Towards a Joint Programming on Radioactive Waste Disposal JOPRAD

Work Package 1

Deliverable D1.4

JOPRAD Mid-Term Workshop report

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Content

1 Introduction

Joint Programming is a structured and strategic process whereby Member States (MS) agree, on a voluntary basis and in a partnership approach, on common vision and Strategic Research Agenda (SRA) to address major societal challenges. In our domain it means how to ensure responsible and safe management of spent fuel and radioactive waste in order to avoid imposing undue burdens on future generation in agreement with requirements of the Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste ("Waste Directive").

With respect to the Waste Directive, the topics to be addressed under the Joint Programming refer in particular to Articles 8 (Expertise and skills), 10 and 12.1(j) (Transparency) and 12.1(f) (Research, Development and Demonstration - RD&D). For the Radioactive Waste Management community, Joint Programming aims at supporting the implementation of the national programmes and the accompanying national research programmes dealing with radioactive waste management, including geological disposal.

The overall aims of the JOPRAD project (Coordination and Support Action "Towards a Joint Programming on Radioactive Waste Disposal") are to assess the feasibility and, if appropriate, to generate a proposal for Joint Programming in the field of Radioactive Waste Management, including geological disposal. This proposal is built for implementation in a future EURATOM Work Programme.

Joint Programming includes RD&D activities, with the accompanying Knowledge Management Programme and its "horizontal activities", namely establishing a state-of-the-knowledge handbook coupled with education, training, strategic studies, guidance, transfer of knowledge to less advanced programmes, as well as dissemination.

The main outcomes of the JOPRAD project will be a set of documents addressing RD&D key priorities of nationally mandated actors including waste management organisations (WMOs), technical support organisations (TSOs), and research entities (REs). In addition, there will be a programme for knowledge management, including the above listed horizontal activities, as well as a proposal for governance and financing structure for the implementation of a Joint Programme (JP).

In addition, it is also intended to engage Civil Society (CS) stakeholders to bring in their interests and identify ways for them to be involved in the different activities, as well as participation in the governance of the process.

2 Aims of the Mid- Term Workshop

The Mid-Term Workshop (MTW) enabled “programme owners” and “programme managers” in European Union (EU) Member-States (MS) to evaluate the feasibility and the added-value of the implementation of Joint Programme at the European level. The programme owners (i.e. Ministries, national/regional authorities) are responsible for the implementation requirements of the Waste Directive in their respective countries. As part of their responsibility, they should provide a formal mandate to the organisations that will be in charge of carrying out RD&D in relation to Radioactive Waste Management to take part in a JP.

The “Vision for Joint Programming” i.e. the rationale (including benefits and challenges), the strategy and the technical common priorities were presented at the Workshop. It was also outlined the contractual instruments as well as governance rules and the possible financing schemes.

The MTW represented a key milestone towards Joint Programming. It was scheduled 15 months (halfway) into the JOPRAD project. The Workshop therefore provided a forum for discussion among the decision-makers of national research programmes across MS and the European Commission (EC) on the different options for jointly establishing and implementing a JP.

The outcome of the workshop was to reach a common vision on the way forward to prepare and implement Joint Programming between MS at the European level.

The “Vision for Joint Programming”

The “Vision for Joint Programming” is the result of the work of the 6 working groups within JOPRAD that were responsible for preparing the technical and organisational background for a common programme between all actors.

After presentation of this “Vision for Joint Programming”, the programme owners, programme managers, the EC and other meeting participants were invited to express their preliminary position on Joint Programming and evaluate if their needs are adequately covered. In view of the potential inclusion of Joint Programming in a future Euratom call, another aim of the JOPRAD project will be to finalize the RD&D and Knowledge Management work programmes, as well as the proposals for a possible governance and legal scheme. This will presented at the final Workshop of the JOPRAD project in November 2017. The MTW was organised by SURAO in Prague on 7th – 8th September 2016. The workshop was opened by a welcome speech of the president of Mr Eduard Muřický, Deputy Minister of the Ministry of Industry and Trade.

A context talk was given by Mrs Rita Lečbychová, Unit head DG-RTD.

The talk on “European vision on Joint Programming in radioactive Waste Management was given by Christoph Davies DG-RTD Project officer.

The Agenda is presented in Annex I and all presentations held during the MTW are given in Annex II. This information is also available on the JOPRAD website: www.joprad.eu.

Actually, 88 people representing WMOs, TSOs REs and CS from 19 countries attended the workshop. However, only three countries sent a ministry representative.

3 Abstracts of the presentations

3.1 Context and objectives of Joint Programming

Towards a Joint Programme 'co-fund action' of EU Member States' and Euratom research programmes in the management and disposal of radioactive waste (C. Davies- DG-RTD)

Since 1975 the EC has been implementing, under the provisions of the European Atomic Energy Community (Euratom) Treaty, Research and Training (R&T) programmes on radioactive waste management, in which all EU MS participate.

The current R&T Programme (the 'Euratom Programme') (2014-2018), complementing the Horizon 2020 Framework Programme for Research and Innovation (R&I), is the ninth continuous programme in this field.

In 2011, the role and mandate for EU support to joint collaborative research on nuclear fission was reinforced with the adoption by the MS of the Council Directive 2011/70/Euratom establishing a community framework for the responsible and safe management of spent fuel and radioactive waste (the waste Directive). The Directive requires each MS to establish and maintain national policy and legislative, regulatory and organisational framework for managing all types of radioactive waste from generation to disposal. This includes establishing a national programme with significant milestones and clear timeframes, as well as RD&D activities needed in order to implement technical solutions.

