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Terms of Reference (TOR) of the SITEX network

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Contents

1 Foreword

The document provides an overview of tasks and operating conditions for establishing a SITEX network. This network is to be created and its goal is to provide a sustainable response to the international needs of cooperation between organizations carrying expertise function in the field of Radioactive Waste Management.

The main sources used for this report are:

- The deliverable D6.1 of the SITEX project that provide an overview of the existing national expertise function practices, needs for improvement and opportunities for establishing a European network to support this national expertise function in the fields of management of competences, Safety Case review, R & D and interaction with Civil Society.
- The other deliverables of the different working groups of the SITEX project (available on the SITEX website at http://sitexproject.eu).
- A cooperative process for establishing a SITEX Framework that has been progressively developed and updated during the SITEX project. This Framework aimed at defining the different functions mode of interactions and future tasks of the network and was constituted on the basis of the answers of the WP6 questionnaire discussed during a meeting in Vienna in May 2012. This questionnaire was sent to the different WP leaders and the outline of the SITEX network resulting from the analysing of the answers was presented and discussed during a meeting in Amsterdam in January 2013. This first proposal was improved through integration of comments of the partners and discussions between WP1/WP6. A second outline of the SITEX network and a design process of the Terms Of Reference (TOR) were sent to the SITEX participants in July 2013. These documents were discussed during the Senec management board meeting in September 2013. A third version of the SITEX framework and an updated version of the TOR were finally presented and discussed during the SITEX Plenary meeting in Paris in December 2013. The final version of the SITEX framework and TOR integrates the comments of this discussion and the different contributions of WPs in order to finalize them.

2 Executive Summary

The Deliverable D6.2 identifies the terms of reference of the future SITEX network. It presents a common definition, shared by the SITEX participants, of the national expertise function and its missions. Section 3 is outlining the various tasks of the national expertise function, detailing the requirements that govern the implementation of these tasks and the

skills and knowledge that are necessary to perform these tasks. It secondly describes the objectives of the SITEX network aiming at supporting national expertise functions, initiating international cooperation and seeking potential opportunities for harmonization, when relevant. Finally, Section 3 gives an overview of the functions, modes of interactions and operating opportunities of the SITEX network describing three different modes of interaction and four functions (set of services and activities) that the future network will provide to its members.

The three graded potential modes of interactions of the SITEX network (see Section 4) are the following: the first mode of interactions ("**Programming**") aims at identifying specific needs and developing diagnostic and specific programmes and products by **sharing national experiences, practices and prospective views** and by auditing appropriate stakeholders. The second mode of interactions ("**Implementing"**) aims at implementing in practice within the SITEX network the programmes and products identified in the first mode of interaction by **developing joint work and sharing resources**. The third mode of interactions **("Harmonizing, linking with external entities"**) aims at promoting and diffusing the SITEX products as well as the collective opinions of the network **with the view to reach harmonization**, where appropriate and at **developing interactions and partnerships** with external entities.

The document describes then the main operating opportunities (summarizes in the Annex 1) related to the four identified functions of the network:

Section 5 presents the services of the SITEX network to the SITEX members regarding **Training and Tutoring**, like: performing a "common core module" for all experts engaged in the licensing review process of a Safety Case for geological disposal; performing specialisation modules for each "expert profile" identified during the SITEX project and providing to tutored the opportunity to work in another national expertise bodies involved in the SITEX network, together with one or several inspiring tutors who agreed to share their expertise and experience and who will assist them to complete their specific learning needs.

Section 6 presents the services of the SITEX network to the SITEX members regarding **the review of the Safety Case (SC)**, like allowing mutual understanding on the regulatory expectations; sharing experience feedback on a type of review, a phase of development of SC or a specific concept; developing detailed review guidance for seeking harmonization of safety review activities; developing procedures for engaging civil society at decision hold points in order to contribute to the review of the extent to which the scientific and technical elements carried out by the Waste Management Organisations (WMOs) comply with these expectations; developing procedures and offer services for peer review activities of network members, to EU and international institutions and providing human resources (e.g. if an expert team searches for an expert in a specific field for a limited time, or a temporarily exchange of experts between two different teams, etc.

Section 7 presents the services of the SITEX network to the SITEX members regarding the **R&D implementation**, like developing and implementing the SITEX Strategic Research

Agenda (SRA); sharing national programmes, resources as well as R&D results within the SITEX partners; interacting with other research platforms; elaborating appropriate joint programming instruments at EU level, and interacting with European Commission for joint programming (Horizon 2020), without prejudice to independence of missions, in order to enhance the scientific level of SITEX members through these potential interactions; Interacting with ETSON on Radioactive Waste Management; integrating societal concerns, needs and opinions at different steps of R&D (definition of the programs, presentation, analysis of results and uncertainties, open questions) and improving the quality of interaction between Civil Society and WMOs by enabling both-way discussion at an appropriate scientific level.

Section 8 finally presents the crosscutting services of the SITEX network to the SITEX members regarding **interaction with the Civil Society** (CS), like initiating joint projects/activities with CS and notably research programmes on specific topics raised by CS answering to specific requests of CS organisations necessitating the support of the expertise function at local, national or European level; contributing to the development of the mutual understanding of CS and expertise functions on safety culture.

3 Characterization of a sustainable international network of technical expertise function (SITEX)

This section is outlining the various tasks of the national expertise function, detailing the requirements that govern the implementation of these tasks and the skills and knowledge that are necessary to perform these tasks. It secondly describes the objectives of the SITEX network as support to national organizations fulfilling technical expertise function regarding Radioactive waste disposals and initiator of international cooperation seeking potential opportunities for harmonization, when relevant. Finally, this section gives an overview of the functions, modes of interactions and operating opportunities of the SITEX network.

3.1 Characterization of the expertise function and partners of the SITEX project

The expertise function contributes in activities carried out in the context of the regulatory review of Safety Case in order to provide the technical and scientific basis of safety for:

- Decisions by the national regulatory body,
- Ensuring that regulatory expectations are clearly communicated to and interpreted by the implementer,
- Improving the quality of the interactions with Civil Society (CS) in the decision making process (DMP) in order to contribute to build a robust review of the Safety Case.

These activities (see sub-section 3.3 of this report for a more detailed description) can be assigned to experts inside or outside the regulatory body and include:

- Conducting safety review and developing the capacities to understand and assess the Safety Case,
- Contributing to inspections,
- Implementing R&D in safety,
- Interacting with CS along the review process and developing appropriate governance patterns to conduct this interaction.

In order to implement its activities, the expertise function must in particular rely on the following requirements:

- **Ensuring transparency**, this may involve public release of its assessments and reports, interactions with Civil Society, etc. (refer to SITEX D4.1 and D 5.2 and sub-section 3.2.2 of this report),

- **Demonstrating the independence of its resources and competences** vis-à-vis the implementer in order to avoid conflicts of interests (sub-section 3.2 of this report) notably regarding acquisition and use of scientific and technical knowledge,

These requirements contribute to guaranty the independence of the expertise function vis-à-vis in particular the implementing function.

According to the various national contexts, expertise function is carried out within different types of institutional framework. Several actors may also contribute to the expertise function within the same national institutional framework.

The expertise function can be performed inside the regulatory body:

- **Included in the national safety authority body** as it is the case in the following contexts: CNSC in Canada, SSM in Sweden, ENSI in Switzerland,
- **Performed by subsidiary of National Safety Authority** as it is the case for the national safety authority FANC in Belgium and its technical subsidiary Bel°V.

But expertise functions can be also performed outside the regulatory body:

- **By an independent technical safety organization (TSO)** officially responsible for supporting the authority as IRSN for ASN in France and GRS for Federal State Authority in Germany,
- **By Universities, research institutes or other external organizations** like consultants or NGOs specialized in various disciplines at stake regarding safety as it is the case for LEI in Lithuania, UJV in Czech Republic, DECOM in Slovakia, NRG in Netherland. Public and private Research organizations as well as Civil Society Organizations can also provide expertise in more specific fields of expertise such as governance, transparency implementation, law, etc.

The role and the interactions of the expertise function with the other stakeholders involved in the DMP are represented in the following scheme (Figure 1):

