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Plan for Integrating Analysis by experts and selection of experts (Expert Elicitation)

Author(s) *Marjatta Palmu, Posiva Oy*

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ABSTRACT:

This memorandum describes the planning for the integrating quality assurance process using the Expert elicitation process for the DOPAS Project. The revision of the DOPAS EE process is described and the feedback of the experts to the process. The process worked in providing improvement inputs to the DOPAS Project Work package final summary deliverables. The memorandum produced does not represent the views of the DOPAS consortium or those of the individual consortium organisations.

RESPONSIBLE:

Marjatta Palmu, Posiva Oy

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D6.1 PLAN FOR INTEGRATING ANALYSIS BY EXPERTS AND SELECTION OF EXPERTS

1 Objectives of this plan

The purpose of this document is to describe how the DOPAS Expert elicitation of the final reports has been planned and carried out including the selection of the independent experts.

The planning process has been carried out simultaneously as the work has progressed and the main input for the plan was first received from the pilot elicitation of the POPLU test plan (final deliverable D3.25 POPLU test plan and D6.1.1) in 2013. Due to the changes in the DOPAS timetable the main elicitations started in the Autumn 2015 and thus also the inputs from the WP2 deliverable D2.4 elicitation have been taken into account in producing this document describing the planning for the elicitation of technical demonstration experiments and the related work packages and tasks. This report is a compilation of the development on the Expert Elicitation plan development since summer 2013 until August 2016.

2 Introduction to DOPAS content

The DOPAS project is a four year demonstration project in geological disposal funded with the partial support of the Euratom 7th Framework Programme. The DOPAS project consortium of 14 organisations from eight European countries has carried out partly or fully five experiments in France, Czech Republic, Sweden, Finland and Germany. The project has seven work packages of which WP2 - WP6 are RTD and DEMO Work packages. In Work package 3 and 4, five different full-scale demonstrations are either monitored and constructed, and constructed monitored or dismantled during the project; or prepared for implementation after the DOPAS project. These experiments are FSS in France, consisting of a full-scale drift seal constructed and later dismantled in an aboveground warehouse; EPSP in Czech Republic constructed, pressurized and monitored in the Josef Underground Laboratory; DOMPLU in Sweden, a full-scale KBS-3V deposition tunnel dome plug constructed prior the start of DOPAS project and pressurized and monitored during the project in Äspö Hard Rock Laboratory; POPLU in Finland, an alternative full-scale KBS-3V deposition tunnel end plug with wedge shape. POPLU has been constructed according to national repository requirements and pressurized for monitoring during the DOPAS project in ONKALO Underground Rock Characterisation Facility at the future repository site that has been granted a construction license in 2015. The fifth experiment is ELSA shaft seal's conceptual development in Germany planned for implementation after the end of the DOPAS project. In



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connection to the planning and material and technical decisions related to the shaft seal various experiments in different scales and material tests have been carried out in Germany during this project.

3 Purpose of the expert elicitation in DOPAS

In the DOPAS project the expert elicitation has three main purposes:

- To carry out a formal review of the final documentation of the DOPAS RTD and DEMO work packages (i.e. the final work package deliverables);
- To produce a formal documentation of the review comments (in the form of an expert approved consensus memorandum);
- To make a formal consortium external quality control on the deliverable.

4 Introduction to the origins of Expert Elicitation at Posiva Oy

4.1 Methodology developed by Hukki

The expert elicitation methodology was developed for Posiva by VTT and especially Ms. Kristiina Hukki as a quality assurance tool for the Posiva Safety Case (TURVA 2012) resulting from the experiences Posiva had when preparing the TILA-99 safety assessment (more details are available in Posiva Working Report WR 2008-60). The elicitation process intends to bring in alignment the different background perspectives and make the underlying assumptions guiding expert thinking more transparent with resulting in a smoother way to reach consensus on issues requiring expert judgment. The view taken in the elicitation is that the elicitation and validation process is regarded as a collaborative and cross-disciplinary whole and it has a systemic character and follows a formal process aiming to support collaboration of the experts during the process.

