011

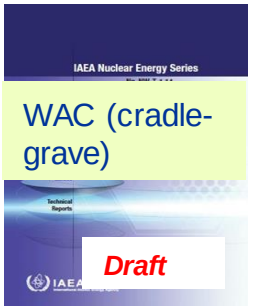
https://nucleus.iaea.org/sites/connect/LABONETpublic/Pages/default.aspx

K on RW: Inventory – Characterization – Waste Acceptance Criteria

- WAC are quantitative or qualitative criteria, approved by the regulator, for a waste to be accepted by the operator of a processing, storage or disposal facility;
- Specify the radiological, mechanical, physical, chemical & biological characteristics of waste packages or unpackaged waste.

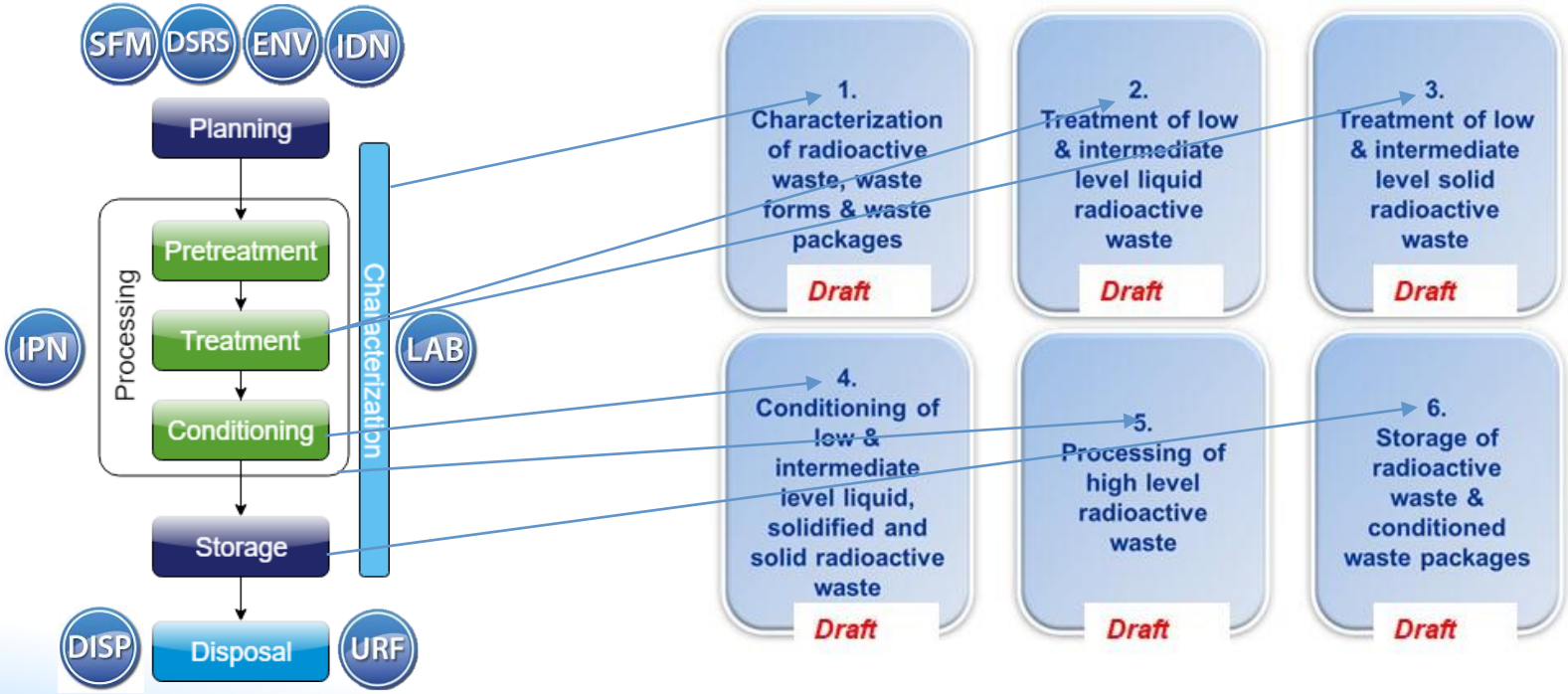
Why are WAC important?

- Ensure compliance with safety requirements
- Prevent technological problems during processing
- Designed to assist with the selection of appropriate processing and packaging options
- Standardize waste management operations
- Assure waste tracking



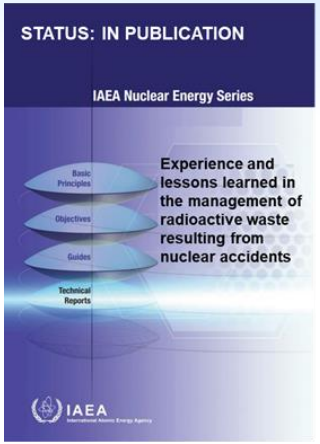
A draft publication reflects international experience and good practices to establish and use WAC for the cradle-to-grave RWM steps.