R&I activities of the Euratom programme are implemented in two ways, firstly by participants in the MSs called 'indirect actions' with co-funding by the EU programme, and secondly by the EC through its Joint Research Centre (the 'JRC') the 'direct actions'.

A key principle of the Euratom programmes indirect actions is to perform joint and/or coordinated cutting-edge research, to support knowledge creation and knowledge preservation. The aim is eventually to promote the development of a common EU view on the main issues related to waste management and disposal of fuel in order for MS to implement safe, sustainable and publicly acceptable solutions in the processing and disposal of radioactive waste. Criteria for Euratom support to research activities are scientific excellence, impact of the research and quality and efficiency of implementation of the project or action.

Over the years, the scope and focus of the Euratom programmes has evolved with the state of knowledge and needs in the participating MS. The programmes have covered all waste categories, from low level short-lived to high-level long-lived waste and spent fuel and on the associated management solutions including pre-disposal (treatment and conditioning), site characterisation, near surface and geological disposal.

From the nineties, as the management methods, technologies and disposal solutions for short-lived and intermediate level waste became widely implemented, research was gradually directed to geological repositories and high level and long-lived waste and spent fuel. A large number of projects were and continue to be implemented in underground research laboratories.

In addition to scientific, technical research projects the Euratom programme provides for coordination and support actions (CSAs) on specific issues and topics. Interest in several MS has therefore led to implementation in the period 2003 to 2009 of two CSAs whose aim was to

promote and support the networking and coordination of activities on shared EU radioactive waste storage and disposal. The possibility for MS willing to cooperate on the sharing of facilities for spent fuel and radioactive waste management, including disposal facilities, was mentioned in the 2011 waste Directive as a potentially beneficial, safe and cost-effective option when based on an agreement between the MS concerned.

During the sixth Euratom Framework Programme (FP) of the EC, FP6 (2002-2006), focus was gradually placed on addressing key remaining issues and uncertainties for implementation of geological repositories as well as on increased integration of the activities and the research community through support of large integrated projects.

In FP7 (2007-2013), in order to make decisive progress towards geological disposal, the EC supported the launch of the Implementing Geological Disposal – Technology Platform (IGD-TP) led by “Implementers” responsible for geological disposal of higher radioactive waste. Focus of FP7 was then placed on implementation oriented research for the actual implementation of the first repositories in Europe by 2025.

At the start of Horizon 2020, after forty years of support to research the Euratom programme can be considered as a very mature programme having covered research on all radioactive waste management aspects and disposal solutions. Actual implementation of the first geological repositories by 2025 is now in sight with approval of the first steps in 2015 and 2016 towards final authorisation by the regulatory authorities to construct and operate such facilities in Finland and Sweden.

Therefore, the purpose, focus and implementation method of the Euratom R&T programme activities deserve to be reviewed to ensure continued effective and efficient support for the twenty eight MS national programmes in addressing the societal challenges of the management of radioactive waste in the coming decades.

Operation of geological repositories is expected to last in excess of 100 years. This implies that in parallel to implementation-oriented research long-term science and innovation-oriented research should be reinvigorated in order to continue to improve understanding, knowledge and tools on cutting-edge topics, processes and solutions of radioactive waste management from predisposal to disposal. At the same time, there is now a large gap between the so called advanced programmes and those in MS in which plans and progress towards geological disposal is much less mature and/or in which start of operation is scheduled several decades from now. In the meantime, existing and expected increase in the coming years in the number of requests to safety/regulatory authorities for authorisation to build geological repositories calls for increase coordination and exchange of best practices and appropriate research activities by technical support organisations (TSO) for the development and maintenance of adequate competence to review the safety cases. Past examples of Euratom projects has shown that implementers and TSOs are able to participate in the same projects whilst maintaining independence in their respective role regarding repository safety cases. Finally, in consideration of the above situation, Euratom as a community has a key role to play in the development of an Integrated Knowledge Management System (IKMS). In developing text books on science in RWM, guidance for research at different stages of programmes, organising related training and dissemination and addressing strategic topics, an IKMS will avoid unnecessary duplication of research and greatly facilitate transfer of knowledge and expertise to both: the generation who have designed the radioactive waste management and disposal concepts and solutions to those that will operate and ultimately close them, and; from more mature programmes to the less-advanced programmes.

Given the above considerations, the range of common issues in MS, the advanced practice of collaboration and joint action between actors in the field and the role of Euratom programme, the EC considers it timely to support the launch of an integrated and coordinated JP of EU added-value research activities between MS.

The JOPRAD EC funded project (Towards a Joint Programming on Radioactive Waste Disposal) launched in 2015 is investigating the feasibility and preparing the technical and organisational background for implementation of such common research programme between MS National programmes.

Vision for Joint Programming (C. Serres – IRSN)

Partners of JOPRAD share a common vision of the European collaboration to move towards safe radioactive waste disposal through a credible and sustained science and technology programme fostering mutual understanding and trust. They consider in particular the opportunity to elaborate a consensus programme between regulatory support organisations, implementers and researchers throughout the decades covering the development and operation of disposal facilities.

The programme should in particular allow the enhancement of the understanding of the risks and uncertainties, developing and making available a high level science on geological disposal and ensuring the societal visibility and transparency of research and development. Many assets have been identified in the development of such a Joint Programming to complement national programmes: the enhancement of mutual understanding of the different actors involved in the decision making process of creation of a geological disposal; the maintenance and building of skills and competencies in MS; the creation of innovative modes of implementation of R&D activities with the Civil Society, and; the efficient use of the resources available at European level.

