

PREDIS SRA Focus Sessions – Characterisation

On-line meeting

Date: 03.11.2022

Time: 9:00 (GMT)

Chair: Alan Wareing (AW)

Secretary: Aaron Ellis (AE)

Attendees: Timothy Schatz (TS), Linda Fowler (LF), Maxime Fournier (MF), Rosa Lo Frano (RLF), Anthony Banford (AB), Paul Carbol (PC), Jose Luis Leganes Nieto (JLL), Laurence Stamford, Romoli (INFN), Maria Oksa (MO), Federica Pancotti, B Janssen (Bas), Christophe Bruggeman (CB), Lumir Nachmilner (LN), konoson84, Isabel Paiva, Deni Priyanto, Euron Roberts, Holt Erika, Tara Beattie, Mihály Veres, Ernst Niederleithinger, Gunnar (Gast) (GG), Marta Fedorciuc-Onisa, Willie MEYER, Ivan Ivanov, Stuart Maclachlan, Jan Rosdahl ((SKB), Tri Phung Quoc (TPQ), Hana Vojtěchová, Diego Espejo Hernando, Helene Nonnet, Rosa Lo Frano, Pedro Pérez Cortes, Andrea Chierici, Vanessa Montoya Garcia, Suresh Seetharam (SS), Josh Turner, Kahina Hamadache, Liz Harvey (LH), Jenny Kent, David Galson, Simon Carroll, Diego Espejo Hernando (DESH)

1. Introduction and purpose of session

AW – In year one of the project we completed the production of the baseline SRA exercise. In year two we have developed the methodology to update the SRA and have conducted activities such as a stakeholder survey, workshops and engagements, further targeted technical topic Focus Sessions and this has delivered results of the survey that we can discuss today. Compiled all the relevant information into the priorities of needs from the stakeholders.

MO – Good comprehensive presentation of what we have done until now.

Characterisation (CB)

Characterise waste to have better access to their properties. A lot of topics need to learn from best practices and harmonise different measurements and practices from member states. Main broad need Rad characterisation i sthe challenges of radioactive waste - radioactive and non-rad techniques development. Other main topic Non radioactive properties in inventory i.e. toxicity, non-destructive assessment, ageing effects, detecting gasses. Digitalisation and data mgt also. Release and clearance methodologies too.

SS– Combine many EU projects for Characterisation techniques in other sciences we have ASTI, ASEM ASTEM standards and codes, is their some effort to create a standard ie one that you can follow?

CB – Good question doing certain measurements absence of ASR different organisations refer to a standardised measurement it is more about what is in the license file of your facility, so control or validation of characterisation can meet levels of these files, as such not a really standardised approach diff types of waste forms and matrices and levels of radionuclides. List of radio nuclides is different for each one so that makes it difficult for having a lot of standard harmonisation.

GG – General improvements of existing technologies for economic and technical reasons, don't see which of these are more innovative for characterisation so co-funding will trigger something that will not happen, somethig more daring, any qualifier in the description of those items?

CB – There was info in some sources related to priorities, what organisations are asking for this, this will be the priority for co-financing.

AE – Also during the exercise we have been able to map drivers from the survey results and focus sessions to these topics so that we can understand their background.

Treatment & Processing (FP)

Four main sub-areas with different activities.

Flexible decontamination processes – R&D on new technologies to help optimisation. Mobile facilities. Strategic Studies (SS), all classed as short term priorities.

Management of problematic waste - R&D on the likes of organics

Recycling and reuse – SS Knowledge Management (KM) and R&D new technologies to improve efficiency, plus additional opportunities at the international level

New and Emerging solutions – these were classed as medium term priorities – R&D demonstrate solutions from the lab scale (SS/R&D)

Conditioning & Packaging (MF)

Focus on all operations introduce waste that could be pre-treated into the container brought into waste package to form the matrix. This was the 3rd most important topic. 3 main drivers Society, Performance (industry), Scientific excellence (R&D)

- optimising existing matrices, - increase performance, share best practices to harmonise technical options at EU level
- developing new conditioning matrices, - R&D SS increased decom projects so volumes of waste and routes to treat them, could apply circular economy reuse material
- studying the long term behavior of conditioning matrices, - R&D in the main durability and demonstration irradiation, hydrogen, non rad characterisation behaviour within matrices. For all simulation and models to help demonstration of long term behaviour when facing regulator
- further studies related to the containers performances and the improvement of the management of broken packages and secondary wastes. – R&D and SS reuse materials performance of these too. Long term behaviour of container

Same approach for each sub-area such activities R&D KM or SS, expected impacts and urgency.

Romoli – At this stage has there been any suggestions to put into drum any sensors or detectors?