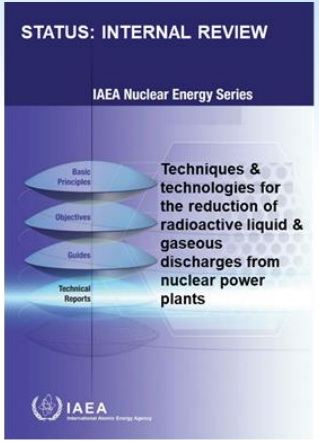
K on RWM steps – Handbooks for a comprehensive introduction to all main technologies

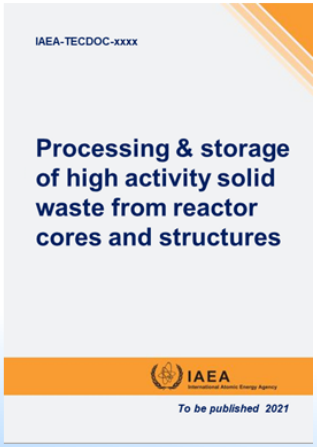


Submitted to publication process.
Anticipate publication in 2023.

K on RWM steps – Publications addressing specific topical knowledge

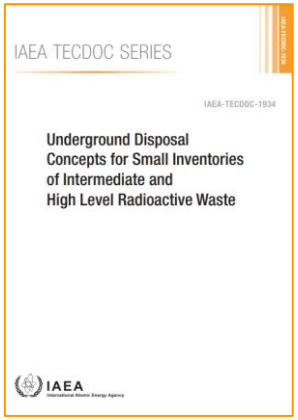


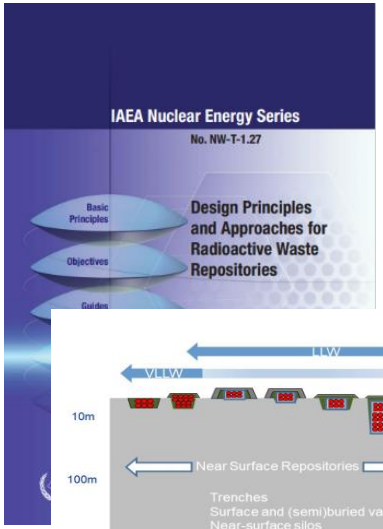


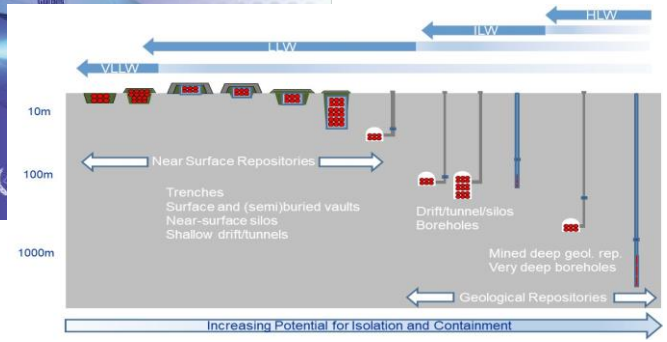


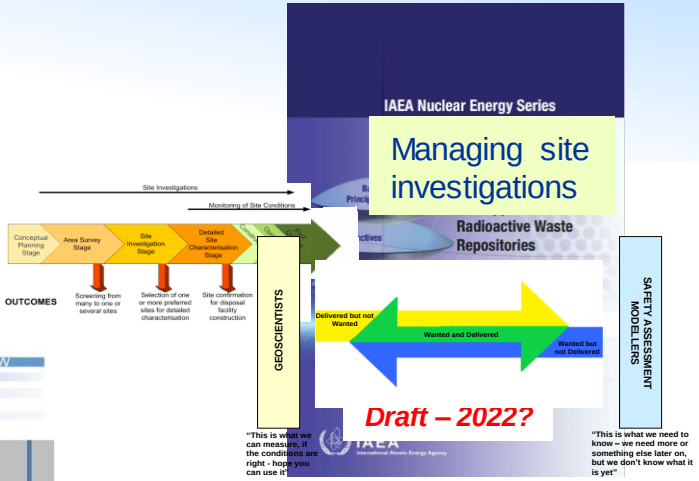
To be published 2021/2022

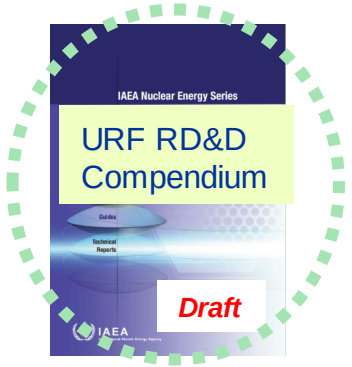
K on Disposal – Publications fundamental to inform technical approaches