The partners of JOPRAD are also aware of some challenging issues to be accounted for in order to ensure the success of the construction and management of the work programme. They relate to the capability to move from independent programmes of work to an integrated set of activities to: ensure inclusiveness; interactions between the different actors; fair governance of the programme; preservation of the duties of the different actors at national level and allocation of sufficient resources for the duration of the JP.

How we have undertaken the JOPRAD Project to date (J. Miksova – CVREZ)

The MTW is a crucial milestone of the JOPRAD project targeted at the wide variety of attendees, especially decision makers interested in Joint Programming related issues.

A short introduction of JOPRAD project was presented in the introductory part of this talk including: project aims; structure; team; key actors; key milestones; overall approach, and; expected outcomes. An explanation of why the three JOPRAD working groups including external stakeholders were established, was given to enable MTW participants to understand the methodology used prioritise of RD&D.

In order to collate the research activities at the European level, the IGD-TP and SITEX activities are taken into account as well the specific role of REs in radioactive waste management and the interaction with other platforms in the domain.

The role of Civil Society was discussed. The main part of this presentation was focused on: engagement of MS; how potential mandated actors were identified and contacted; the methodology used, and; what are the main conclusions and findings to-date. Special attention was given to engagement of Less Advanced Programmes (LAPs) in the JP. In addition, the main objective and outcomes from the Regional meeting which took place in Bucharest in February 2016 were presented.

3.2 Joint Programming – The way it could be implemented

Benefits/added value of Joint programming (J. Slovak - SURAO)

Research, development and demonstration (RD&D) activities in radioactive waste management are needed for a sufficient level of system understanding to allow an adequate evaluation of safety, optimisation of technologies and siting of repositories. The importance of RD&D is recognized in Council Directive Euratom/2011/70 and all MS are required to prepare RD&D plans.

The main aim of Joint Programming is to bring together at the European level those aspects of RD&D activities implemented within national research programs where synergy is identified. This approach benefits both the EC supporting RD&D activities to contribute to the development of safe longer term solution for the management of ultimate radioactive waste, and EU MS and all organizations financing and operating research regardless of their responsibilities.

The main benefits/added value for the EC are: the achievement of excellent science (because best research organizations will be involved); integration of activities in the coherence scheme described in the waste directive; increase the efficiency of use of the financial resources, and; inclusiveness for all the active actors in the domain. For MS it will help comply with waste Directive requirements, increase the efficiency of the national research effort by sharing research efforts with other European research organization (increase in competence), and increase the efficiency of the national research effort by having access to complementary funding (increase in resources). For programme managers it will provide an area of research for all actors involved regardless the specific national organization in the country, accessible knowledge base for all stakeholders, and better use of access or financial and human resources at European level.

All organizations financing and operating research regardless their responsibilities will get credible, verifiable, up-to-date scientific understanding shared by large scientific community. They will have the possibility to: utilize knowledge of experts from all MS; gain scientific understanding of safety relevant issues; keep up with the evolution of worldwide leading edge scientific knowledge; get access to common experimental facilities; learn from each other during systematic investigating issues requiring more scientific understanding; improve the education and training system in the domain (competence acquisition maintenance and transfer) and improve use of financial and human resources. Future arrangements of Joint Programming should be tangibly better than the current ones with respect to: administration costs that will not exceed a clearly defined maximum; lower costs of joint experiments; lower costs for projects preparation, and; lower EC administration costs.

Joint Programming can be a useful and effective tool for supporting National Waste Management Programmes regardless their different implementation levels as well implementation schedules.

Establishing a legal scheme – The European Joint Programme scheme (B. Autrusson- IRSN)

One JOPRAD task consists of the management analysis of Joint Programming and platforms in the frame of radiation protection and nuclear safety in order to put in place a suitable management structure, in H2020 context, to perform technical projects and horizontal activities in the scope of radioactive waste management, including geological disposal.

The project management instruments provided by European Commission (EC) have been analysed. For the same types of funding, comparisons are made between the different instruments with a feed from nuclear safety field and radiation protection.

The examined EC instruments are those dedicated for projects

- Projects as innovation actions;
- Coordination and support actions;
- Programme Co-fund at EU level
    - European joint Programme (EJP)
    - European Research Area NETwork (ERA-NET)

An EJP is the most flexible management instrument and seems to be well adapted for a geological waste disposal Joint Programming.

The stakes and goals are of a wide scope and cover various items dedicated to research to coordination and networking activities, including: training activities; demonstration and dissemination activities; support to third parties etc.

The participants in a European JP must be legal entities from MS or associated countries owning or managing national research and innovation programmes, in case of EJP at least five legal entities.

The duration EJP is five years with two additional years.

An EJP offers the possibility to open the partnership to a representative association in a related domain (MELODI in CONCERT).

The European contribution represents at maximum 70% of the eligible costs for an EJP.

The EJP will identify the objectives, work and the schedules of activities to be carried out in this context. It will be necessary to provide a detailed description of these activities for the initial and each successive twelve-month periods of the EJP, as the JP develops in line with the initial objectives. An Annual Work Programme, combined with a progress report on previous achievements will be a key deliverable for the implementation of the EJP on a rolling basis. It will be submitted and approved by the Commission prior to commencement of activities for each reporting period:

The work could be done with or without integration of new members after the signature of the grant agreement. If needed, enlargement of membership will be submitted and approved by the management board of the EJP.

Current Status: Definition and implementation of activities (C. Serres – IRSN)

The partners of JOPRAD have studied existing initiatives of Joint Programming and in particular OPERRA which is a programmatic tool (Coordination and Support Action) about the radio-ecology, low doses and crisis management funded by the European Commission and CONCERT which is a European Joint Programme (EJP) for the integration of radiation protection research set up in July 2015.