MF – Between packaging and characterisation we could consider this need to develop new techniques, any ideas to promote?

Romoli – External detectors our focus already, in the slides to develop non destructive technologies (NDA) to control contents of drum or break cement to get inside the drum. Demonstration of Muon tomography

NDA way to assess distribution of known drum for IZ elements we have been working on these developments in WP7.

MF – Sharing best practices and existing techniques.

TPQ – Innovative matrices for conditioning and recycling how can we combine these?

MF – We can build innovative matrices from information coming from the circular economy discussions.

TPQ - Need to see how much binding material we need to meet the criteria this is important. Raw material of the future opcs is cement still viable in future.

MF – Security of supply and quantity of raw materials available is a key consideration.

Comment link detectors to drones?

Romoli – Wifi connections being used. Mounting depends on weight capability of drone.

IP– Small areas but with many drums inside use as a survey, quite inaccessible areas, so use this as an initial survey.

MF – Characterisation of already existing drums.

WAC (DESH) presenting for Jose added one slide (**chase up**)

Really linked to the other topics. Definition explained. Purpose needs to be stated and clear especially dealing with standards and regulations and technical challenges. Difficult to make generic WAC as it is developed for particular disposal model that each country has.

Standpoint to harmonise the development of WAC. Inputs Inventory classification and hierarchy and any previous characterisation. Plan scope for WAC. WAC properties (generic, Radiological, chemical, mechanical and biological etc). Diagram shows the importance of role of WAC waste accept system. Develop WAC for scope of all the areas and select best technology to do this.

KM and SS required to build a WAC system, SS for non-compliant packages, SS avoid or reduce conservativeness. New research areas examples were identified. Analyse or research developments on the system.

LH– Understanding this figure you have presented on how to achieve safe disposal or develop safety case?

DESH – Disposal model is important as an input also an output of safe disposal understand the final goal, for criteria to be developed safe disposal, the objectives.

LH– Guide what you want to achieve.

GG – What you say about conservatism you add if you feel that you don't have the necessary info, if have probabilistic will have what you need to justify. Removal of additions to what is known. Subjectivity does not help.

DESH – Not discussed this in detail, the point was pulled out for discussion it needs further research and testing work probabilistic or theoretical to avoid excess of conservativeness comes from previous topics everything needs to be more accurate and defined.

Inventory (AW)

Overview from survey and focus sessions appropriate level of knowledge. Very large data sets to be generated and managed – need to be high quality to inform any decision making. Store and share it to be available for any necessary calculations. Links for inventory to other technical topic areas ie Characterisation and WAC. Feedback needed from those areas too.

Key topics –

Non-radiological, hazardous and chemotoxic materials – equally materials are quite hazardous and there are some chemically aggressive wastes. Need to meet regulations.

Inventory – Legacy / Problematic wastes – they often sit in storage as they don't have a disposal route or are not characterised, some examples include corrosion, gas generation, retrieve and treat. Inventory underpins that decision making process. Recent report issued by ROUTES. Gap quite often KM and sharing best practice.

Future Wastes – reactors and future fuel types engineers should now take into account waste produced. Decommissioning strategy must be considered before granting a license. Need the methodology and sharing across nation states.

Assessment, recording and management of data – understand sensitivity of safety case, how gather level of uncertainty and its impact could influence data collection methods.

Presented the Key Topics table along with their priority and urgency.

LN– Still not sure how precise inventory should be missing info for safety case what real target for precise inventory, this may be also a point for other topics.

AW – What we are using info for and safety case should influence that accuracy, don't gather info we don't need but needs to be detailed enough.

Tech Selection (AW)

Presented introduction.

What has come out of PREDIS. Methods to capture condition data, monitor package and store. Industrial mature treatment technologies.

Areas of interest gathered.

Selection of technologies for (existing or future) waste streams

Where there is no WAC present at the moment (no industrially mature waste disposal route available)

Comparison of technologies at different levels of maturity, including cost-benefit ratio and availability with focus on Non Destructive Testing.

Supporting innovation and reducing environmental impact of radioactive waste management.

Further development of advanced technologies (geopolymers, ultra & nano filtration, selective sorption)

Presented table and ran through activities and urgency for each of the key areas.

Optimisation (TS)

Slides presented. New and existing technologies. Any step can be optimised. Already heard previous speakers talk about optimisation, FP and MF directly.

Sources used PREDIS SRA survey PREDIS SRA focus session also used PREDIS GA report and outcomes from previous webinars. Ranked 7th highest 6% of score. With respect to optimisation 10 organisations focussed on this of them 6 were WMOs, 2 Waste generators, 1 of each TSO and research. Decision to optimise driven by performance. Drivers for this area were - 1st improvement, 2nd innovation, 3rd safety protect citizens and environment.