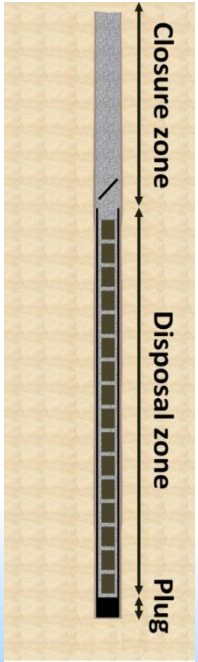




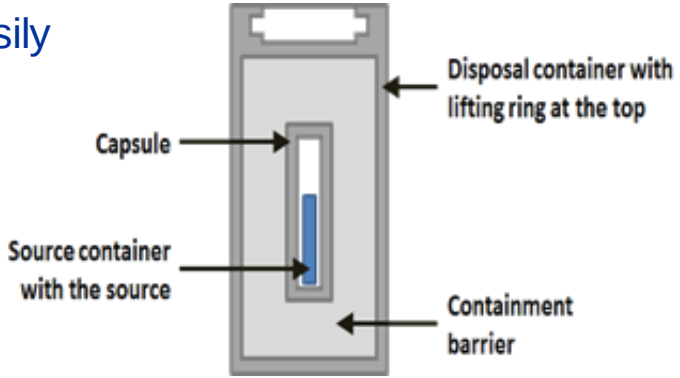


K on Borehole Disposal – CRP to develop a standardized framework

Coordinated Research Project

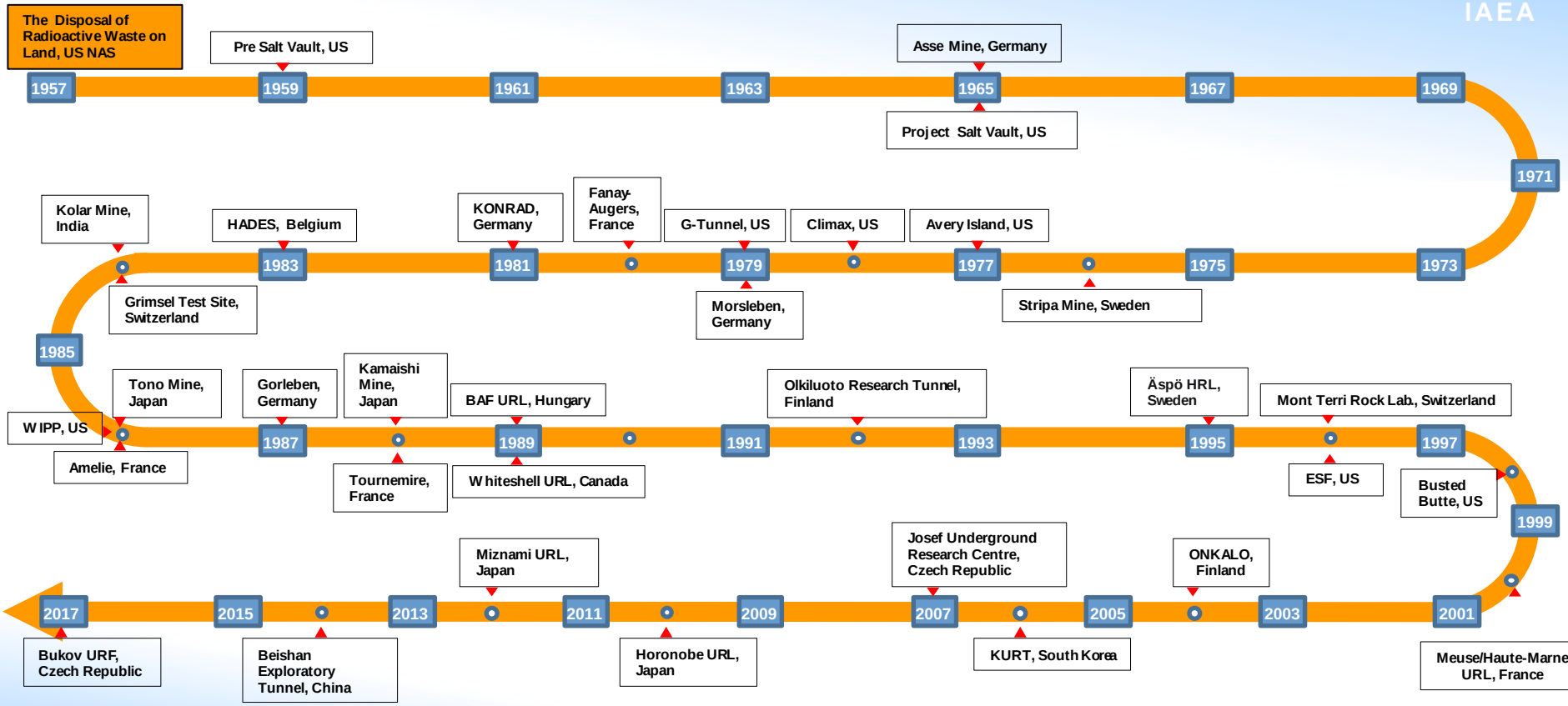


- Targeted first at Disused Sealed Radioactive Sources
- Approach: Standardization and Envelope assessments
- To provide a comprehensive documentary basis developed wit the most experienced countries
- To enable Member States to implement more easily their own borehole disposal programme



Addresses the interest of 100++ Member States!