The major lessons learned on the basis of these programmes relate to the organization of calls (work/time to prepare calls, selection of independent experts, cost, …) and to the management of the JP (Role of partners, identification of program owners, program managers, linked or not linked third parties, mandated actors, …).

In parallel, two European instruments, EURANET and European Joint Program (EJP) have been analysed, in order to benchmark their respective pros and cons accounting for the characteristics of the actors potentially involved in the future implementation of a JP on geological disposal. From the above studies, the JOPRAD partners consider that the EJP without a call could be the best option for the implementation of a JP and propose to continue building the governance of the JP on this basis.

In the framework of an EJP, they propose a first scheme for the implementation of research, horizontal and networking activities taking into consideration the participation of waste management organizations, technical safety organizations, research entities and Civil Society in the implementation and governance of the different kinds of activities. Detailed arrangements are not described at this stage but the aim is to identify the major principles allowing balanced influence and responsibilities of the different actors in the implementation of a JP.

Civil Society engagement in Joint Programming: purpose, expectations and added value (G. Hériard-Dubreuil – Mutadis)

The main objective of the task 3.5 led by Mutadis was to propose and prepare the mechanisms for interacting with the Civil Society (CS) on the common R&D cross-cutting issues of TSO, WMO and Research entities and determine research topics relevant for society notably regarding social science. In order to reach this objective, task 3.5 tried to:

- Establish the expectations and views of CS regarding the conditions and means for setting a JP and regarding its potential involvement in the governance of the JP,
- Identify key research areas that CS would like to see included into the research programmes.

In order to achieve its work, task 3.5 has interacted with a network of European Civil Society Organisations (CSO) engaged in RWM gathering 35 organisations coming from 18 countries in Europe and provided a variety of CSO viewpoints. CS considerations on its potential role in the governance of the foreseen JP are made, not as a research player but in the perspective of the

implementation of the Aarhus Convention (Public information and participation). CS groups gathered three times (2015-2016) to present, discuss, update the participants on the progress of the JOPRAD work and discussed the selected R&D topics and schemes of governance.

Regarding the contribution of the task 3.5 to the discussion on the SRAs, comprehensive R&D needs for CSOs were identified, an assessment of the different SRAs (WMO, TSO, RE) was carried out to highlight issues relevant for CS that were explicitly, possibly or not covered by them. Reflections on selection process of joint R&D issues have been developed. Needs for social and citizen science have been identified and complex socio-technical topics that could be integrated in Joint Programming have been developed.

Regarding the scheme of governance, a guide for evaluation of JP governance patterns and also criteria for assessing the governance of the JP were developed. Three main functions for CS in Joint Programming have been identified: a contribution to governance of the Joint Programming itself; a function of Knowledge Sharing and Interpretation (as horizontal activity), and; a contribution to technical and social science R&D topics. A model regarding the modalities of participation and involvement of CS organisation into the considered EJP was developed.

Current status: legal documentation, governance, and funding mechanism (J. Delay- Andra)

The European Joint Programme ('EJP Cofund') is a programme cofund action designed to support coordinated national research and innovation programmes. Core participation in this programme is targeted at organisations that can fully participate through their national programmes. These organisations should have a mandate of the national Ministries/regional authorities. However, the breadth of the mandate is limited to defined research activities in the time frame of the duration of the cofund action. It doesn't relate to any responsibility in the direct implementation of disposal project. In addition, other legal entities such as associations created to coordinate or integrate transnational research efforts may participate if justified by the nature of the action.

The programme cofund action is implemented through a set of activities. The JOPRAD consortium has identify four types of activities adapted for our community of research: (i) technical activities that are similar to technical projects under previous work programmes; (ii) horizontal activities comprising education, training, knowledge management, dissemination, etc.; (iii) networking activities for exploring specific needs such as those of implementers, Technical Support Organisations, research groups dedicated to less advanced programmes or CS attempts, and; (iv) management activity of the EJP.

The grant agreement for an EJP will contain a detailed description of these activities for the initial and each successive twelve-month periods of the EJP Cofund. An 'annual work programme', combined with a progress report on previous achievements will be submitted and approved each year by the EC. The Grant Agreement will contain the governance rules covering the mechanisms for implementing and evaluating the activities, and the funding scheme associated. These rules should take into account the conditions for participation of the mandated actors and their linked third parties, as well as the Aarhus and Espoo convention for the involvement of CS.

3.3 How research priorities have been identified and establishing the programme

Establishing the priorities: views of the Waste management Organisations (R. Kowe – RWM)

The main objective of the WMO Working Group (Task 3.1 led by RWM) was to identify key aspects of the IGD-TP's SRA that could be incorporated into a JP. The working group represented the views of mandated actors responsible for RD&D programming, planning and implementation of geological disposal at a national level.

The working group had four meetings (2015-2016) to achieve this objective. The specific aims of the WMO Working Group (WG) were to:

- Develop a common vision for all actors within a potential JP;
- Define a common area that covers the interests of all the WMOs;
- Identify the added value of Joint Programming, whilst maintaining the independency of all actors;
- Identify the boundary conditions for the involvement of members of the IGD-TP Executive Group; and
- Maintain the interests of Less Advanced Programmes.

The meetings in 2015 discussed the prioritisation and urgency of WMO RD&D topics based on the topics in the IGD-TP's Strategic Research Agenda. The urgency of each topic, its alignment to an agreed set of boundary conditions and assignment of eligibility categories were used to identify those topics which could be put forward into a set of common topics for Joint Programming and those which should be ruled out at this stage.