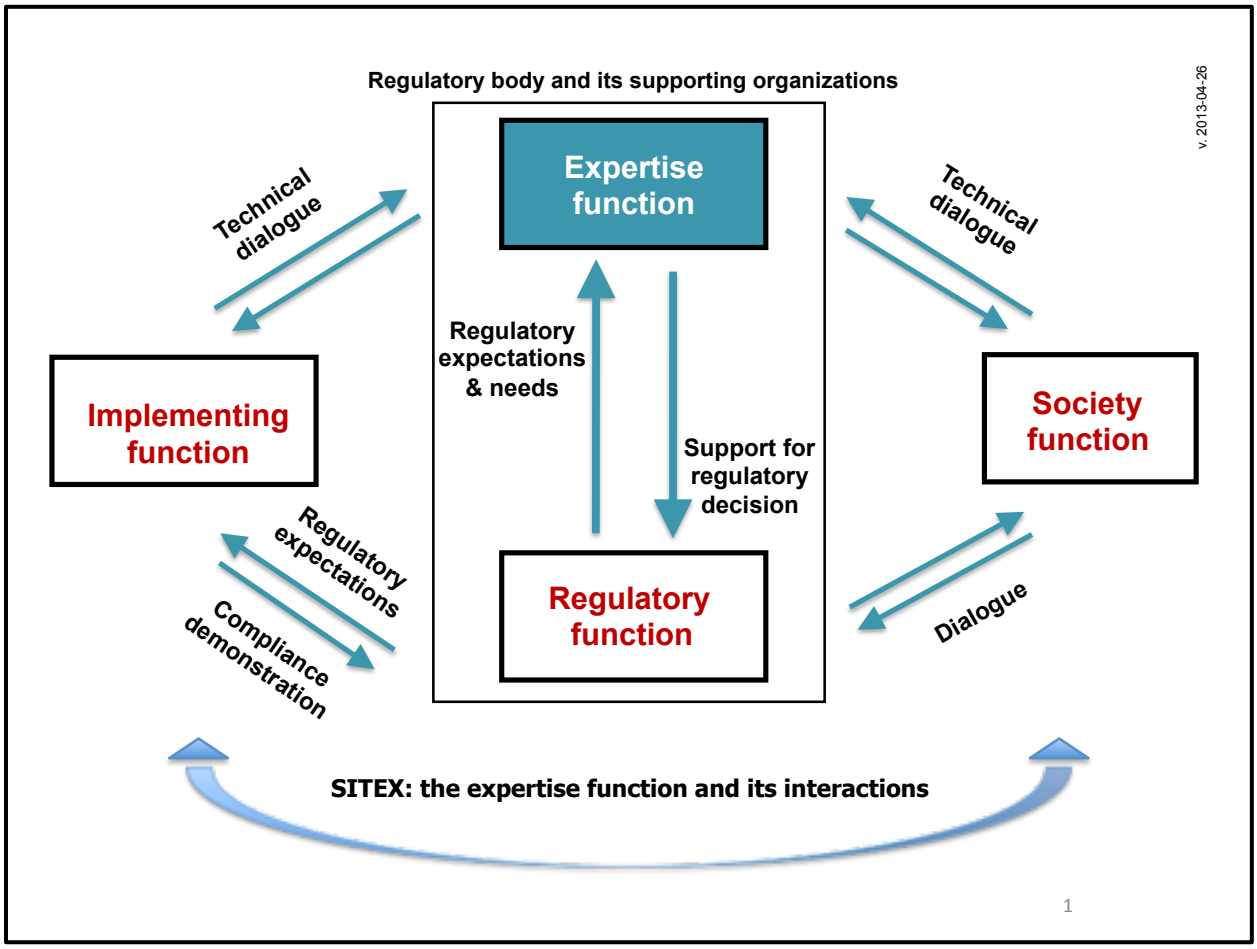


Figure 1: The expertise function and its interactions

Interactions between the expertise and regulatory functions contribute in:

- Developing the safety requirements and conditions that have to be fulfilled in order to meet the general safety objective of protecting human and the environment against the hazards associated to ionizing radiations ("Regulatory expectations");
- Assessing the compliance with these requirements and conditions ("Compliance demonstration").

Assessing compliance with safety requirements requires strong technical support from the expertise function. This includes several activities such as independent R&D, reviewing of safety demonstration and inspections. In order to provide the regulatory function with an adequate decision support, the regulatory needs associated with the evaluation of conformity have to be clearly formulated and communicated to the expertise function.

The expertise function interacts with the implementing function through technical dialogue with Waste Management Organisations (WMOs). For example this dialogue can include technical exchanges on R&D issues and on the adequacy of the approaches followed to

tackle safety issues. These discussions can occur inside or outside the formal review of a Safety Case.

Finally, the expertise function also has to interact with the society function. It is indeed requested from the Civil Society to interact on the definition of the R&D programme carried out by expert's bodies and on Safety Case review with a specific emphasis on the assessment of the safety strategy and safety concept adopted by the implementer.

3.2 Objectives of the SITEX network

The general objective of the SITEX network is to constitute a sustainable European and international cooperation in order to support a robust and reliable expertise function at national level in the field of safety of radioactive waste disposal.

Organizations carrying out Expertise Function at national level undertake various activities in order to fulfil their missions of expertise. In order to contribute to the quality and efficiency of these activities, the SITEX network will implement the following set of activities (SITEX functions, see Figure 2):

- Activities related to Training and Tutoring (SITEX Function A),
- Activities related to the Review of Safety Case (SITEX Function B),
- Activities related to Research and Development (R&D) implementation (SITEX Function C),
- Activities related to Interactions with Civil Society (SITEX Function D).

3.3 Proposed terms of reference for the SITEX network

The four functions (A, B, C, D) will be carried out by the SITEX network in order to support, facilitate and strengthen national activities of expertise of its partners. These functions correspond to the activities listed above in section 3.2.

For each of these four functions, the SITEX network will provide the following three graded potential modes of interactions (1,2,3) that are detailed in section 4:

- The first mode of interaction ("**Programming**") aims at identifying specific needs and developing diagnostic and specific programmes and products,
- The second mode of interaction ("**Implementing"**) aims at implementing in practice within the SITEX network the programmes and products identified in the first type of interaction,
- The third mode of interaction **("Harmonizing, linking with external entities"**) aims at promoting and diffusing the SITEX products as well as the collective opinions of the network and at developing interactions and partnerships with external entities.

These three graded modes of interactions provide different types of operating opportunities related to each of the four SITEX functions (see green boxes in figure 2 below). These operating opportunities are the different procedures and actions that the network could implement to fulfil needs for each SITEX function.

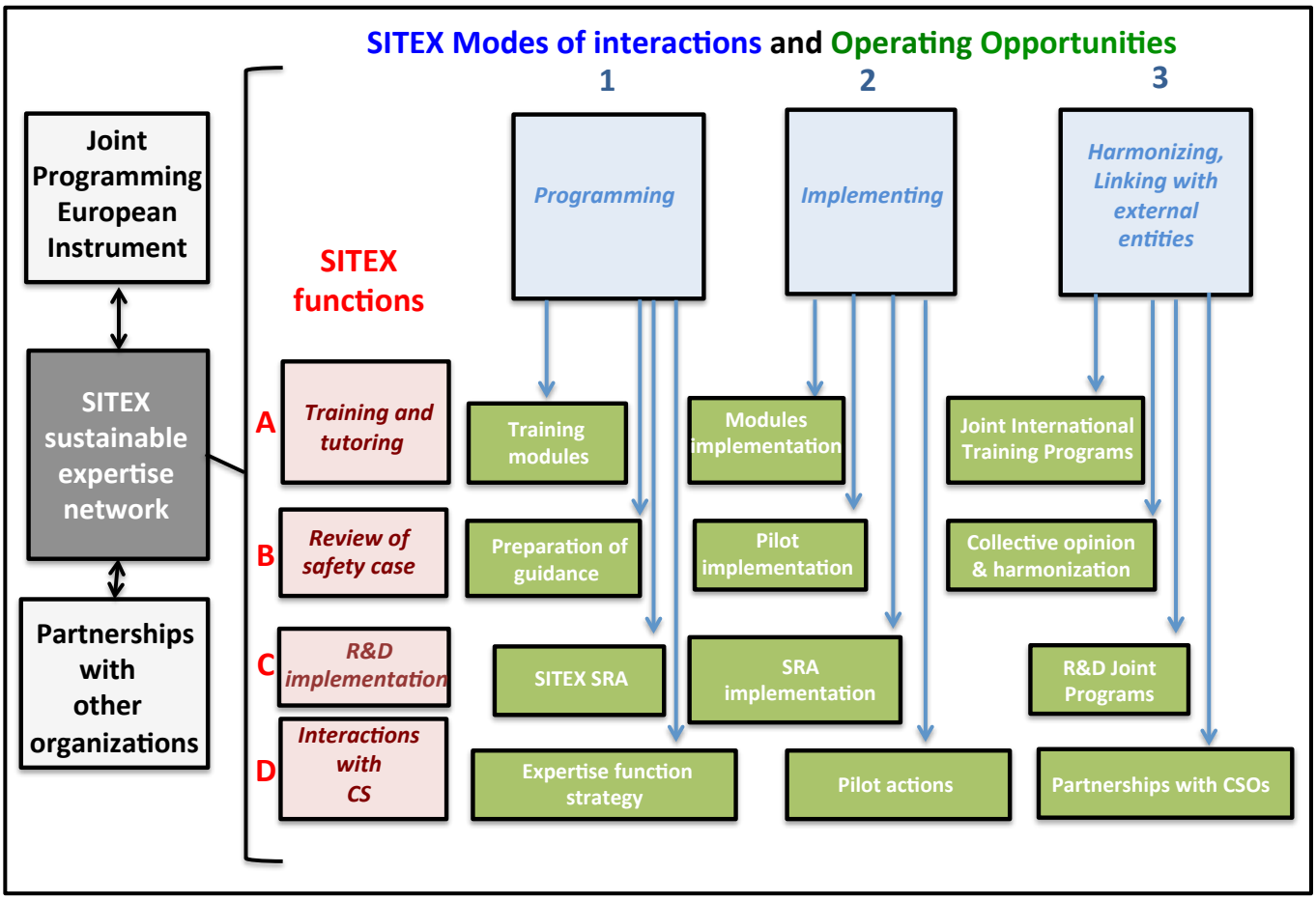


Figure 2: Framework of the SITEX network

Legend of Figure 2:

In red A, B, C, D: Functions of the SITEX network (functions carrying specific needs of expertise function at European level)

In blue 1,2,3: Modes of interactions offered by the SITEX Network

In green A1, A2, A3, B1, B2, B3, C1, C2, C3, D1, D2, D3: Operating opportunities (procedures to fulfil needs for each SITEX function)

The grey box “partnerships with other organizations” indicate that The SITEX network will develop interactions with international organizations and potential European partners like: WENRA, ETSON, IAEA, NEA, ENSTTI, IGD-TP, NTW, etc.

At the European Commission level, the interaction with the grey box “Joint Programming European Instrument” represents the situation of The SITEX network within the governance of European research. The creation of the SITEX network takes place in the context of the development of the European-Technological Platform and notably in the area of radioactive waste. In this perspective, the SITEX network will coordinate the establishment of a SRA devoted to the expertise function (and its specific needs and constraints) in order to reinforce the existing European joint programming of R&D with appropriate interactions with the WMOs Strategic Research Agenda (SRA).