K on URF RD&D – A global historical overview



Inform future URF RD&D with program needs and available results

URF Compendium: Since Pre-Salt Vault, USA, 1959…

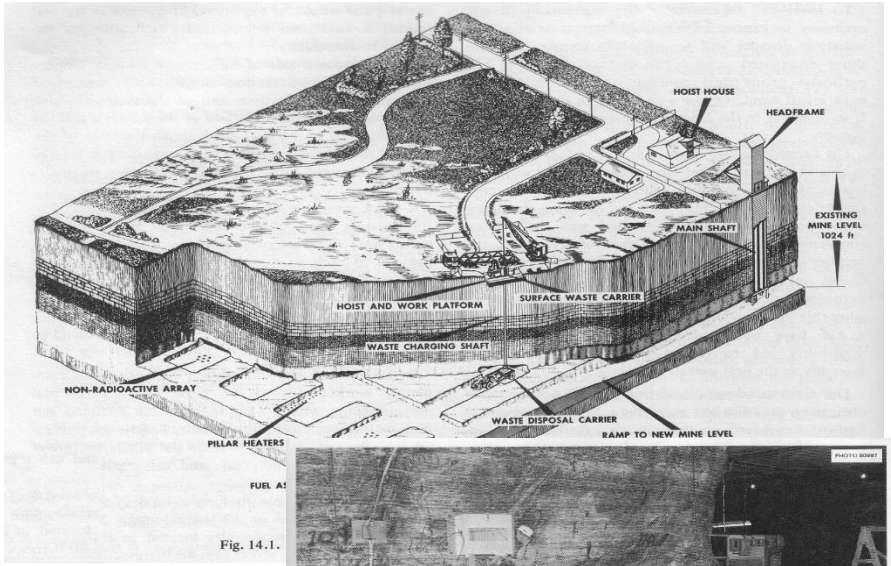


Fig. 14.1.

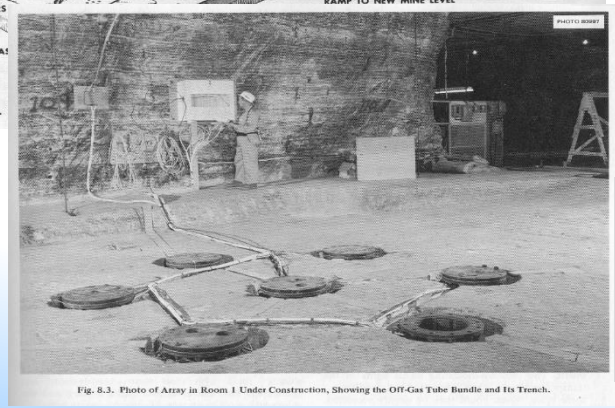


Fig. 8.3. Photo of Array in Room 1 Under Construction, Showing the Off-Gas Tube Bundle and Its Trench.

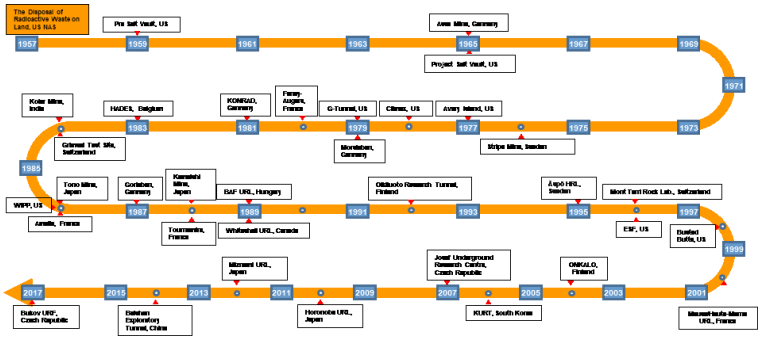
…60+ years of international RD&D in over 15 major national DGR programmes