A WG questionnaire on joint topics for Joint Programming was sent to the 25 MS WMO's (note not each of the 28 MS has an identified WMO). This questionnaire confirmed the list of common topics that had been chosen by the WG and led to the re-instatement of several topics which were excluded from the list of common topics. These were then use to produce a potential list of topics for Joint Programming.

These topics were reviewed by the IGD-TP Executive Group in November 2015 and they suggested several amendments to the list. The revised list of topics was reviewed by WG members during meetings in 2016 and further prioritisation of the list of topics took place with some topics being amalgamated. A set of 17 topics were chosen to take forward for Joint Programming. These were sent out to the IGD-TP Executive Group and to the 25 member state WMO's for final endorsement in June 2016.

Establishing the priorities: views of the Technical Support Organisations (F. Lemy – Bel V)

The first phase of the JOPRAD project was aimed notably at identifying key aspects of WMOs, TSOs and REs RD&D that could be included in Joint Programming and at allowing all the parties potentially involved in a JP to set the conditions for the "Programme Document". For the TSOs, the work comprised the development of their Strategic Research Agenda (SRA) in the framework of the SITEX initiative bringing together organisations fulfilling an "expertise

function". The "expertise function" entails activities carried out in the context of the regulatory review of the safety case to provide the technical and scientific basis of safety for:

- Decisions by the National Regulatory Authorities;
- Ensuring that regulatory expectations are clearly communicated to and interpreted by the implementer; and
- Improving the quality of the interactions with CS in the decision-making process with a view to improving the quality of the review.

The SITEX SRA identifies possible common activities and topics for which future collaboration and sharing of resources would be beneficial considering the foreseen agenda of safety case reviews and the expected gain in expertise.

The primary objective of the TSO Working Group (WG) established in the framework of the JOPRAD project is to identify the nature and the key aspects of the RD&D needs and activities identified in the SITEX SRA that could be shared in a JP. The WG was also intended to:

- identify what would be the added values of a JP from a TSO perspective
- identify the boundary conditions for JP from a TSO perspective;
- define, from a TSO perspective, the level of independence between the different actors which is required for the different types of research needs and activities;
- determine whether sufficient areas of interest and interested parties exist to initiate a JP.

The WG represents the views of mandated or potentially mandated TSO actors responsible for R&D on radioactive waste management including geological disposal at the national level. 10 TSOs among the 16 (potentially) mandated TSOs identified in EU MS and Switzerland contributed to the work performed by the WG. The WG includes a representation of both advanced and less advanced programmes.

The WG identified the various types of arrangements and activities that TSOs need to carry out in order to fulfil their missions effectively. These activities include both R&D activities (i.e. modelling and experimental work) and horizontal activities such as training activities, state-of-knowledge activities or exchange on practices and views. Several boundary conditions for a JP were identified. In particular, the conditions for preserving the independence of TSOs were investigated. It was found that independence in joint R&D activities (i.e. carried out jointly with WMOs) can be preserved as long as the work is focused on data acquisition, process understanding and benchmarking of tools and approaches. Conditions for ensuring impartiality of joint horizontal activities were also identified in order to avoid conflicts of interests and preserve the independence of the expertise function. It was concluded that the necessity to preserve the independence between the actors is not seen as an obstacle to a JP provided that clear rules are defined and that specific "autonomous" activities can still be carried out by organizations fulfilling an expertise function where needed.

The main topics for which needs for joint R&D and/or horizontal activities are identified by the TSOs are as follows:

- Pre-disposal radioactive waste and spent fuel management;
- Waste inventory and source term;
- Transient THMBC conditions in the near-field;
- Evolution of EBS material properties;
- Radionuclide behaviour in disturbed EBS and host rocks;
- Safety-relevant operational aspects;
- Managing uncertainties and the safety assessment;

- Lifecycle of a disposal programme and its safety case; and
- Social and citizen sciences.

The participants in the TSO WG expressed a strong interest in the project and in participating in a JP as this would constitute a unique opportunity to further develop and maintain their skills and expertise efficiently and effectively.

Establishing the priorities: views of the Research Entities (B. Grambow – CNRS)

Research Entities (RE), take part in many European and national projects on geological disposal of nuclear waste, are often working either within implementation driven programs for waste management organisations (WMO) or for the safety research of technical support organisations for regulators (TSO). Being fundamentally oriented to long term knowledge generation, the research objectives of RE go beyond the implementation or safety oriented needs of WMOs and TSOs. The interest in participant in European Joint Programming is large. The first step of JOPRAD was aimed to ensure inclusiveness of participation of major European RE as potentially mandated actors. 45 potential mandated research actors were identified by the EURATOM national contact points. 22 research entities from 10 countries worked together in a working group (WG) to identify a joint long term vision and mission of RE, a joint research road map ("strategic research agenda, SRA") and key research priorities to be shared with TSO, WMOs and Civil Society Organisations (CSO).

Amongst REs there is a large variability in academic research and overall systems understanding on waste disposal in various European countries. Research is often driven by needs of parameters (Kd…) without being at the forefront of science (molecular models, surface complexation…). Research is rarely guided by a common vision of the needs of developing a scientific safety case but by open questions in specific knowledge fields. The participation in the Joint Programming should change this situation.

The guiding vision is that scientific understanding of geological disposal issues must remain credible, verifiable, shared by large scientific communities, open to CS stakeholders over many decennials, keeping up with the evolution of worldwide leading edge scientific knowledge. The goal of REs in the European Joint Programming is therefore to develop an integrated fundamental and leading edge scientific understanding oriented in the long term for all concepts related to safe and environmentally sound disposal of long lived intermediate and high radioactive waste and spent nuclear fuel in repositories within Europe, joining advanced and less advanced European R&D programs.