Besides being used by Posiva, expert elicitation in the way as it was developed in WR 2008-60 (Hukki, 2008) has been used during the FP6/7 PAMINA project (Deliverable M No 2.2.A.12 by Bolado et al. 2009).

Since the EE process was originally planned to be used in the expert judgments related to safety case preparation, its suitability for other types of elicitations was now tested in the DOPAS Project's quality assurance.



4.2 The process of EE by Hukki

The generic process for the expert elicitation as defined in Hukki (2008) included the following steps:

- Selection of issue (generally something not easily agreed, but requiring judgment and consensus).
- Selection of forum.
- Selection of domain experts (probabilistic SA).
- Selection of shared conceptual frameworks (description production).
- Preparatory work of safety analysts.
- Training of domain experts.
- Instruction of domain experts.
- Independent work of domain experts.
- Iterations (consensus meeting).
- Treatment of possible controversies (consensus meeting).
- Validation of expert judgments for later use.
- Final documentation of the process (facilitator).

4.2.1 Tools and Preparatory Work

The tools of the Expert Elicitation process include in the case of the probabilistic performance assessment the training of the domain experts by the safety assessment experts. Further tools include structural and contextual descriptions about the elicitation target and the two different types of questionnaires given for the experts to carry out their independent elicitation work and for providing their views.

The preparatory work for the elicitation includes first the selection of the elicitation experts, their recruitment, their training and the preparatory work for introducing the target of elicitation and setting up the meetings and recording the results of the kick-off or training session discussions.

4.2.2 Iteration of the experts' independent work

The experts review the target under elicitation independently providing their input on the questionnaire forms. The questionnaire form inputs are then compiled by the facilitator, who prepares an agenda for the iteration or the consensus meeting. The facilitator identifies for the agenda the similarities of the expert comments, potential controversies and the experts' suggestions for improvement of the issue under elicitation (solutions for a common judgment on an issue with a clear-cut direct solution) or the reporting about the issue.



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5 EE and technology demonstration projects

In the planning phase of the DOPAS project, the aim of the elicitation was to cover the full work of the project in one elicitation. Simultaneously, the elicitation is used as an alternative approach to the use of an expert group like it was implemented in the LUCOEX (FP7 GA no 269905) or ESDRED (FP6 GA 508851) projects, which were also full scale technology demonstration projects.

6 Adoption of the EE process to DOPAS targets

In the WP6, the Task 6.1 was to plan for the quality assurance using the Expert elicitation as a means of carrying out an external review of the final work package deliverable D2.4, D3.30, D4.4 and D5.10, which summarize the work of the individual RTD and Demonstration work packages in DOPAS.

The external elicitation experts were used to pinpointing the lessons learned and further uses of the DOPAS results, in identifying controversies, omissions or errors in the individual deliverable drafts submitted for the expert elicitation and also the elicitation process helped in identifying eventual gaps between the work of the individual work packages.

6.1 DOPAS Pilot elicitation and revision of Hukki's process

6.1.1 Expert elicitation in DOPAS Project

The Expert Elicitation (EE) was carried out first as a pilot action for the POPLU test plan in autumn 2013 (Deliverable 6.1.1 Pilot EE consensus memorandum, available on DOPAS Project's website <http://www.posiva.fi/en/dopas>). The pilot elicitation demonstrated that the process could be applied for a technical target of the elicitation. It also highlighted the need to have the comprehensive report draft available for the elicitation experts in the beginning of the process. This requirement is based on the objective of having a relative fast elicitation and review process of the deliverables with a lead time of around three months for the process.

Hukki's process was modified for the DOPAS elicitations so that some of the steps were combine and some of them were left out from the process as described in the **Table 1**.

The main elicitations were carried out for the DOPAS Work packages 2, 3, 5 and 4 in this order using the process. The work packages 2 and 5 were in their nature research and technology development (RTD) work packages and the WP3 and WP4 were demonstration work packages



(DEM) in the original work plan. Feedback about the process was collected from the experts of each elicitation.