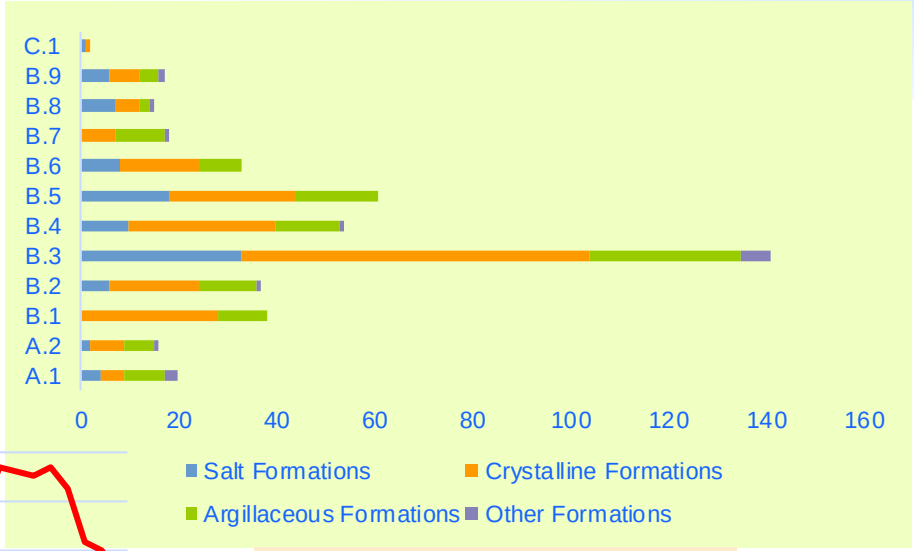
RD&D relevant to liquid HLW injection

- **Not recommended due to gas generation and corrosion issues**

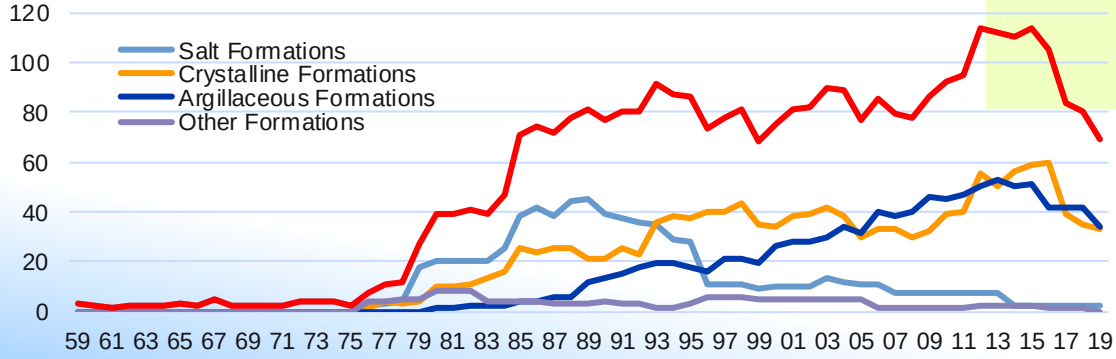
URF Compendium

A basis to inform future URF RD&D planning



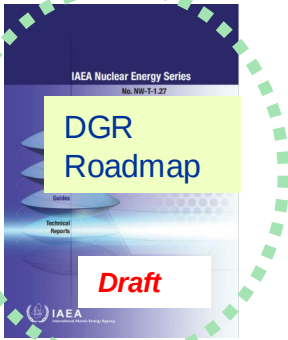


Experiments classified by scope and host formation



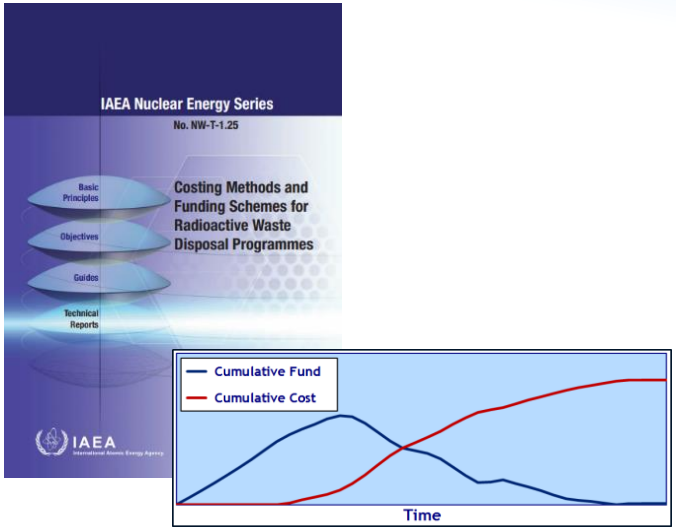
Cumulative number of ongoing experiments

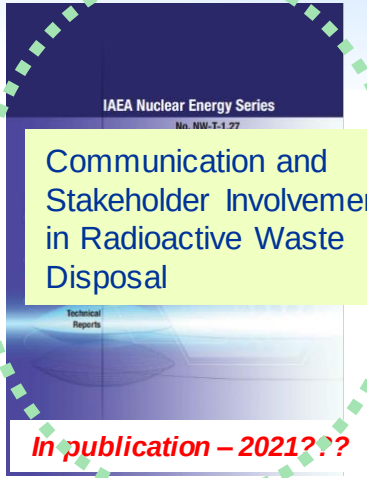
K on Disposal – Publications on topics fundamental to program management