4 SITEX Modes of interactions

For each of these four functions, the SITEX network will provide three graded potential modes of interactions:

- The first mode of interaction ("**Programming**") aims at identifying specific needs and developing diagnostic and specific programmes and products (training modules, safety guides, review guidance, SITEX SRA, strategy for interacting with Civil Society) by **sharing national experiences, practices and prospective views** and by auditing appropriate stakeholders.
- The second mode of interaction ("**Implementing"**) aims at implementing in practice within the SITEX network the programmes and products identified in the first mode of interaction by **developing joint work and sharing resources** (human resources, tools, funding, etc.).
- The third mode of interaction **("Harmonizing, linking with external entities"**) aims, on the one hand, at promoting and diffusing the SITEX products as well as the collective opinions of the network **with the view to reach harmonization**, where appropriate. On the other hand, it aims at **developing interactions and partnerships** with external entities such as: European Institutions, international organisations (IAEA, NEA, ICRP), networks and platforms (ETSON, WENRA, IGD-TP), and civil society organisations and other partners (e.g. ENSTTI).

4.1 Programming by sharing national experiences, practices and prospective views

The first mode of interaction includes basic exchanges of experiences and practices of the national expertise function. This type of interaction has already been developed in the past on a bilateral basis by some of the SITEX partners. It has been extensively developed within the SITEX project along the various categories of activities that are currently undertaken by the national expertise functions (see D6.1). This work has resulted in a shared understanding of the rationales of the expertise function. Further needs in order to improve the expertise function have been identified as well as more sensitive issues that deserve specific attention. For instance, specific needs of national expertise functions have been identified according to their institutional setting that have been found to be different across in the considered countries. In this perspective, opportunities for future improvement of the expertise function have been identified as a result of "sharing national experiences, practices and prospective views" in the SITEX network, such as:

- Building specific trainings (development of modules) aiming at developing competences for reviewing the Safety Case,
- Discussing existing guidance on radioactive waste safety and interpretation of existing recommendation or for new recommendation,

- Discussing methodologies to review safety cases in function of the different phases of development of a repository,
- Developing a Strategic Research Agenda as a result of a common view on the key safety issues and associated R&D actions that may be undertaken by a future network,
- Studying ways for engaging civil society at decision hold points in order to take into account their contributions in the review process.

In order to implement in practice this first mode of interaction, it is suggested to organize a SITEX exchange forum on a yearly basis (see annex 4).

4.2 Implementing by developing joint work & sharing resources

The second mode of interaction is defined as the set of bilateral and multilateral cooperation established between SITEX members that aim implementing the programmes and products developed in the first mode of interaction. These international partnerships aim at achieving joint works and programs and at sharing, where appropriate, facilities and financial, human and technical resources. This cooperation will rely on case-by-case initiatives, for which members will find an added value in:

- Exchanging staff or students that allows disseminating knowledge and know-how and within the network (tutoring for instance) and increasing the overall competences of members by testing the training modules defined in the first mode of interaction,
- Contributing to national review process, where appropriate, with the view to complete the national review team with external skills available in SITEX and implementing pilot study to test grid of analysis developed in the first mode of interaction,
- Sharing research facilities that would allow to implement experimental programmes of interest for all the parties with the possibility to share the costs and the data obtained (e.g. Tournemire),
- Sharing modelling capabilities for performing numerical calculations and increasing the experience feedback in using computer codes, in defining scenarios, in interpreting results with respect to the safety issues,
- Implementing the SITEX SRA developed in the first mode of interaction,
- Mobilizing resources from SITEX on requests of Civil Society organizations in order to support these organisations at national level in the framework of specific national cases, and to develop joint and pilot actions.

4.3 Harmonizing, linking with external entities

The third mode of interaction aims on the one hand, at promoting and diffusing the SITEX products as well as the collective opinions of the network with the view to reach harmonization, where appropriate. On the other hand, it aims at developing a strategy of interactions and partnerships with external entities such as: European Institutions, international organisations (IAEA, NEA, ICRP), networks and platforms (ETSON, WENRA, IGD-TP), and Civil Society organisations and other partners (e.g. ENSTTI). This third mode of interaction aims at going beyond the national models towards European (and possibly international) harmonized practices of expertise and promoting a SITEX label in the different components of the expertise function: training, review, R&D implementation, interactions with Civil Society. Such work towards harmonization should cover:

- The valorisation of the modules of the SITEX training programme by working with ENSTTI and IAEA,
- Producing guidance on radioactive waste safety to support the implementation of existing international recommendations,
- Producing practical guidance for reviewing the Safety Case with grid of analysis for the different phases of the review,
- The development of SITEX collective opinions,
- The publication of strategic positions on key safety issues (position papers),
- The development of peer review activities,
- The development of international joint programming in R&D in the frame of Horizon 2020 or with ETSON,
- The establishment of a sustainable process of interactions with Civil Society at European level by developing partnerships with Civil Society Organizations, in particular in the framework of European joint programming tools,
- The establishment of a sustainable process of interactions with WMOs in the framework of the European platforms context (IGD-TP) and with regulators networks (WENRA, ENSREG for instance).

After the presentation of these three generic modes of interaction, the following sections will present the four functions describing activities to be carried out by the SITEX network at European level and will detail the various operating opportunities related to these functions.

5 Training and Tutoring (Function A)

5.1 Definition and overall objectives

The review of a Safety Case of geological disposal requires a large panel of competences, specific knowledge, as well as specific attitudes and skills. The scientific knowledge required for experts is part of the initial knowledge offered by academic learning and is periodically updated through professional instruments outside SITEX.

In complement, the skills for reviewing the Safety Case are progressively developed through daily work but it is considered that a programme of specific training courses, tutoring and companionship should be developed in order to better support the development of the required professional competences. This programme of training and tutoring constitutes one of the functions of the SITEX network, Function A on Figure 1, and aims at offering services to national expertise function to ensure the availability of competences in the relevant aspects for the safety of geological disposal. It should in particular aim at developing:

- A common culture of safety (support for exchange of experience and best practices),
- Awareness on key safety issues,
- Common methods for reviewing the Safety Case (support for harmonization of practises),
- Awareness of complexity of safety governance considering key social and ethical aspects.

The potential users of the training services provided by the SITEX network will be the different categories of expert profiles (see D4.2 of SITEX) involved in the review process:

- Environmental scientists and risk experts in long-term safety, who carry out R&D and are able to use their scientific knowledge in environmental science to argue their expertise, shortly named "**environmental experts**" hereinafter;
- Risk experts in construction and operational safety, including material & civil engineers and scientists as well as conventional underground experts, shortly named "**operational risk experts & material engineers**" below; these experts may also carry out R&D and use it to argue their expertise;
- Numerical modellers, mathematicians and experts in code development, who have a transversal role, carrying out modelling and implementing software programs well-suited with the needs for expertise (including all types of models such as integrated models or process models, for long-term safety as well as for

operational safety); these expert, shortly named "**numerical modellers**" in the following of the present report, may also need to do R&D, generally not to use directly the results in the technical review but to improve the performances of a code.

- Generalist experts (or "general engineers") and experts in safety assessment who both have a central role in the expert team. **Generalist experts** have a high level of expertise on the different aspects of a Safety Case and coordinate the reviews performed by the other categories of experts. Thus, they possess a more global view of the review as a whole. This also includes experts in the assessment of long-term safety and in operational safety (scenario development & evaluation of uncertainties) who need to integrate data and knowledge from other experts.

Implementation of activities and services provided to the SITEX members

The function of Training and Tutoring of the SITEX network could provide services to the SITEX members, like:

- Performing a "common core module" for all experts engaged in the licensing review process of a Safety Case for geological disposal, dedicated to the "beginners" in expertise or for experts on other nuclear installations;
- Performing specialisation modules for each "expert profile" (see above)
- Providing to trainees the opportunity to work in another national expertise body involved in the SITEX network, together with one or several inspiring tutors who agreed to share their expertise and experience and who will assist them to complete their specific learning needs.

In addition, SITEX members will discuss on the possibility of providing training services for interested civil society representatives, where appropriate.

5.2 Sharing national experiences, practices and prospective views on training and tutoring (A1- first mode)

The first operating opportunity regarding training and tutoring is to develop the tutoring modules identified by SITEX in 2013. Three types of tasks are intended:

- Identifying the national practices at present-day on various activities in the following of SITEX WP4 (Task A1-1),
- Developing and implementing a "common core module" (module A) for experts on geological disposal (Task A1-2),

- To develop several "specialisation modules" for each identified expert profile: modules B, C, D, E (Task A1-3).

Task A1-1: Identification of national practices

A first task will consist in identifying the common practices and points of view as well as the inconsistent practices between the partners. This requires listing the current practices on the following topics:

- Existing training programs at national levels;
- Strategies/ management of human resources;
- Carrier management;
- Competence building;
- Existing initiatives on interacting with Civil Society.

To achieve the list of current practices regarding these issues, the network could for instance collect written contributions from each SITEX partner and organize annual meetings in order to discuss and propose a synthesis on these contributions.

Task A1-2: Development of a "common core module" for experts on geological disposal

A second task may correspond to the development of a "module A" (see SITEX D4.2), proposed to all experts engaged in the licensing review process of a Safety Case for geological disposal and especially dedicated to "beginners" or to experts working on other nuclear installations. This module could be divided in three thematic sessions:

- **Session I-** Definition of independent expertise (independence from WMOs, transparency and openness to Civil Society, competences and profiles of experts);
- **Session II-** Content of the Safety Case, detail of different parts and phases of development;
- **Session III-** Different steps of the technical review and exchanges with other stakeholders.

The activities related to the development of this module will evolve with the implementation of the SITEX network. During the first year after the creation of the network, the SITEX work will focus on the finalization of the implementation of this module through several meeting that will aim at:

- Identifying the appropriate trainers;
- Presenting the training courses to the SITEX partners. These presentations will be performed by the trainers (slides and exercises);
- Organising a pilot session between partners or with trainees;

When the module will be defined, the SITEX network will implement regular sessions of this module (e.g., one session by year, see section 5.3 of this report).