Table 1. Expert Elicitation (EE) Process Steps and Their Application in DOPAS

Expert Elicitation Process Steps and their application in DOPAS		
Step number	Elicitation process step according to Hukki 2008.	Elicitation process steps as adopted in DOPAS Expert Elicitation
1	Selection of issue (generally something not easily agreed, but requiring judgment and consensus)	The target for elicitation was the DOPAS Project Work Package summary reports and this selection was made in the project proposal. During the project, it was decided in the consortium to do separate elicitations for each of the four summary reports D2.4, D4.4, D3.30 and D5.10 (in this order).
2	Selection of forum	The selection of the forum was defined by the decision that the individual summary reports were elicited separately. The forum consisted of 4-5 experts, the facilitator and as an observer the work package leader or/and the main editor of the summary report in question. It was also planned that the elicitations would take place either in Finland or at the location of the organisation responsible for the work package in question.
3	Selection of domain experts (originally the EE is applied for issues needing knowledge about probabilistic SA)	The selection of the experts took place by long-listing and short-listing suitable technical domain experts and experts with performance/safety assessment (PA/SA) expertise for the individual work packages by the consortium and by the project officer from the EC. This long-list was screened and at the same time it was recommended that one of the experts would participate as the main expert in all of the four elicitations as the other experts varied based on the content and expertise needed for each work package EE. The final contracting of experts for the individual elicitations started by the facilitator after the timetables for the WP summary reports and their availability for the EE were available from the work package leaders.
4	Selection of shared conceptual frameworks (description production)	The DOPAS EE did not include training for probabilistic safety assessment and therefore both the domain experts and the PA/SA experts



Expert Elicitation Process Steps and their application in DOPAS

Step number	Elicitation process step according to Hukki 2008.	Elicitation process steps as adopted in DOPAS Expert Elicitation
5	Preparatory work of safety analysts	all participated in the same process. The shared conceptual frameworks were already partly included in both the WP2 and WP5 RTD work packages, but the rest of these descriptions needed to be produced by the facilitator prior the elicitation start. The preparatory work of the safety analysts was not included into the DOPAS EE as no probabilistic SA training was needed in the DOPAS Project elicitations. In addition to the description production, the facilitator adopted the EE forms that had been produced for Posiva's EE for each WP elicitation separately. After the WP2 elicitation, the forms were also reviewed and commented by the main elicitation expert.
6	Training of domain experts	The training of the domain and PA/SA experts took place simultaneously in a kick-off meeting. The kick-off gave each expert a share framework about what was expected from their independent review work and it also set the timing for the production of their independent work and for the consensus meeting.
7	Instruction of domain experts	The kick-off meeting presented both the elicitation process and a summary of the work package report under elicitation. The experts were able to ask questions about the WP work and about the process and the common dates were set. The main materials and the supporting background materials were given to the experts. A pdf-version of the summary report in question had been sent via e-mail few days earlier to the experts with the intention to give them a chance for more focussed questions about the work and the report at hand.
8	Independent work of domain experts	The experts were given time from 2.5 weeks to 4 weeks to respond to the elicitation form questions and to make their conclusions about the WP summary reports. The inputs were then compiled by the facilitator and the consensus meeting content structured based on the replies.
9	Iterations (consensus	The experts participated the consensus meeting



Expert Elicitation Process Steps and their application in DOPAS

Step number	Elicitation process step according to Hukki 2008. meeting)	Elicitation process steps as adopted in DOPAS Expert Elicitation
10	Treatment of possible controversies (consensus meeting)	and gave first their general impression of the work done. This was followed by going through and discussing the items listed by the facilitator from the replies of the experts and common views were recorded after the discussion by the facilitator. The descriptions either produced by the work packages or by the facilitator were discussed and modified accordingly. Very few controversial views came up in the experts' review. The general views of the experts were very well in alignment. Eventual misunderstandings were clarified in the meeting itself.
11	Validation of expert judgments for later use	The validation of the expert judgments itself did not take place. However, the consensus meeting minutes were approved by all experts who participated the consensus meeting and any mistakes in the minutes were commented by the experts. Also the expert inputs on the elicitation forms are stored as raw data for any future use, but the individual replies are treated as project's internal information. In addition to the expert elicitation, these reports will further undergo the consortium and in some cases organisational internal review process, too.
12	Final documentation of the process (facilitator)	The consensus memorandums produced by the facilitator and reviewed and approved by the participating experts are reviewed and approved by the project coordinator for submission to the EC and they will be published as public deliverables of the project.