The SRA was developed by discerning between Generic/ Specific/ Networking/ Review/ Think-tank projects. The goal of the SRA is to make sure that future Joint Programming will be a tool for structured, long-term R&D commitment:

- Building and guaranteeing confidence in safety assessments and underlying scientific assumptions for many decades to come
- Narrowing the safety gap and decrease of conservatism in safety assessment calculations in view of progressive scientific assessment of multi-scale complex systems behaviour
- Embedding techno-scientific research in an ever more demanding society
- Building a European knowledge platform on waste disposal

The key elements of the SRA of the RE are:

- Integration of scientific understanding in the safety case and in assessment of its uncertainties
- Crosscutting bad and well defined processes
    - impact on radionuclide migration by colloids, organic matter, microorganism
    - incorporation of radionuclides in solids, considering thermodynamics, speciation and strong sorption
- Upscaling and complex THMC couplings, including reactive transport
- Work on waste forms, source terms, characterisation and integral HLW nearfield experiments
- The long term THMCB(R) performances of near field rock, EDZ, bentonites, seals and plugs
- Geotechnical studies on bentonite barriers (resaturation…)
- Transformations at interfaces of various materials
- Production and fate of gases and the understanding of resaturation of void spaces
- Geopolymers and cement systems
- Monitoring science: operational phase, radiological, criticality, leakage, redox, sensors, long term stability …
- Social science studies: ethical framework, expectations of citizens in safety…

RE will also participate in horizontal activities such as knowledge management, training or guidance. It was found that there is generally no restriction on the topics that can be shared among all actors.

Establishing the priorities: Horizontal Activities covering Education, Training, Knowledge Management and Knowledge Transfer (G. Buckau – JRC)

There has been plenty of data, information and knowledge in the field of radioactive waste management generated in the past. This will continue for several decades as MS turn planning into action with their widely varying implementation time schedules. In order to benefit from past activities and ensure that present and future generations of experts have access to the knowledge generated, an Integrated Knowledge Management System (IKMS) is established. Documentation of Knowledge builds around a WEB based “Knowledge Handbook”.

The handbook consists of domains and topics, in particular from past EURATOM Research and Training Framework Programmes, forthcoming R&D projects from the joint work programme of the forthcoming Radioactive Waste Management Joint Programming, Guidance on planning RD&D programmes, but also other sources and domains to be developed by the IKMS Executive Committee. The scientific basis for the Safety Case is an important part of the Knowledge Handbook. The individual topics are dealt with and updated according to priorities and available resources and thus the Handbook will be gradually built over the coming years.

The Knowledge Handbook is coupled with several activities in order to identify priorities (strategic studies), generating guidance on implementation of the Knowledge, transferring the Knowledge (in particular training), making it available (dissemination) and creating awareness of the available Knowledge (communication). The European Commission’s Joint Research Centre is taking the lead in establishing the IKMS.

Production of the Programme Document: WP4 (J. Martin - RWM)

Vision of the EJP on Radioactive Waste Disposal

"A step change in European collaboration towards safe radioactive waste disposal through a credible and sustained science and technology programme fostering mutual understanding and trust."

Progress of the Programme Document (the technical and scientific basis of the EJP)

Work has begun to identify common research and development needs of interest between the 3 mandated actors within the JOPRAD project – WMOs, TSOs and REs. Drawing on each of their strategic research agendas the needs of common interest, considered as suitable for EJP, have been organised into "Domains" – some are predominantly technical (pure science), whist others can be considered more multi-disciplinary and include the integration of CS issues. These domains include:

- Waste acceptance criteria (WAC) and waste characterisation;
- Waste treatment, conditioning and associated uncertainties;
- Spent fuel and fissile material;
- Waste form behaviour and container evolution (interim storage & geological disposal);
- Understanding of near-field systems;
- Geosphere;
- Radionuclide aqueous pathways;
- Gaseous pathways;
- Process modelling;
- Safety case methodology and communication;
- Total system modelling;
- Operational safety assessment;
- Site characterisation;
- Design optimisation;
- Operational monitoring;
- Knowledge management tools and infrastructure;
- Final operational license (before full commissioning);
- Decision making processes and governance; and
- Shared safety culture.

In addition to the identification of research and development needs, horizontal activities have also been considered, these activities include: support the maintenance and / or increasing of competence; exchanges on practices so as to develop a robust common position, and; knowledge transfer and management. Such horizontal activities are fundamental to ensuring the EJP meets the needs of less-advanced programmes (i.e. learning from the large body of research already completed over the past decades and transfer of good practice from the more advanced radioactive waste disposal programmes).

To-date over one hundred activities have been suggested for inclusion within the EJP. This comprehensive list, drawn together by the potential mandated actors within JOPRAD, is currently being further refined and prioritised to establish:

- Clear drivers for each activity – is it operational or prospective R&D (i.e. if it is considered a short / medium or long-term experiment and/or a modelling activity)?
- Where complementary horizontal activities would be beneficial?
- Timescales of interest – high interest for 2019-2024, or beyond?
- Financial / in-kind support - interest to participate by providing a financial contribution or effort in-kind, versus interest in outputs without contribution (i.e. end-user)?

The first draft of the European Joint Programme Document for Radioactive Waste Disposal will be available and consulted on during March – May 2017, and thereafter updated and finalised for November 2017.