Task A1-3: Development of "specialisation modules" for experts on geological disposal

This task of the SITEX network will consist in developing several modules dedicated to the experts already trained in the "common core module". One module will be developed for each identified expert profiles (see SITEX D4.2 and D6.1 for a further description of the contents of the following modules):

- **Module B**, dedicated to "**environmental experts**", with possible sessions on the R&D program in earth sciences for expertise, on how to use knowledge and the results of R&D in earth sciences to carry out the expertise, and with a focus on the site investigation and selection phase.
- **Module C**, dedicated to "**numerical modellers**", with possible sessions on the modelling program and development of codes for expertise, on how to use knowledge and results of modelling to carry out expertise, and with a focus on the Safety Case at design development and selection phase.
- **Module D**, dedicated to "**operational risk experts & material engineers**", with possible sessions on the main hazards usually examined in the Safety Case and expertise of their treatment, on R&D programme for characterization and evolution with time of waste, engineering components and how to use knowledge and results of R&D on materials to carry out expertise, and with a focus on the Safety Case at construction phase and application for operation.
- **Module E**, dedicated to "**generalist experts**", with possible sessions on various regulatory aspects, on the safety assessment, on the management of experts and expertise and relations with other stakeholders, and with a focus on the operational phase.

The activities related to the development of these training modules will evolve with the implementation of the SITEX network (see section 5.3 of this report); its organization necessitates:

- To define the learning outcomes for each of the proposed training sessions. For instance, it could be:
  - The development of R&D programs needed on environment, for each phase of the Safety Case,
  - The development of a modelling exercise that will form the trainees to the use of results of modelling in the expertise,
  - The development of R&D program needed on the characterisation and evolution of waste and of engineering components, for each phase of the Safety Case,

- The analysis of an existing Safety Case for each phase of development of the disposal project or the elaboration of fictive ones,
- Exercises of review of the SC for each phase.

- To develop exercises of final tests on the learning outcomes of these sessions.

5.3 Joint work and sharing resources on Training and Tutoring (A2- second mode)

The main objective of the second mode of interaction regarding training and tutoring is:

- Delivering a regular training "common core module" and regular "specialisation modules" for each identified profile of experts on geological disposal (Task A2-1),
- Organising tutoring activities (Task A2-2).

Task A2-1: Delivering a regular training "common core module" and "specialisation modules" for experts on geological disposal

When the different modules of training will be developed (see section 5.2 of this report), the SITEX network will implement regular sessions of these modules. During the first years, SITEX will firstly prepare this implementation of modules through several meetings in order to:

- Develop the syllabus and programme of the training sessions for each module A, B, C D and E,
- Establish the terms of reference of the recruitment of trainers and creating a SITEX pool of appropriate trainers,
- Present the training courses to the SITEX partners. These presentations will be performed by the identified trainers (slides and exercises),
- Establish the contractual agreement among SITEX partners regarding the practical organization of the training courses,
- Organize a pilot sessions between partners or with trainees,
- Determine the leading organizations among the SITEX partners that will coordinate the implementation of the training programmes.

After this first period of organization, these modules will be held on a one-year basis for instance and these annual training sessions will be prepared by SITEX during one short organizational meeting, aiming at:

- Progressively incorporating the harmonized practices, resulting from the conclusions of 1st series of activities,
- Commuting the trainers, where appropriate (e.g. turn-over between SITEX partners),

- Modifying the courses contents, taking into account experience feedback, either from previous training sessions given or from expertise activities of partners' teams.

There will also be the possibility for the members of the SITEX network to provide adapted courses to reply to specific requests of another SITEX members.

Task A2-2: Development of tutoring activities

The SITEX network will also develop tutoring activities. That may include the setting up of work placements for trainees having followed the training "common core module" and one or several "specialisation modules".

Tutoring activities consists in a mutual exchange and it may not necessitate any additional funding (except regarding travels expenses of the learner). The financial compensation of the learner may be taken in charge by the organisations of the learner and the tutor that will benefit from this exchange:

- The advantage for the learner's organisation is that the learner achieves his training cycle and will become autonomous, i.e. able to carry out the review of a Safety Case in the expert team of its country,
- The advantage for the tutoring organisation is that the tutor and its team benefit of a third party. Even if the learner is not completely trained, he is not novice and its questions and remarks sharpen the expertise.

5.4 Harmonizing, linking with external entities on Training and Tutoring (A3-third mode)

The third mode of interaction regarding Training and Tutoring aims at promoting the training and tutoring activities developed by the SITEX partners outside the SITEX network. It will also entail the development of programmes on topics of mutual interest as a result of demands of external partners at national and international levels. In this mode, the network activities will consist in:

- Coordination with international organizations (A3-1)
- Development of Euratom training activities (A3-2)
- Development of training sessions involving experts and Civil Society partners on key social and ethical aspects of Radioactive Waste Management governance (A3-3)

A3-1: Coordination with international organizations

In addition to the national training activities, the training module will have to match with the existing international networks of training courses (ENSTTI, IAEA, NEA, European Credit System for Vocational Education and Training-ECVET…).

The network will also constitute joint training programs in coordination with ENSTTI and possibly with IAEA, Clausthal University, etc. that will principally focus on methods of technical assessment of the Safety Case.

A3-2: Development of Euratom training activities

The SITEX network will also seek to coordinate its training activities with the Euratom Research and Training programme on Radioactive Waste Management included in work programmes of Horizon 2020.

A3-3: Development of training sessions involving experts and Civil Society partners on key social and ethical aspects of Radioactive Waste Management governance

The SITEX network will also develop regular exchanges with Civil Society partners on key social and ethical aspects regarding Radioactive Waste Management governance in order to:

- Improve the awareness of the concerned actors on the complexity of safety governance considering these specific aspects,
- Develop a common culture of safety with Civil Society.

6 Review of Safety Case (Function B)

6.1 Generic Definition and overall objectives

The review of Safety Case is grounded on the safety requirements developed by the regulatory function that guide the development of the Safety Case. In order to develop an appropriate review of the Safety Case, a necessary step for the national expertise function is to get a common understanding of the regulatory expectations as expressed through the different national and international safety requirements.

In that perspective, it is necessary to exchange on the interpretation of international recommendations by comparing national technical guides. These exchanges could lead to further develop the existing requirements, to complete them when missing and to seek harmonization when possible

In addition, the fulfilment of safety requirements by the implementing function requires a clear formulation of the regulatory expectations, which may necessitate the development of technical guidance and procedures explaining how these requirements can be met in practice and how compliance should be substantiated. The criteria, against which safety will be judged, should be clearly defined as well.

On this basis, the expertise function has to develop guidance to support the implementation of the Safety Case review along the development of the geological disposal project.

Implementation of activities and services provided to the SITEX members

The function of Review of Safety Case of the SITEX network could provide services to the SITEX members, like:

- Allowing mutual understanding on the regulatory expectations, through exchanges:
    - Among SITEX experts,
    - With WENRA, ENSREG, HERCA, IAEA on safety standards, reference levels, requirements (existing standards and needs for further developments and clarifications),
    - With implementing organisations (e.g. IGD-TP),
    - With Civil Society.
- Sharing experience feedback on specific review aspects: a phase of development, a concept, etc.,
- Seeking harmonization of safety review activities by developing guidance on the safety case review process,
- Studying ways for engaging civil society at decision hold points in order to take into account their contribution in the review process. For example, it will be important to

know from the civil society the extent to which the safety case meets their preoccupations,

- Developing procedures and offering services for peer review activities of network members, to EU and international institutions,
- Providing human resources (e.g. if an expert team searches for an expert in a specific field for a limited time, or a temporarily exchange of experts between two different teams, etc.).

6.2 Sharing national experiences, practices and prospective views on Review of Safety Case (B1-first mode)

The regulation including **safety guides** constitutes the basic safety requirements for developing the Safety Case. It is crucial that these rules are clearly established and made explicit for all the concerned actors (implementers, experts, civil society). The expertise function has to perform an independent verification of compliance with these requirements and conditions that involves reviewing the Safety Case. By this way, the expertise function can leade to identify areas where further clarification and development are needed. The expertise function needs also to identify review principles and to develop methodologies in order to frame the review process implementation. As a matter of fact, for its own use, the expertise function has to develop **a dedicated technical guidance** in order to structure the way of implementing the Safety Case review.

This first mode of interaction of SITEX regarding Review of Safety Case aims to prepare the establishment of the guidance on safety and on the review process (to be provided under third mode) through exchanges between SITEX members on:

- The interpretation and implementation of international recommendations and on needs for harmonization (task B1-1),
- On safety case review principles and review practices to assess and to prepare the review of a safety case (task B1-2).

The outcomes of these activities constitute an important input for the second mode of interaction aiming at implementing internal guidance for the SITEX network and for the third mode of interaction aiming at seeking harmonization of the Safety Case review process.

Task B1-1: Exchanges on national regulations and safety guides

Safety requirements to be verified and expectations related to the Safety Case are addressed by international recommendations developed by different organisations (IAEA, NEA, ICRP, WENRA, etc.). In this perspective, the task B1-1 of SITEX will aim to share national experiences and prospective views on the interpretation and implementation of these recommendations and on related national regulatory requirements. Topics will be discussed accordingly with the priorities identified during the SITEX project (see SITEX D2.1, D.2.2, D2.3) like for instance the Safety Case review, the promotion of safety culture, radiological protection principles, safety principles, site selection criteria, etc. The frequency of meetings between SITEX members on these topics could be about twice a year.

To perform its missions, it is also essential for the SITEX members to take into account exchanges with WMOs, international organisations and Civil Society undertaken within third mode on:

- Experience feedbacks on the application of the international recommendations (difficulties encountered, possible gaps in international recommendations or technical guides, etc.),
- WMOs and Civil Society needs related to these issues.

Information exchanged between SITEX members on these topics should allow identifying proposal for a common interpretation of SITEX members on existing recommendation and proposal for new recommendations, where needed, as a basis for harmonisation to be done in third mode.