6.2 Selection of experts for the process

The experts in the pilot elicitation were not selected on the wider DOPAS forum due to the limited scope of the pilot Elicitation target. As already recognised early on in the project, the more feasible approach for the elicitation was to split the different work package deliverables into separate elicitations. This would enable selecting experts more acquainted with the target of the elicitation compared with the selection of experts who would need to cover the full scope of the DOPAS project



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in all the different host rock conditions that the experiments and other work packages are implemented.

As planned in DOPAS the expert selection was submitted for the DOPAS General Assembly and consulted with the EC project officer.

The expert selection started with a request to the consortium to name experts for a long-list. The criteria for the experts were that they should be independent of the on-going DOPAS project work and that they should have sufficient expertise in the content of each of the work packages WP2 - WP5 and further their knowledge in each elicitation group should cover all or almost all of the host rock environments where the experiments are implemented. Further part of them should come from the consortium, and a part was to be subcontracted. Further a consideration also on the gender balance of the experts would be made, if possible.

The long-listing of knowledgeable experts suitable for the elicitation work took place in November 2013 after the implementation of the pilot elicitation. After the DOPAS General Assembly meeting no 2, the long list was submitted for the screening of the consortium and few changes were made to it. At later stages the expert list was shortened to a final list of experts including potential deputies for the experts, since the two meetings, kick-off meeting and the consensus meeting, required all of the same experts to be present and assembling all of named experts at the same time to the meetings might not be possible.

The final expert selection for each elicitation required adjustments for various individual expert related impediments. However, it was decided early on in the process that for consistency at least one expert is required to participate in all of the work package elicitation. For this role Mr. Jan-Marie Potier was selected by the consortium due to his extensive background and subject knowledge.

For each elicitation experts with two different roles are required: Experts with performance assessment/safety assessment background and technical domain experts. The number of experts per elicitation is between 4-6 experts depending on the extent of the elicitation work (size and scope of the deliverables and their complexity).

The recruitment of the experts was carried out by direct contacts asking the short listed experts availability and interest for this task. The contract values for the subcontracted experts fall below the national threshold of public procurement. Also the project budget set a cap on the expert contracts and the adverse value development of Euro in relation to other currencies needed to be considered in the contracts limiting the use of experts from outside the Euro zone unless members in the DOPAS consortium.



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7 Timing and implementation of the EE process

The WP2 elicitation was carried out in Autumn 2015, the WP3 elicitation started in April 2016 and the consensus memorandum was approved by middle of July 2016 by the experts, the WP5 and WP4 elicitations were started the second half of May 2016 and the approvals for the consensus memorandums were received by the end of July 2016.

The time use of the experts per person for each elicitation was originally estimated to be around 8 days. The actual time usage was around the amount of 10 days per experts.

The experts also provided feedback on the elicitation process itself. The main feedback related

- to the timing of the elicitation;
- to the potential to integrate the elicitations into one elicitation and have it in two stages - at the planning stage of the work and at the end of the project work;
- to the structure and length of the questionnaires and their potentially redundant questions.

The feedback related to the elicitation itself is described in more detail in the consensus memorandums (DOPAS deliverables D6.3, D6.3.1, D6.3.2, and D6.3.3).

8 Conclusions

The expert elicitation process provided an alternative means of doing quality assurance of the project's summary deliverables. The long and short listing of the experts provided a list of several suitable experts for the review task. The external review could be carried out for improving the final deliverables of the DOPAS Project in the time available for the elicitation and competent and committed experts could be recruited for the process. Thus this is an alternative approach that can be applied for external expert review in addition to the project expert groups.