DGR Roadmap

Draft



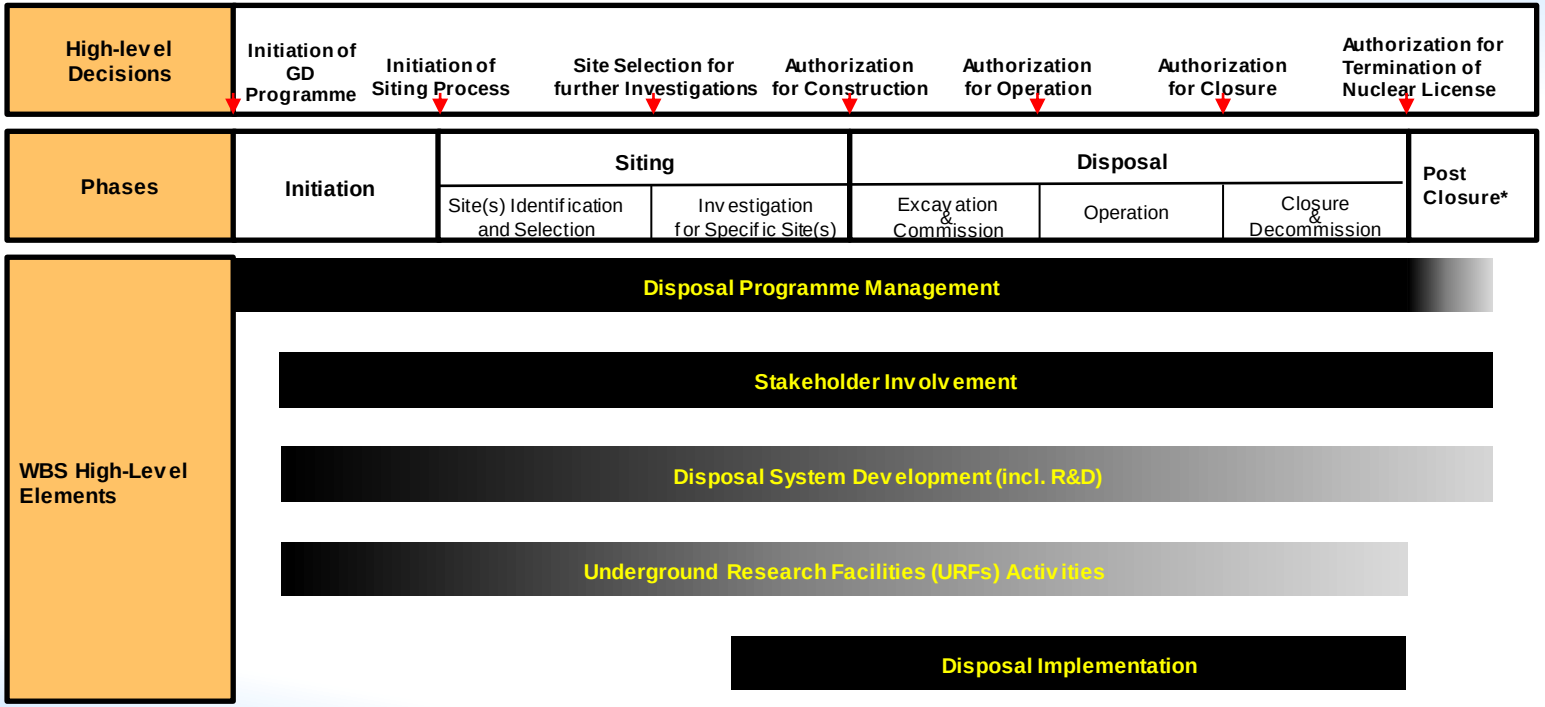


Communication and Stakeholder Involvement in Radioactive Waste Disposal

In publication – 2021???

K on DGR program framework

Introducing a Generic DGR Roadmap



Program governance: Prepare and inform key decisions - Obtain mandate/framework for next phase