Task B1-2: Exchanges on technical guidance and review practices

An objective of the SITEX project was related to the overview of national practices when reviewing the Safety Case. The study of the approaches to perform the technical safety review amongst SITEX participants revealed similarities, that allowed to go further in the definition of a standardized review methodology. The SITEX participants have developed a preliminary grid of analysis based on the specific phases of development of the disposal program. The main principle driving the development of the review for each phase is to adapt the level of analysis to the level of development of the project. The general framework is presented according to a general "grid of analysis" common to all phases but with various focus and assessment depending of the progress of the project. These common issues to be addressed are related to:

- the description of the context of the Safety Case,
- the focus of the technical review, then to the assessment of the implementation of the safety strategy,
- the assessment of the set of data used, of the processes considered, of the models and computer codes used (assessment basis),
- to the effectiveness of the safety functions and of the performances of barriers, then to the definition of scenarios for radiological and non-radiological impact calculations,
- to the management of uncertainties,
- to the integration of safety arguments and evidence.

The selected phase to test the methodology refers to the end of "site investigation and selection phase", leading to the decision to select a site and start investigation for a reference design. It corresponds to the status of the SR-Can SKB report (implementer in Sweden) or to partly the Andra's Dossier 2009 (implementer in France).

The SITEX network will develop, within third mode, a common technical guidance on harmonized safety review activities. In this perspective, the task B1-2 of SITEX will continue the work initiated in 2013 (see SITEX report D4.1) and will aim to:

- Consolidate the "site investigation and selection phase" grid of analysis and continue the construction of the review grids for each phase of development of the Safety Case (conceptualization, reference design, construction, operational and post-closure phases),
- Define the expected content of the technical review reports for each phase of development of the Safety Case,
- Share national experiences and prospective views that requires achieving on:
    - Hazard assessment both for the operational phase and for the post-closure phase,
    - Practices to verify that the recommendations are effectively implemented.

In order to specify more precisely the issues to be reviewed by the experts, the SITEX partners will:

- Use the IAEA questionnaire developed by GEOSAF as well as the questions raised recently by GEOSAF2 on the operational safety,
- Take into account exchanges with WMOs and Civil Society taken within third mode, to precise their expectations related to the content of a Safety Case throughout the repository lifecycle.

Information exchanged between SITEX members on these topics should allow identifying methodologies and good practices of the review process as a basis for harmonisation to be done in third mode.

6.3 Joint work and sharing resources on Review of Safety Case (B2- second mode)

The second mode of interaction of SITEX regarding review of Safety Case aims to test methodologies and good practices to review a safety case identified in the previous mode of interaction (see section 6.2). This objective will be achieved toward two tasks:

- Pilot studies implementing methodologies and good practices on specific cases (Task B2-1),
- Punctual expertise to regulatory and experts bodies (Task B2-2).

Task B2-1: Pilot studies to test the relevance of methodologies and good practices

In order to implement methodologies and good practices identified in task B1-2 (see above), the SITEX network will have to develop pilot studies on specific cases within working groups by seizing the opportunity of the current call of the European Commission, mobilizing its own available financial resources and/or resources from EC projects.

The SITEX network will also have to organize the process of approval by its members regarding (see section 6.4 below):

- Harmonisation of the review process and related guidance,
- Harmonisation of regulatory requirements and related guidance,
- Position papers.

Task B2-2: Expertise to regulators and expert's bodies

In the context of this second mode of interaction, the second task of the SITEX network will also be to test the service of one or several experts in a much specialised domain to another team (regulators or expert's bodies), contributing to their global Safety Case assessment. This expertise could be one-off and one-time, focusing on specific topics of the review related to uncertainties management, performance assessment or impact assessment. The extent of this task will depend on the demand.

Regarding this task, the type of services provided by SITEX could be:

- Published in folders and on SITEX website,
- Funded by organisations applicant.

6.4 Harmonizing, linking with external entities on Review of Safety Case (B3-third mode)

The third mode of interaction SITEX regarding review of Safety Case aims to view SITEX as a body of experts sharing similar references in terms of review process and of technical review methods and guidance on regulatory requirements, allowing SITEX to open outside, offering services to other institutions or platforms.

Four types of activities are considered:

- Interaction with WENRA, ENSREG, IAEA, civil society etc. to contribute in improving common understanding on regulatory requirements and review process (Task B3-1),
- Delivering collective opinions of SITEX (Task B3-2),
- Peer reviews and secondment of experts (Task B3-3),
- Harmonisation (Task B3-4).

Task B3-1: Interaction with WENRA, ENSREG, IAEA, civil society etc. to contribute in improving common understanding on regulatory requirements and review process

The regulatory function is responsible for the establishment of requirements and conditions for the development, operation and closure of disposal facilities and has also to develop safety guides in order to detail the expectations related to these requirements. The expertise function provides technical support to the regulatory function in order to perform this task and to frame the review process of safety cases. In this context, the task of SITEX

will consist in contributing to the improvement (as far as national specificities allow) of a common understanding of regulatory requirements, in close interaction with WENRA, ENSREG, IAEA, etc., and to identify WMOs and Civil Society needs related to the review process. Task B3-1 provides input for tasks B1-1 and B1-2.

Task B3-2: Delivering SITEX collective opinion

A task in this mode of interaction will consist in developing position papers and common position on:

- Specific topics for clarification of specific safety aspects,
- Specific requests from IGD-TP, from Civil Society or its platforms of representatives,
- Documents developed by international organisations (EC, IAEA, ICRP, IGDTP, NEA, ETSON etc.)

These common positions and position papers will be submitted to the approval of the SITEX consortium according to the procedure defined above (see task B2.1).

SITEX could also participate to various EC research programmes and facilitate dialog with Waste Management Organisations (WMOs) through IGDTP, communicating on common regulatory bodies positions, requirements and expectations related to the IGDTP vision consisting in operating safely the first geological disposal facilities in Europe for spent fuel, high-level waste, and other long-lived radioactive waste by 2025.

Task B3-3: Peer reviews and secondment of experts

A other task is to offer a pool of experts with a very large panel of competences and experiences, which allow answering to a need for review of very specific competences or to a temporary important working load in a country.

Obviously, SITEX will realise Peer reviews of documents, advices or practices on the request of other members of SITEX and also on the request of regulatory bodies, WMO's or Civil Society. These Peer reviews should bring a judgment based on experience and knowledge under the SITEX label. The organization of SITEX Peer reviews should also be defined on a case-by-case basis and could be funded by organisations applicant.

Task B3-4: Harmonisation

The expertise function has a continuing role to review the Safety Case, which has to be regularly updated to remain an adequate basis for making decisions throughout the geological disposal lifecycle. The evolving nature of the Safety Case is largely acknowledged and addressed by on-going international initiatives (e.g. IAEA SSG-23, European Pilot Study). In this context, this task of SITEX will consist in the harmonisation (as far as national specificities allow) of:

- The interpretation and implementation of international recommendations,

- The process and practices used to verify that the Safety Case complies with the regulatory expectations.

The outcomes of this task will lead to the publication of guidance, which can be updated at regular interval taking into account feedback from SITEX members. Different working groups will develop different parts of these documents on specific topics and the final version would be submitted to the approval of the SITEX consortium according to the procedure defined above (see task B2.1).

On this topic, the SITEX network will develop exchanges notably with ETSON.

7 R&D implementation (Function C)

7.1 Generic Definition and overall objectives

R&D work is essential for the experts' scientific and technical ability to review the Safety Case, because it maintains or improves their competence, it contributes to their independence and finally it helps to reinforce the reliability of the decision making-process. The R&D objectives set by the expertise function in the context of Radioactive Waste Management are:

- To investigate issues directly related to safety in order to check the adequacy of the approaches developed by the implementer, for the Safety Case,
- To initiate R&D investigations where there is a need for additional studies beyond those undertaken by the implementer,
- To perform redundant and independent R&D work, when required, in order to apply suitable critical considerations in its review and assessment of the Safety Case,
- To pay specific attention to the detection of possible inadequate methodologies, hypotheses or assumptions, knowledge gaps, incompleteness, inconsistencies, mistakes (of reasoning or of implementation), etc.

Implementation of activities and services provided to the SITEX members

In this context, the SITEX function of R&D implementation is defined as the following R&D interconnected activities of the network:

- Setting and updating SITEX Strategic Research Agenda (SRA). The development and the implementation in practice of the SRA should duly account for the aspects hereafter,
- Sharing national programmes, resources (facilities, codes, staff) as well as R&D results within the SITEX partners,
- Interacting with other research platforms (SNE-TP, IGD-TP, MELODI-OPERRA), elaborating appropriate joint programming instruments at EU level, and interacting with European Commission for joint programming (Horizon 2020), without prejudice to independence of missions, in order to enhance the scientific level of SITEX members through these potential interactions,
- Interacting with ETSON on Radioactive Waste Management,
- Integrating societal concerns, needs and opinions at different steps of R&D (definition of the programs, presentation, analysis of results and uncertainties, open questions),

- Investigating the opportunity for the expertise function to contribute to improve the quality of interactions between Civil Society and WMOs by enabling two-way discussion at an appropriate scientific level (role of "buffer" of the expertise function?).

7.2 Sharing national experiences, practices and prospective views on R&D implementation (C1- first mode)

Based on national experiences, the SITEX project has developed a common view on the key safety issues and the related scientific skills needed by the expertise function to review the Safety Case with an appropriate level of quality (see D6.1, section 6). The set of scientific skills needed is organized around the following axes that drive generally the review of the safety demonstration developed by the WMOs:

- The quality of the data on which rest the safety demonstration and in particular the adequacy of experimental methods used for producing the sets of data,
- The understanding of the complex processes which may potentially influence the long term safety of the geological disposal and in particular the development of basic scientific knowledge in the fields where there is a lack of knowledge, especially regarding the complex phenomena and interactions occurring all along the life of the repository and their influence on nuclear safety. In some cases, this understanding may require specific experimental tests aiming at assessing the key parameters that warrant the performances of the different components of the repository. Such experiments are designed in particular to simulate the behaviour of components in altered conditions and allow the assessors to rely on independent data and results for delivering appraisal on the specifications of construction that are to be justified by implementers,
- The assessment of the future evolution, in spatial extent and intensity (orders of magnitudes of perturbations) of the processes, as well as the assessment of their impact on the safety. Such calculations allow preserving an independent evaluation of the Influence of assumptions made by the designer and of the related uncertainties.
- The due consideration of potential hazards that could impair safe operation of the waste emplacement, considering the influence of accidents during operational phase on the long-term safety.