3.4 Way ahead – Discussion

Review and production of the programme document

The JOPRAD Consortium indicated that the Programme document will be open for consultation to the programme managers and discussed at the programme workshop to be held in London, April 4th 2017

Ministries will be sent further information including final public documents so that they can clarify their positions on Joint Programming. The JOPRAD consortium indicated that the Ministries should make sure that scientific programme is consistent with national programmes. It is not expected nor requested an approval of the programme by the Ministries

France have already decided on their position ; with its TSO, WMO, RE and Ministry being in favour of a permanent follow-up of JOPRAD.

It was noted that few Ministers participated in the MTW. Further effort is required from organisations attending the meeting in order to contact their Ministries and inform about JOPRAD.

The issue of duplication of effort

Some participants expressed concerns about possible duplication of efforts, taking into account in particular IAEA and OECD –NEA activities and initiatives.

The JOPRAD consortium is well aware of this. IGD-TP and Sitex participants also participate in other international fora and are closely linked with these organisations so there is a limited risk of duplication.

The IGD-TP including members of JOPRAD are collaborating with the NEA IGSC in order not to duplicate work on the safety case.

The JOPRAD consortium mentioned that IAEA and NEA do not carry out research, they collect information, in our research activities we are producing information that can be used by these organisations.

Some other participants indicated that there is still a risk of duplication. Thus duplication will be considered in a very systematic way for each topic (e.g. thermodynamic databases).

Possibility for private companies to participate to a JP

DG-RTD indicated that private companies could participate as beneficiaries to a Joint Programme as long as they have the mandate to carry out a research programme.

A template page for applying for a mandate is available and can be downloaded on the EC portal:

http://ec.europa.eu/research/participants/data/ref/h2020/other/mga/ejp/h2020_ejp_participant_decl_en.pdf

Concerns about the Civil Society board

It was indicated that creating a separate ethical group to support transparency and trust does not create trust.

The JOPRAD consortium indicated that the governance rules are under discussion. For the moment we consider one executive board which takes the decisions, but in order to be efficient, it was indicated that people involved in technical activities could have a specific board to discuss on their specific matters.

The JOPRAD consortium indicated that this group could discuss for example on challenging events that could happen. Civil Society Organisations' group in Sitex II developed a tool which allows for discussing RWM strategies leading to passively safe disposal of radioactive waste, and where we can discuss when this kind of events happen.

Development of guidance for specific case

It was asked if JOPRAD intend to develop regulatory hydrogeological guidance with regards to geological disposal. What happens if a proposed facility is locates in the boundary of several countries or in a war zone?

The JOPRAD consortium indicated that the issue of regulating non-radiological aspects of disposal is covered by national regulations. Regarding siting the principles applied need to be the same. In addition, it was recalled that Article 37 of the EURATOM treaty requires that programmes look at the impact on other states.

Involvement of new partners

The issue of embedding new partners in the project was raised by the participants.

The JOPRAD consortium indicated that the common rules of EC projects will apply.

DG-RTD stressed that beneficiary might have research resources, and then it does the research. If not, non-signatory parties to the contract can participate through calls (cascading grant) or through subcontract

Contact of Ministries by the JOPRAD consortium

Some participants expressed that in the mind of the programme owners, the benefits/added value of a JP is not clear. So there is a need support from JOPRAD to convince them. For example, JOPRAD consortium should organize a memo, or organize specific meeting to increase the understanding of the programme owners.

The JOPRAD consortium recalled that all fission committee delegates have been contacted, and proposed to provide them directly additional information about JOPRAD. Only 2 phone calls were received.

It was also mentioned that if a participant cannot embark at the first EJP they could do it at the next phase.

Less Advanced Programmes needs

It was asked to DG-RTD about the relationship between NFRP8 (Euratom Call WP 2016-2017) and the work preparing in JOPRAD project regarding this aspect of transfer of knowledge? Is NFRP8 a preparatory work to be integrated into the EJP?

DG-RTD recalled that the SecIGD2 work package 2 provided support for LAPs on guidance on planning. NFRP8 should be aimed at extending this guidance in specific key areas. This could be an opportunity to study the issue of transfer of knowledge: what is propriety knowledge what is not? what is commercial, what is not? This question should be addressed before the EJP starts.

However, Joint Programme is a different programme, the EC is not in a position to say what should be in Joint Programme.

Limitation of the Role of the JOPRAD project

The JOPRAD project indicated that it is not in its remit to either organize nor fund the discussions at national level. The JOPRAD project could however provide help in terms of provision of further information, if requested officially by the countries.

Each country could learn from the experience gained from the Eurofusion EJP.

The issue of funding research

It was asked how the balance between financial input and effort in kind will be weighted in the governance of projects.

The JOPRAD consortium indicated that it will be similar to normal call within a framework, if the activities are defined with a sufficient level of detail.

Benefits in participating in a EJP

The JOPRAD consortium stressed that the 2 key benefits of Joint Programming are: financial gearing from collaborative research often resulting in 10-30 times investment, and; that working with research entities highlights the excellence of research outputs.

JOPRAD have the experience needed to prepare a programme; it takes time to understand and reach consensus. With LAPs there is a need to identify coordination activities to prepare the involvement in the programme.

3.5 Conclusion

Overview

- We have progressed understanding of legal frameworks and how beneficiaries and third parties can be supported under a JP
- Outstanding issue concerns the involvement of the mandated actors within each MS

(But not necessarily the Ministries, as the role could be formally assigned to the Implementer).

The JOPRAD consortium will prepare a new memo in order to inform the Ministries, and, more generally, the community about the progress of the project and the issue of the expected commitment and mandate.