K on SI – Publications and other tools capturing international experiences

Stakeholder Involvement throughout the lifecycle of nuclear facilities

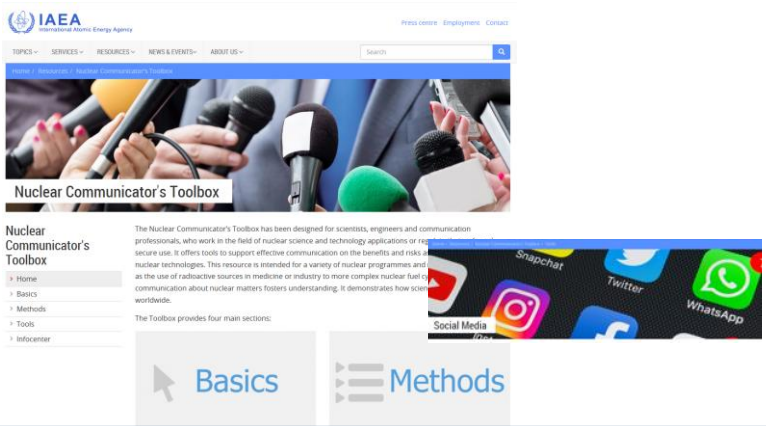
NG-T-1.4 (2011)
Revision in publication

Stakeholder Involvement in radioactive waste disposal

NW-T-1.16
2021 (or 22?)

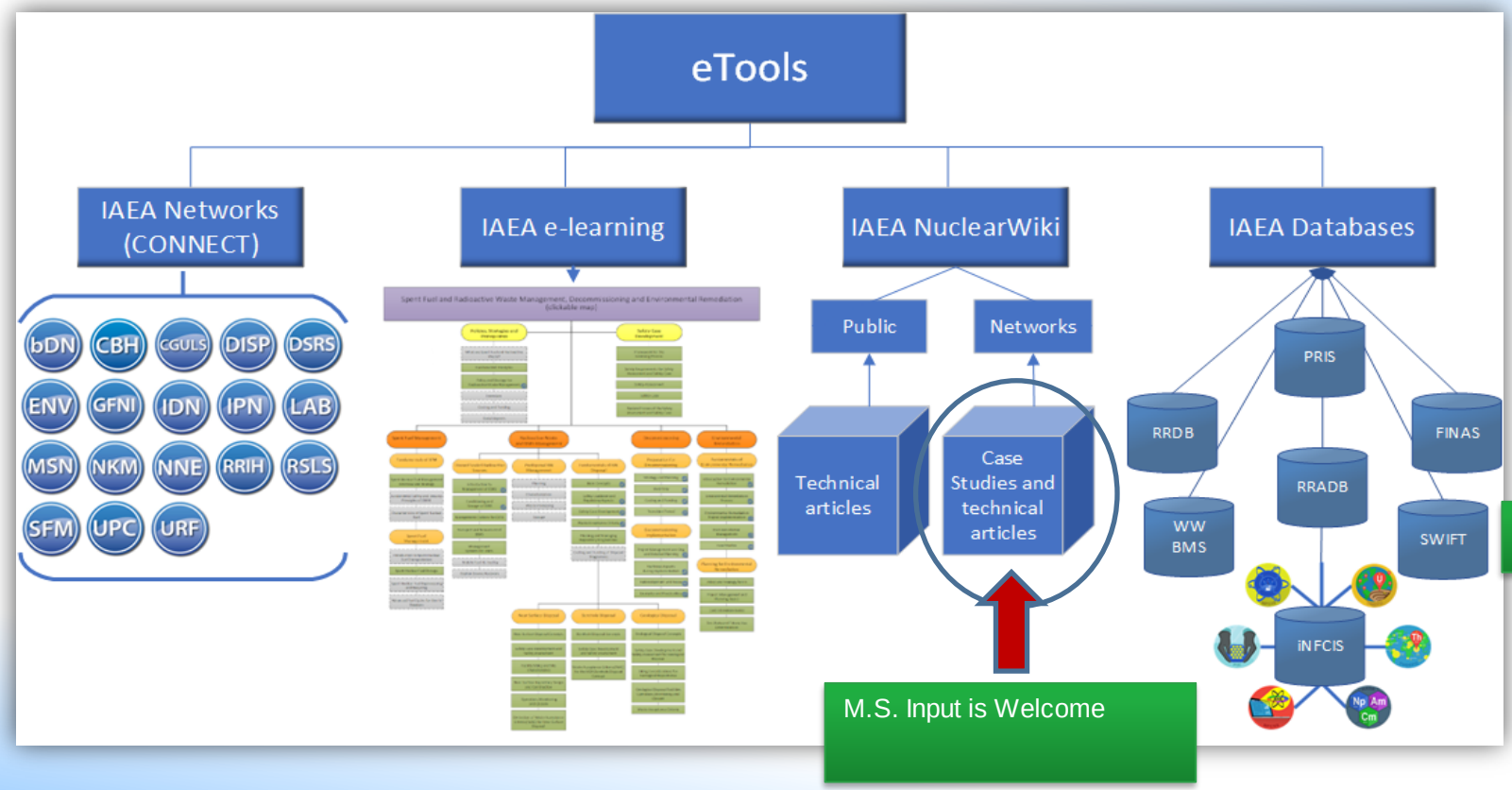
Experiences and expectations of local stakeholders to nuclear facilities NEW PROJECT

Experiences and expectations of local stakeholders to disposal programmes Draft



IAEA Nuclear Communicator ToolBox

eTools for transfer of knowledge
NuclearWiki, Databases, e-learning, webinars, ….