Because national programmes are at very different phases (conceptualization, siting, design…) and because concepts/host rocks are different, the mapping of the on-going research activities carried out by SITEX members (see SITEX D3.2) reveals different concerns and areas of research. In order to identify further cooperation, new needs of scientific development, research programs and priorities, it is proposed to establish a distinction between areas where interest is concept/specific and where it is more generic.

In that perspective, two main categories of scientific issues may be addressed: on the one hand those related to processes where the scientific community already made progress and where additional efforts concern specific on-going development designs in selected sites (for more advanced programmes), on the other hand those related to generic scientific topics that concern any kind of programmes (more related to the assessment methodology). In general, collaborative programmes do remain of interest on some higher-level scientific topics related to components and materials (behaviour of concrete, performance of seals…) or crosscutting issues and integrated modelling (role of interfaces, coupling of processes for example, transient phase…).

In this context, the first step for the SITEX network will consist in:

- Further analysing the different concerns and available resources within the SITEX partners identified in SITEX D3.1 and D3.2 (Task C1-1)
- Elaborating the SITEX Strategic Research Agenda (SRA) on the basis of the results of the task C1-1 and according to the strategy developed in SITEX deliverable D3.3. The SRA will constitute a vision for implementing actions that are needed in order to fulfil all the R&D needs of the expertise function (Task C1-2)

Task C1-1: Further analysis of the different concerns and available R&D resources

The further analysis of the different concerns and available resources within the SITEX partners identified in SITEX D3.1 and D3.2 will aim at:

- Identifying gaps in scientific skills and knowledge within the SITEX partners,
- Identifying scientific areas where scientific knowledge are considered as sufficient,
- Identifying scientific and technical activities that are under the responsibility of the operators and the way to access and share this knowledge,
- Highlighting the potentiality for implementing joint research programmes, using and sharing available tools, based on the identification of generic and specific concerns.

For this purpose, SITEX will audit where needed:

- The regulatory function in order to share expectations in review capabilities,
- The implementing function in order to study potential interactions in R&D programmes, and way to share knowledge,
- Representatives of the Civil Society, who may provide valuable inputs for framing the R&D programmes.

In practice, these actions will be implemented through periodic meetings and working groups, that SITEX will organize.

Task C1-2: Construction of the SITEX SRA

The elaboration of the SRA will be derived from the outcomes of the Task C1-1 and the strategy defined in the SITEX D3.3. In particular, the SRA will consider the technical and scientific issues to be assessed when implementing the regulatory review, where expertise function have identified that:

- Dedicated investigations have to be performed in order to complete the understanding of specific factors that may influence the safety,
- An independent view must be developed in order to be able to develop contradictory exchanges between implementer and reviewer.

In both cases, the SRA will be focused on key safety issues and related scientific concerns and especially on main phenomena where related uncertainties must be assessed.

The SRA will mainly address three scientific and technical activities:

- Implementation of experimental works and computational simulations related to the understanding of processes and phenomena governing the containment capabilities of the disposal,
- Implementation of experimental works and computational simulations related to the understanding of hazards possibly occurring during the operational phase (ventilation, fire, explosion, flooding, etc.),
- Crosscutting activities mainly related to the development of approaches for reviewing the Safety Case.

The prioritisation of the R&D activities will be defined according to:

- National Radioactive Waste Management agendas,
- Opportunities of joint programming within SITEX,
- Opportunities of partnerships with WMOs,
- Societal concerns.

For this purpose, SITEX will organize workshops and meetings and will deliver a final document that will constitute a version of the SITEX SRA that will be a living document periodically updated.

Several potential sources of funding could be checked in order to support the construction of the SITEX SRA:

- National funds (e.g. Programs owners within SITEX members),
- European co-funding (e.g. Projects focused on implementation of R&D in the frame of H2020)

7.3 Joint work and sharing resources on R&D implementation (C2- second mode)

The second mode of interaction of the network regarding R&D will consist in the implementation of the previously defined SRA (see section 7.2) within the SITEX network. Indeed, in order to achieve the high level of scientific excellence, the SITEX network will encourage close R&D cooperation among its members. Cooperation is also expected to favour synergies among national programmes and more specifically enable less advanced programmes to benefit from larger R&D resources. In this context, the network will implement several specific activities:

- Sharing human resources (task C2-1),
- Sharing of scientific equipment/installations/laboratories (task C2-2),
- Sharing of data, codes and models, and scientific results (task C2-3),
- Joint programming (task C2-4).

Task C2-1: Sharing human resources

Firstly, SITEX will coordinate the sharing of human resources in the frame of joint programmes, contracts, young scientist exchange programmes, etc.

Task C2-2: Sharing of scientific equipment/installations/laboratories

Secondly, SITEX will organize the sharing of scientific equipment, installations and laboratories, where needed, notably concerning high-tech equipment and specialized labs (e.g. radiochemical labs or underground labs). One of the advantages for SITEX members is notably to spare the costs of renting of the scientific equipment that consume a lot of financial resources of national expertise function.

Task C2-3: Sharing of data, codes and models, and scientific results

In the framework of SITEX, exchanges of data will be implemented on the basis of:

- The definition of pattern and governance, depending on the source of data,
- The availability of data, depending on their source (public funding/private resources),
- The description of objectives of the data use.

SITEX will also set up the sharing of mathematic codes, models and data, depending on their source (public available/open source/commercial product). In this context, national and international benchmarking might be a useful tool for testing the model in the process of future system development or in the process of data quality assessment, for instance. The codes/models exchanges and benchmarking can be organised among SITEX members. SITEX will also implement a procedure for exchanging scientific results that can be used for achieving different objectives (methodology, quality assessment, assessment of data relevance, etc.).

These exchanges of results and benchmarking can be practically organized on the basis of workshops and meetings, accompanied with email communication and report exchange.

Task C2-4: Joint programming

Finally, SITEX will coordinate the implementation of joint projects and joint programming on both national and international level among SITEX members, according to the strategy defined in the SITEX SRA.

7.4 Harmonizing, linking with external entities on R&D implementation (C3-third mode)

The third mode of interaction of the network regarding R&D implementation will include activities that will be focused on implementation of common procedures, methodologies dedicated to international cooperation and exchanges with external partners. The two main tasks of this mode of R&D implementation will be:

- R&D joint programming in the frame of Horizon 2020 (task C3-1),
- Specific coordinated actions involving other stakeholders, notably to implement in practice the SITEX SRA (task C3-2).

Task C3-1: R&D Joint programming in the frame of Horizon 2020

In the framework of this task, SITEX will notably pursue the dialog with the European Commission on:

- The potential ways to involve the expertise function in R&D EU programmes within H2020,
- The launching of specific programmes and projects that would bring together different stakeholders (WMOs, regulators, CS, academics, experts bodies) in order to define new modes of R&D governance for the future research projects.

Task C3-2: R&D Specific coordinated actions with other stakeholders

The second set of activities that SITEX will develop in the context of this mode of R&D implementation concerns the development of coordinated actions at the European (and possibly international) level with other stakeholders. It includes:

- **Interactions with other research platforms** (SNE-TP, IGD-TP, MELODI-OPERRA). Some of the scientific topics considered in the R&D actions of the expertise function and the implementing function overlap. As some of scientific installations or models are unique, potential joint programmes should be considered under strict conditions in order to preserve the independence of the expertise function. The development of specific guidance related to the governance of this exchange could be implemented through the organization of exchanges and workshops.

- **Coordination with ETSON (European Technical Safety Organisation network**). ETSON associates TSOs all over Europe and its activities are based on voluntary exchanges of experiences and technical and scientific options. SITEX will study the opportunity to coordinate actions with ETSON working group on Radioactive Waste.
- **Integration of societal concerns at different steps of R&D,** through the organization of regular workshop or work programme with Civil Society. Early interaction with Civil Society is an increasingly important challenge as developed above (see section 7.1) and below (see section 8). Civil society could bring an important feedback for SITEX SRA as Civil Society members can bring different view on key safety issues, different prioritisation of issues that could be constitute an added value to the SITEX SRA. All these aspects of interactions should be mirrored in all the R&D actions undertaken and basically in SRA.

8 Interaction with Civil Society (Function D)

8.1 Generic definition and overall objectives

According to the perspective developed by the SITEX project, transparency of the decision-making process includes several requirements such as:

- To make explicit and public, at the early beginning of the decision making process, the "**rules of the game**" (requirements and way to verify that they are applied, through technical review and inspections),
- To maintain over time, **consultations and interactions** with interested parties in the decision process, in particular with the CS at national and local levels.

As underlined by the Aarhus Convention, the sustainable presence and engagement of the public along the decision-making is expected to reinforce the quality of the decision-making of RWM and the review of the extent to which the scientific and technical elements carried out by the WMOs comply with the regulatory expectations. Public engagement is therefore expected to contribute to the reliability of the democratic decision-making in the context of RWM at local, national and international levels.

According to the common definition of the SITEX members (see section 3 and SITEX D6.1), one of the tasks of the expertise function is to improve the quality of the interactions between experts and Civil Society (CS) in the Decision Making Process (DMP). The expertise function has therefore a key role to play in the development of appropriate governance patterns to conduct these interactions that should constitute an opportunity for CS:

- To have access to different sources of expertise in order to enhance its technical knowledge & capacities,
- To raise its capacity and knowledge in order:
    - To engage in a meaningful way along the RWM decision-making process at local, national or international levels,
    - To voice its concerns and values,
    - To duly influence the framing of the issues at stake in the expertise process (including R&D), and to contribute to the quality of expertise.