Remaining questions

We have answered the "*could we?"* question

- So the "*should we?"* question needs to be addressed within each MS and potential participants, as the SRA and the Programme are developed
- How do we consider work packages longer than 5 years?
- Arrangements for consultation of the programme document require refinement
- Role of social science should be presented in the document
- Budget is unclear at present, due to the timing, falling in between H2020 and FP9 – how it would be structured and total sum?
- Need clarity of the benefits of joint-programming to support national discussions:
    - Financial gearing
    - Excellence in research
    - Greater involvement of Civil Society
    - Risk of not being involved
    - Opportunity for greater involvement of Less Advanced Programmes
    - A clearer strategy for horizontal activities

4 Summary of the meeting

In conclusion, JOPRAD considers that:

- High proportion of discussion time has been beneficial
- We have presented what is meant by Joint Programming
- We have explained how the Joint Programme would support technical activities, horizontal activities and a limited degree of networking
- We have explained the progress that has been made to-date
- We have, and will further, explain what the next steps are
- We've gained extensive feedback

Next step

- Preparing the programme document
  - JOPRAD WP4 - Organisation objectives and schedule
  - Programme Workshop: April 4, 2017 London (UK)
- Preparing the legal Framework
  - JOPRAD WP5 Preparing a Governance Scheme and legal documents
- Final Workshop: November 16, 2017 Prague (CZ)

Annex I: Mid-Term Workshop Agenda

Mid-Term Workshop Agenda
JOPRAD – Towards a Joint Programming on Radioactive Waste

7- 8 September 2016 Congress Centre, Prague, Czech Republic

Programme DAY 1
Starting 9:00 pm

9:00 – 9:30 Registration and coffee		
Session 1: Context and objectives of Joint Programming (Chairs J. Slovak – F. Plas)		
1	Welcome - host country	J. Slovak *SURAO*
2	National context on radioactive waste management in Czech Republic	*Official CZ*
3	European vision on Joint programming in radioactive waste management	*Official DG-RTD*
Coffee Break		
4	Vision for Joint Programming	C. Serres IRSN
5	How we have undertaken the JOPRAD Project to date	J. Miksova CVREZ
Questions		
Lunch break		
Session 2: Joint Programming – The way it could be implemented (Chairs: J. Miksova – G. Buckau)		
6	Benefits/Added value of Joint programming	J. Slovak *SURAO*
7	Establishing a legal scheme – The European Joint Programme scheme	B. Autrusson *IRSN*
Questions		
Coffee break		
8	Current Status: Definition and implementation of activities	C. Serres *IRSN*
9	Civil Society engagement in Joint Programming: purpose, expectations and added value	G. Hériard-Dubreuil *Mutadis*

10	Current status: legal documentation, governance, and funding mechanism	J. Delay *Andra*
Questions		

Ending 5:30 pm

Programme Day 2
Starting 9:00 am

Session 3: How research priorities have been identified and establishing the programme (Chairs C. Serres – A. van Kalleveen)		
11	Establishing the priorities: views of the Waste management Organisations	R. Kowe *RWM*
12	Establishing the priorities: views of the Technical Support Organisations	F. Lemy *Bel V*
13	Establishing the priorities: views of the Research Entities	B. Grambow *CNRS*
14	Establishing the priorities: Horizontal Activities covering Education, Training, Knowledge Management and Knowledge Transfer	G. Buckau *JRC*
Coffee break		
Session 4: Way ahead – Discussion (Chairs: J. Martin –L. Nachmilner)		
15	Discussion and feedback from the audience	J. Martin *RWM*
Lunch break		
Session 5: Conclusion (Chairs: B. Grambow – C. Davies)		
16	Summarizing the overall outcomes Next steps	L. Nachmilner J. Martin *RWM* J. Delay *Andra*
17	Closure of the meeting	J. Slovak *SURAO*

Ending: 3 pm

Annex II: Mid-Term Workshop Presentations

Session 1: Context and objectives of Joint Programming (Chairs J. Slovak – F. Plas)

Welcome - host country, J. Slovak, SURAO

National context on radioactive waste management in Czech Republic, E. Muřický, CZ

European vision on Joint programming in radioactive waste management, R. Lečbychová, C. Davies DG-RTD

Vision for Joint Programming, C. Serres, IRSN

How we have undertaken the JOPRAD Project to date, J. Miksova, CVREZ

Session 2 : Joint Programming – The way it could be implemented (Chairs: J. Miksova – G. Buckau)

Benefits/Added value of Joint programming, J. Slovak, SURAO

Establishing a legal scheme – The European Joint Programme scheme, B. Autrusson, IRSN

Current Status: Definition and implementation of activities, C. Serres, IRSN

Civil Society engagement in the joint programming: purpose, expectations and added value, G. Hériard-Dubreuil, Mutadis

Current status: legal documentation, governance, and funding mechanism, J. Delay, Andra

Session 3 : How research priorities have been identified and establishing the programme (Chairs C. Serres – A. van Kalleveen)

Establishing the priorities: views of the Waste management Organisations, R. Kowe, RWM

Establishing the priorities: views of the Technical Support Organisations, F. Lemy Bel V

Establishing the priorities: views of the Research Entities, B. Grambow, CNRS

Establishing the priorities: Horizontal Activities covering Education, Training, Knowledge Management and Knowledge Transfer, G. Buckau, JRC

Session 4 : Way ahead – Discussion (Chairs: J. Martin –L. Nachmilner)

Discussion and feedback from the audience, J. Martin, RWM

Production of the Programme Document: WP4, J. Martin, RWM

Session 5 : Conclusion (Chairs: B. Grambow – C. Davies)

Summarizing the overall outcomes & Next steps, L. Nachmilner ; J. Martin, RWM ; J. Delay, Andra

Closure of the meeting, J. Slovak SURAO