Framework of Nuclear Wiki - Option for capturing more K on focused topics

Wiki – includes all aspects of Backend

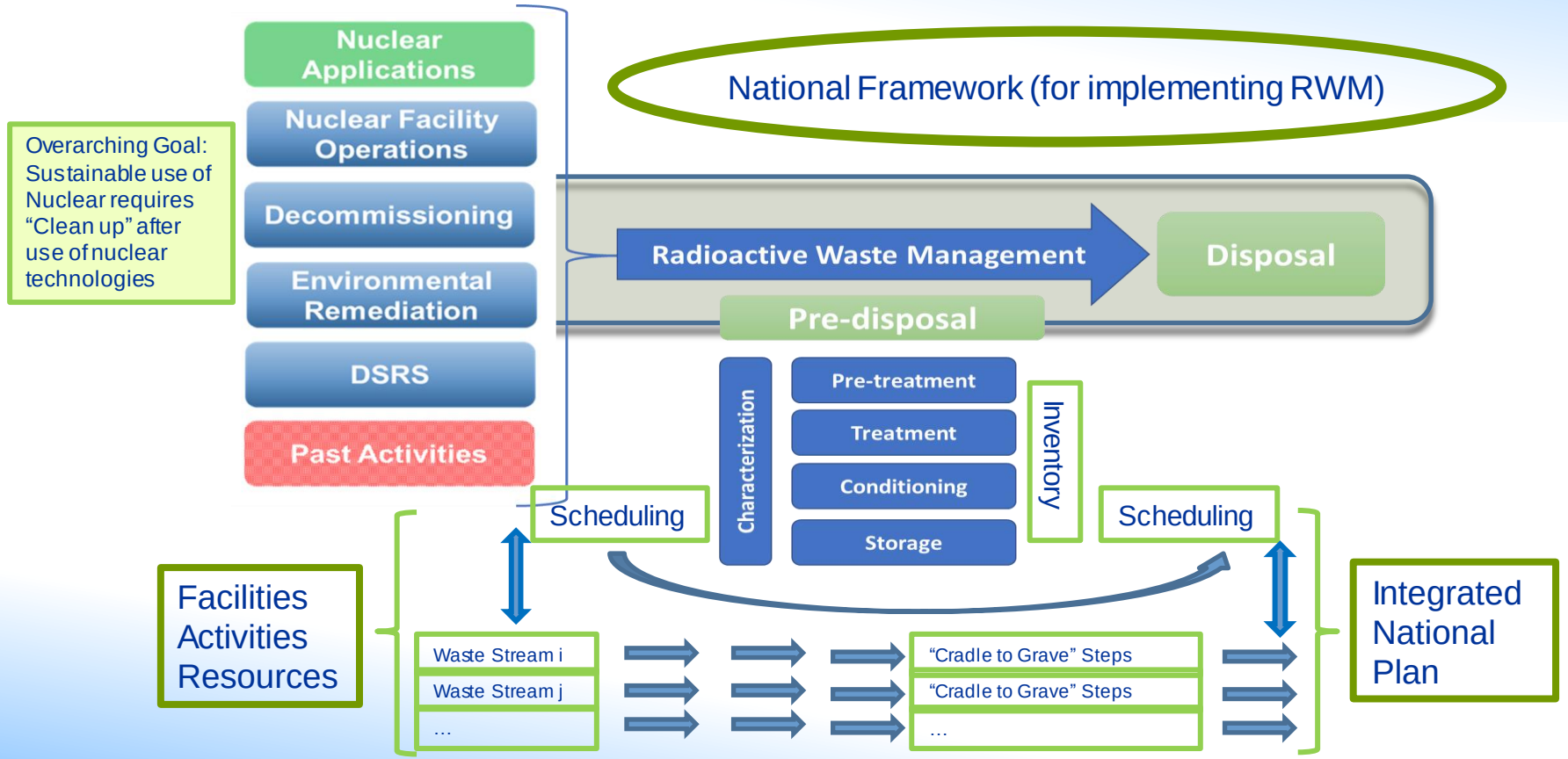
- Decommissioning wiki fully function IDN Network
- Currently expanding wiki content to cover all of radioactive waste management
  - Predisposal
  - Disposal
- Type of content:
  - Facilities
  - Technologies
  - Lessons Learned
  - Good practices
  - ……

Toolkit for Predisposal

Existing Technologies and Practices

Disposal Facilities World-wide

Developing KM for full national RWM program - what framework? (The below only a sketch)



IAEA
International Atomic Energy Agency

Thank you!

And Stay Connected !

Professional Networks – link

eLearning – link

Videos:

- Two minute - link
- Ten minute – link

Nuclear Communicators' Toolbox - link