The SITEX network is expected to support the development of the national expertise function interactions with CS at different levels of governance and at different steps of the decision-making process. The possible multi-level contributions of CS along the decision-making steps of RW disposal (see Annex 2) offers many opportunities of interactions with experts according to considered phase of the decision making process (conceptualization, siting, reference design, construction, operation, post-closure).

Implementation of activities and services provided to the SITEX members

In this perspective, the SITEX function "Interaction with CS" is defined as the network crosscutting activities related to the interactions of the expertise function with CS. It includes:

- Identifying the opportunities and possibilities for CS to engage in the RW decision-making process at the local, national and international levels, along the RWM decision-making processes,
- Determining the need for the expertise function to interact with CS (notably along the Safety Case development and review), and to inform the public on the results of the expertise supporting the decisions of the regulatory body,
- Identifying the needs for the SITEX network to interact with CS in the context of its activities such as training and tutoring activities (Function A), Safety Case review activities (Function B) and R&D implementation (Function C).

Several types of actions are considered to be implemented, such as notably:

- Initiating joint projects/activities with CS and notably research programmes on specific topics raised by CS (see section 8.4 of this report),
- Answering to specific requests of CS organisations necessitating the support of the expertise function at local, national or European level (see section 8.3 of this report),
- Contributing to the development of the mutual understanding of CS and expertise functions on safety culture (see also section 5.1 of this report).

8.2 Sharing national experiences, practices and prospective views on interaction with CS (D1- first mode)

In the context of the SITEX function "Interaction with CS", the first mode of interaction includes basic exchanges of experiences and practices regarding the interaction of the national expertise function with CS. A review of existing interactions has been undertaken within the SITEX project. A case study analysis has been performed (see D5.1) and a SITEX workshop involving experts and CS representatives has been held in SENEC, Slovakia (see D5.2) in order to investigate potential areas of co-operation of the future SITEX network with the CS (see D6.1).

This work has resulted in a shared understanding of the rationales of the interactions of the expertise function with CS. Opportunities for future improvement of the expertise function have been identified as a result of "sharing national experiences, practices and prospective views" in the SITEX network. Based on these results, two main types of activities are considered in the framework of this first mode of interaction:

- Mapping and discussing the experience of national expertise function interacting with CS, sharing evaluation of this experience with CS organizations (Task D1-1),
- Exchanging on the implementation of CS expectations regarding the expertise function at local, national and European levels (Task D1-2).

The outcomes of this task will also constitute useful incomes for SITEX D2 and D3 activities (see section 8.3 and 8.4).

Task D1-1: Discussing the experience of national expertise function interacting with CS, sharing evaluation of this experience with CS organizations

Developing a mutual understanding between Civil Society & experts necessitates appropriate tools for enabling communication between the parties. The Civil Society must be provided with relevant and reliable information in due time, while the conditions for an actual dialogue should be established in order to avoid inefficient polarised discussions.

The regulatory body, including the expertise function, is expected to develop exchanges with the Civil Society, on a regular basis, on:

- The fundamental safety issues, like safety principles & requirements,
- Each steps of the decision-making process,
- The successive outcomes of Safety Case Review (making explicit the position of the authorities on Safety Strategy and Safety Concept adopted by the implementer),
- The outcomes of the R&D programmes that is developed by the expertise function.

The formal options for achieving public participation in the decision making process depends also on the type of the process and national legislation. The PIPNA survey (December 2012)[1] commissioned by DG ENER is proposing institutional and legal procedures tools in order to achieve public participation in the nuclear sector along the decision-making process. The IPPA 7 FP7 project has also developed a mapping of public participation tools in various decision-making processes together with a toolbox to support decision makers in the selection of the proper tool for interacting with the public.

Task D1-2: Exchanging on the implementation of CS expectations regarding the expertise function at local, national and European levels

A first overview of the expectations of CS regarding the expertise function has been shaped during the SITEX workshop in SENEC. These expectations rely on the openness of the expertise organizations involved, and on a set of prerequisite values to be shared such as

[1] Public Information and Participation in Nuclear Activities (PIPNA): Assessment of good practices on the participation of civil society in the development of nuclear activities - Final report 5th December 2012 - Contract NO. ENER/D2/2011-539

http://ec.europa.eu/energy/nuclear/studies/doc/20130128_pipna_final_report_05-12-2012.pdf

transparency and independence (see definition proposed by SITEX D6.1 and section 3 of this report). In this perspective, it is especially expected from CS that experts make explicit:

- The scientific uncertainties of the decision-making context,
- The criteria for assessing technical solutions and how they lead to recommendations,
- The background documentation of expertise,
- The terms of the expertise as it is elaborated for the need of safety authorities,
- The traceability of the collective expert's opinion that should be provided in order to enable the public to identify the various views of the experts before achieving the trade-offs.

Moreover, experts are expected to adopt a genuine intellectually independent perspective in order to be able to voice their personal concerns (as a whistleblower), as soon as they are not properly taken into account by the institutional decision-making process. The expertise function is also expected to adopt a broader vision, not limiting its scope to a narrow perspective (e.g. linkage between radioactive waste management and energy strategy, etc…).

Besides the conditions for allowing relevant interaction between experts and Civil Society, the SENEC workshop has identified several concrete research & experimentation and potential activities in order to structure the public engagement along the decision-making and the Safety Case review. Further exchanges of SITEX with CS will aim at defining strategies for implementing these activities. It will represent the basis of projects and activities that will be developed by SITEX in the third mode of interaction (see section 8.4).

8.3 Joint work and sharing resources with CS (D2- second mode)

In the context of the SITEX function "Interaction with CS", the second mode of interaction is defined as the set of bilateral and multilateral cooperation to be established between SITEX members on the one hand and CS organisations on the other hand. These international partnerships aim at achieving joint works and programs and at sharing, where appropriate, financial, human and technical resources. This cooperation will rely on case-by-case initiatives, for which members will find an added value in:

- Supporting pilot projects of expertise function for developing interactions with CS at national or local level,
- Contributing and supporting national CS review activities regarding RWM safety,
- Offering expertise capacities to CS when needed,
- The definition of training activities on issues involving a mutual interest for both national expertise and CS,

- Mobilizing resources from SITEX on requests of Civil Society organizations in order to support these organisations at national and European levels in the framework of specific national cases.

An example of such an ad-hoc multilateral cooperation is given by the conference on "Nuclear Energy and Public Participation" that was organised in Ljubljana, capital of Slovenia, on December 2nd, 2013, by the CS organisation "Focus-Association for Sustainable Development" (see Annex 3).

8.4 Harmonization, linking with CS (D3- third mode)

In the context of the SITEX function "Interaction with CS", the third mode of interaction will aim at the development of European (and possibly international) harmonized practices of expertise interactions with CS at local, national and international levels, developing, testing and diffusing practices in this area. Such work towards harmonization should typically cover:

- The development of sustainable processes of interaction of national expertise function with CS along the RW decision making at local, national & European levels, more specifically along the Safety Case review activities,
- The development of partnership of national expertise functions with CS organizations at national and European levels (through the channel of the SITEX network), notably in the perspective of supporting CS review activities at European level,
- The development of a common vision with CS of the challenges for R&D on RWM safety,
- The involvement of CS along the implementation of the SITEX SRA, in particular in the framework of possible European joint programming tools (to be implemented in the future),
- The implementation with CS of training activities on issues involving a mutual interest for both national expertise and CS.

Several potential areas of mutual interest have been identified along the SITEX project. The foreseen SITEX 2 research project will offer opportunities to start implementation of this third mode of interaction in the context of this SITEX function "Interaction with CS". During the SITEX workshop in SENEC, several areas of interest for CS have been identified that could constitute matter for potential interactions with CS in the context of this SITEXT 2 project:

Task 1 - CS contribution to Safety Case Review and safety culture

- The building of a common understanding (between experts and CS) of what is a **Safety Culture** (with reference notably to "safety culture", e.g. IAEA INSAG-4, 1991; INSAG-15, 2002) more specifically in the context of RWM, and the understanding of the role of Civil Society in this perspective as laid out in the terms of the Aarhus Convention (1998), within various kinds of spontaneous or institutional processes at

local, national or international levels.

- The development of processes and tools in order to enable experts interactions with CS along the RW decision-making and more specifically along the **Safety Case Review** activities allowing Public information and participation in the perspective of the Aarhus Convention.

Task 2 – Review of Institutional Settings for the governance of RWM safety

- The review of **Institutional Settings for the governance of RWM safety** regulation, expertise, and control and their articulation vis-à-vis political institutions and SC and in this perspective the **review of the implementation of the EU RWM (2011/70) Directive**.

Task 3 - Intergenerational governance patterns for Geological Disposal

- The development of **Intergenerational patterns** of inclusive governance (> 100 years) along the foreseen **Operating Phase** of geological disposal. This entails the review of possible appropriate institutional settings for RWM safety regulation, expertise, and control and their articulation vis-à-vis political institutions and Civil Society at local and national levels.

Task 4 - CS interacting with R&D

- The development of interactions with CS along the **development of R&D** and more specifically the CS contribution to the SITEX Strategic Research Agenda:
    - Framing and taking on board potential area of research raised by the CS (e.g. the development of "RWM PLAN B" as potential alternatives in the case of a potential SC failure of the "reference RWM solution"). This includes both technical areas of research and societal aspects of RWM to be identified with CS,
    - Supporting CS review of the European Strategic Research Agendas on RWM (such as the IGD-TP SRA and the SITEX SRA),
    - Developing the appropriate processes for CS to interact with experts along R&D development.

The SITEX network will investigate in the near future the potential opportunities offered by the current European Horizon 2020 programming in order to implement these considered tasks:

- Identifying and answering to EC calls that could support the work on these different topics,
- Identifying SITEX members and CS organisations interested to work on these issues,
- Organizing dedicated working groups of SITEX members with CS representatives to exchange on these topics.