Presented key sub areas activities needed and urgency. Specific areas usually related to R&D advances.

Breakout sessions

3 questions – very active exchanges but had to cut discussions short, unfortunately.

- 1) Any general feedback on what you have heard about the SRA itself today?
- 2) Anything major that has been missed from what has been presented?
- 3) How best the PREDIS team can utilise this document?

Feedback

Room 1

No strong objections how to now capitalise and take those priorities and ideas into the next phases of work, i.e. EURAD 2.

- 1) Paul Carbol - Lot of KM cross cutting management, very much at the fore. Lot of knowledge and experience how to share that information across member states put activities in place to share. Synergy to put all this together. Gunnar – Really good content. Lots of knowledge on how to do things. Putting together what's already there and making it available. Critical mass of knowledge leads to new development
- 2) Engagements and activities how to get more opportunities and availability of people to get involved get peoples view, maximise the views. Hadn't seen practical demonstrations share this and how make this happen. Prevention of cross contamination Waste Hierarchy separate section not presented today. Maria - how to get more involvement and engagement from the community as we go forward. Janssen - Missing practical situations/demonstrations and knowledge sharing exercises. Ivan – linking characterisation, inventory, optimisation, the prevention of contamination around facilities, cross-contamination. WMH not covered in today's session but is in the SRA
- 3) PREDIS 2 EURAD 2 collab outside of EURAD live document to inform decision making over time. Janssen- PREDIS 2, EURAD 2. Can see development of a collaboration network. Gunnar - Discussed in application of EURAD 2, but should be used as a tool for collaboration outside of EURAD too. Maria - use as a live document within PREDIS amongst the participants.

Room 2

1) Positive presentations good confidence for future. Document we have is a complete document apart from few points regarding characterisation topics, NTA of big packages conditioning matrices how to characterise them. Treatment and processing scale up from lab to industrial important and needs to be considered. Conditioning & Pack other solution new shaping of containers ease handling and use space. Optimisation topics already on reduce conservativeness better data management and measurements numerical evaluation a valuable tool to reduce. The webinar on the SRA was very useful and interesting. Feedback was encouraged in the group, especially from end users / operators.

2) New methodologies for conditioning and other types of packaging (current emphasis is on drums, when other shapes/sizes/types can provide better/optimised solutions – optimise volume, use of larger packages, provide flexibility).

Strengthen need for the SRA to decrease conservativeness of the methods/data - move towards accuracy. Approaches towards reducing conservatism.

Characterisation of large volume wastes/packages – facilities are not flexible enough to allow different sizes/package types.

Characterisation and Treatment Processing – account for the practicalities of upscaling from laboratory scale to pilot scale to industrial scale. Dealing with the issues encountered during scale up.

3) Answer wider question on future importance of exchange of dialogue between research to industrial and regulators. Specific topics more exchanges and dialogue. Support further technical discussion on specific topics. Need to link R&D with industry and regulators – R&D should be started with the industry needs in mind.

Room 3

Discussion covered all three topics

1) Conditioning already have matrices new matrices optimisation of existing solutions or approaches. Influence of site on WAC not stressed enough main driver and input in its development, difficulties to develop a common WAC. Removing or reducing conservatism maybe not best idea can't predict future in 10 or 1000 years maybe case for increasing conservatism. More assessment of impact of the waste package on the environment. Conditioning and Packaging - The development of 'new' matrices is essentially an optimisation; wastes have been and are being immobilised in 'old' matrices. Long-term assessment of waste package performance should include impact of waste packages on the environment as well as vice versa. WAC - The importance of site properties on WAC development should be stressed. Site properties are a primary WAC input and a main reason why a uniform set of WAC do not exist. Removal or reduction in conservatism is not a straightforward issue. The future cannot be predicted and, therefore, it could be argued that even more conservatism is needed.

2) Missing optimise testing of waste forms a standard protocol - industry wide. Guidance on monitoring of stored waste for long term storage times increasing in future long term monitoring. Problematic wastes substantially more KM sharing how countries deal with them for those that are inexperienced. Conservatism and optimisation of the conservative approaches define waste forms and their performance. Conditioning and Packaging/Optimisation -Standardisation of testing protocols. Treatment Processing - Better knowledge sharing with respect to managing problematic

wastes. Storage (not missing, but not presented in webinar) - Guidance/standard approaches for monitoring over extended storage periods

Great engagement and discussion throughout the webinar. Intend to engage further with some targeted sessions. If anybody thinks of anything else we can gather that feedback so tha the SRA meets the requirements.