The outcomes of these activities will constitute the basis to elaborate a framework of sustainable and regular exchanges between the SITEX network with CS organisations.

ANNEX 1 Operating Opportunities for implementation of the SITEX network

Mode 1 of interaction: Identification of Needs: Diagnostic/Programming

Training and Tutoring	Development of training modules
Review of Safety Case	Proposal for interpretation of existing recommendations, for new recommendations, where appropriate. Development for a grid of analysis for the different phases of the Safety Case Review, identification of methodologies and good practices
R&D implementation	Development of the SITEX Strategic Research Agenda (SRA)
Interaction with Civil Society	Development of a strategy of generic interaction with CS

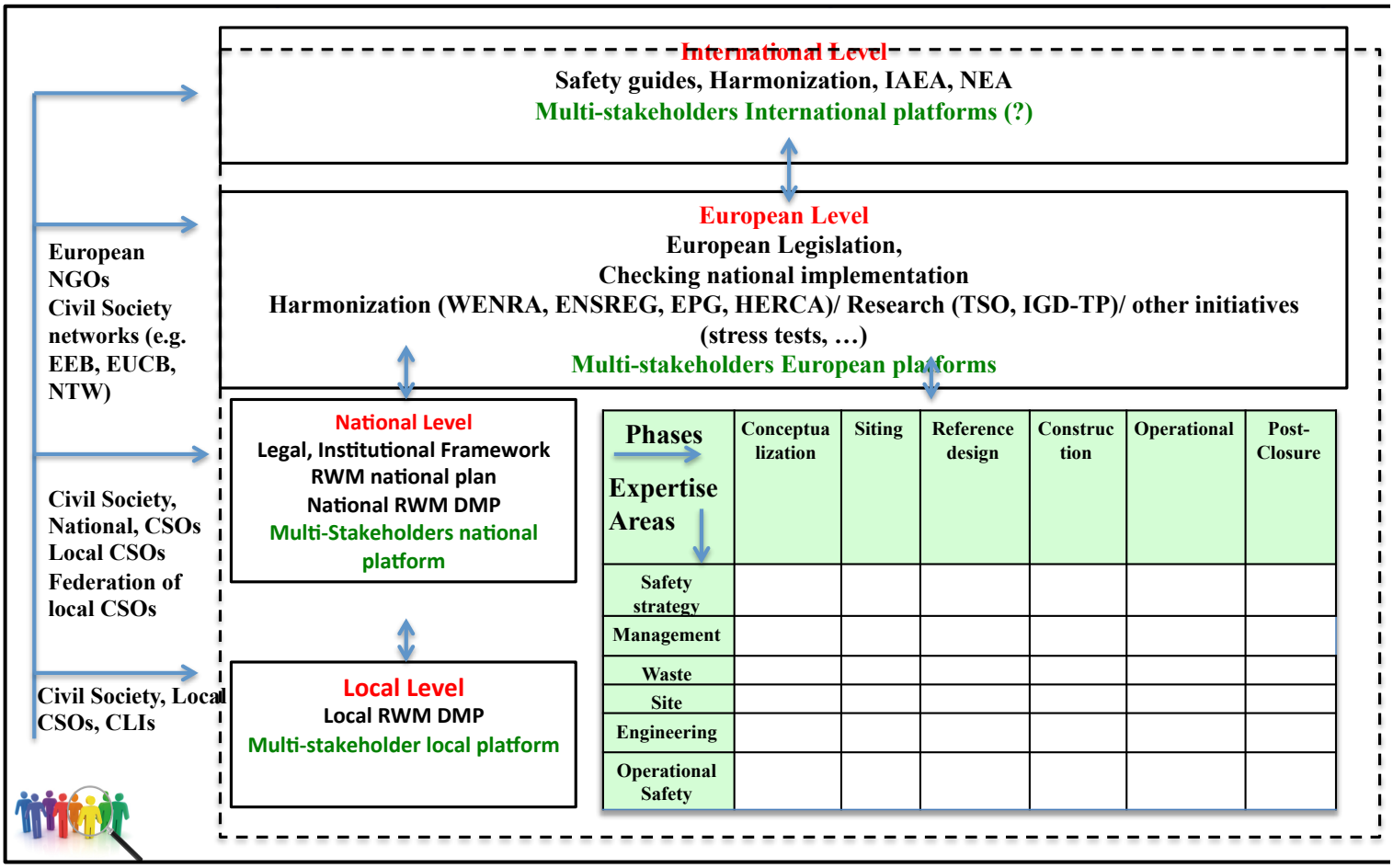
Mode 2 of interaction: Implementation among SITEX partners

Training and Tutoring	Implementation of training modules and tutoring among SITEX partners
Review of Safety Case	Pilot study to test methodologies and good practices in review process, Sharing resources for review of Safety Case among SITEX partners
R&D implementation	Implementation of SRA among SITEX partners, Sharing resources, models and tools
Interaction with Civil Society	Joint actions, case studies, Pilot actions

Mode 3 of interaction: The SITEX network interacting with external entities

Training and Tutoring	Valorisation of SITEX training modules, development of programmes with ENSTTI and IAEA
Review of Safety Case	SITEX collective opinion, guidance on safety requirements and review process, interaction with ETSON/IAEA on standard for expertise function, interaction with WENRA/IAEA on safety guide
R&D implementation	Joint programming H2020, with ETSON, etc.
Interaction with Civil Society	Joint Programming at EU level, Contribution to the Safety Case review

ANNEX 2 Possible multi-level contributions of CS along the decision-making steps of RW disposal Operating



ANNEX 3 Example of multilateral cooperation with CS

An example of an ad-hoc multilateral cooperation with CS is given by the conference on "Nuclear Energy and Public Participation" that was organised in Ljubljana, capital of Slovenia, on December 2nd, 2013, by the CS organisation "Focus-Association for Sustainable Development", with the participation of:

- The Slovenian Nuclear Safety Administration (URSJV),
- The Institute for Radiological Protection and Nuclear Safety (IRSN) from France,
- The French National Association of Local Information Committees and Commissions (ANCCLI)
- The Nuclear Transparency Watch (NTW),
- The Faculty of Social Sciences of the University of Ljubljana (FDV) & the IPPA Euratom Research project
- The ARAO-Slovenian Agency for Radioactive Waste Management and Greenpeace.

Slovene Civil Society and NGOs initiated the conference. They have asked IRSN and ANCCLI and Nuclear Transparency Watch to support the Civil Society engagement on RWM with their expertise and strategic advices. The conference has confirmed the usefulness of an international support for a fruitful and balanced discussion of topical nuclear safety issues raised by the CS. It has provided valuable insights on how Civil Society can self-organise to engage on nuclear safety and contribute to safety vigilance. The need for balanced engagement of Civil Society, industry and pubic authorities in finding solutions to build trust and solve both technological as well as social challenges related to nuclear power has been underlined. This includes transfer of know-how and good practices for well-designed and long lasting frames and support mechanisms to CS engagement. The conference has also underlined the need for further investigations of geological faults at Krško in order to further determine the scope and the scale of risks involved in the operation of the existing NPP and the expectation of the CS in this perspective.

ANNEX 4 Practical implementation of the SITEX exchange forum

It is suggested to organize an annual meeting of the network (SITEX exchange FORUM) with topical sessions on specific technical aspects. Topics are identified and prioritised by the members of SITEX on a yearly basis. However SITEX should strive to have a 3 years outlook and prioritise. Each member can suggest topics. However if a member is suggesting a topic they should be prepared to participate on the Organizational Committee.

Organizational Committee

Each topical session of the SITEX exchange Forum will be organised by a small team (~3 persons from different organisations). By having a small team, it is hoped to minimise administrative and organizational issues. It is suggested that organisations, which have a strong interest in this topic, organise the topical session. The committee will:

- Set up the programme, invite the speakers,
- Reserve sufficient time for discussions,
- Provide minutes with the results and conclusions.

Topical sessions

The topic of the session should be specified at least one year in advance. This will help to ensure that organisations can send their experts. The advantages of topical sessions combined with an annual meeting are that:

- It requires few additional efforts to organise it,
- New topics can be identified at the general assembly,
- It is a flexible system allowing that sessions can be simply dedicated for sharing information, experiences, learning about what is going on in other countries on training activities, review aspects, guides and research activities, interaction with Civil Society, etc.,
- Members will meet the experts from different organisations on specific topics.

To organize such annual meeting, the SITEX network will have to find common technical topics, organising teams and the appropriate funding.

ANNEX 5: Glossary of acronyms

CS, CSO: Civil Society, Civil Society Organisation

DMP: Decision-Making process

GD: Geological Disposal

EC: European Commission

ENSREG: European Nuclear Safety Regulators Group

ENSTTI: European Nuclear Safety Training and Tutoring Institute

ETSON: European Technical Safety Organization Network

GEOSAF: The International Intercomparison and Harmonisation Project on DEMONSTRATING THE SAFETY OF GEOLOGICAL DISPOSAL

IAEA: International Atomic Energy Agency

ICRP: International Commission on Radiological Protection

IGD-TP: Implementing Geological Disposal of Radioactive Waste Technology Platform

MELODI: Multidisciplinary European Low Dose Initiative

NEA: Nuclear Energy Agency

NTW: Nuclear Transparency Watch (European Network of CSOs)

OPERRA: Open Project for the European Radiation Research Area

R&D: Research and Development

RWM: Radioactive Waste Management

RWD: Radioactive Waste Disposal

SITEX: Sustainable network of Independent Technical Expertise for Radioactive Waste Disposal

SNE-TP: Sustainable Nuclear Energy- Technological Platform

SRA: Strategic Research Agenda

SSG: Specific Safety Guide (IAEA Safety Standards)

WENRA: Western European Nuclear Regulator Association

WMO: Waste Management Organisations