

EVALUATION OF THE FINNISH NUCLEAR SAFETY RESEARCH PROGRAM “SAFIR2010”

MAIN RESULTS

Presentation in the SAFIR 2014 Strategy Seminar

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EVALUATION PANEL

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MAIN QUESTIONS

- A. Are the achieved results in balance with the funding? Are the results exploited efficiently in practice?
- B. How well does the expertise cover the field? Is the entire SAFIR2010 program balanced to all different fields in nuclear safety? Does it raise efficiently new experts?
- C. Have 2006 evaluation results been implemented successfully into SAFIR2010 program?
- D. Challenges and recommendations.

Evaluation background material

- **National Nuclear Power Plant Safety Research 2007-20010, Proposal for SAFIR2010 Framework Plant, Ministry of Trade and Industry, MTI Publications 32/2006**
- **Evaluation of the Finnish Nuclear Safety Research Program “Safir”, Ministry of Trade and Industry, MTI Publications 33/2006**
- **Eija Karita Puska (Ed.), “SAFIR2010 The Finnish Research Programme on Nuclear Power Plant Safety 2007-20010 Interim Report,” VTT Research Notes 2466 (2009)**
- **Annual Plans and Reports 2007-2009**
- **SAFIR2010 Interim Seminar material**
- **Collection of SAFIR2010 publications in 2007-2008**

INTERVIEWS, January 18-21, 2010

- Members of the Steering Group (11)
 - objectives, direction, administration and funding
- Project persons (36)
 - contents, results and other aspects of the projects
- Members of the Reference Groups (25)
 - relevance to end users and organization aspects

Comments on the evaluation process

- Evaluation process very well organized
- Very good material and presentations
- Very openminded and constructive discussions
- Due to broad scope of the SAFIR2010 all technical details could not be addressed in the evaluation

GENERAL CONCLUSIONS (1/2)

- The SAFIR2010 program provides an excellent basis for co-operation of the Regulatory Authority, the Utilities and the Research Organizations in maintaining and developing further safety analysis tools, expertise and safety culture;
- The cooperation among stakeholders within the SAFIR2010 program has been found very efficient in view of achieving high quality results with limited resources;
- There is no indication that this co-operation could compromise the independence of the Regulatory Authority;
- The overall quality of work in the SAFIR2010 program is judged to be high compared to international standards;

GENERAL CONCLUSIONS (2/2)

- The SAFIR2010 program provides excellent opportunities provided to attract and train the young generation to address the current and future safety issues, thus providing very valuable contributions to managing the generation change;
- The commitment of the experts working for SAFIR2010 projects has been found to be very high;
- Many projects of the SAFIR2010 program make a very intelligent use of international collaboration.
- Crosscutting issues, such as ageing, aggressions or passive systems behavior, should be addressed in a more systematic way within the next SAFIR program.

ANSWERS TO MAIN QUESTIONS (1/6)

A1. Are the achieved results in balance with the funding?

Generally yes

Comments

- The question cannot be fully addressed without accessing more detailed information on the financing scheme and the contents of the complementary research activities carried out outside the SAFIR2010 program;
- Some minor differences may subsist among the projects.

ANSWERS TO MAIN QUESTIONS (2/6)

A2. Are the results exploited efficiently in practice?

Generally yes

Comment

- The strong commitment and involvement of the stakeholders in the definition, the planning and the conduction of the program contributes to an efficient and effective exploitation of the research results for practical purposes.

ANSWERS TO MAIN QUESTIONS (3/6)

B1. How well does the expertise cover the field?

The SAFIR2010 program provides a good coverage of the generic technical research issues relevant to nuclear safety, as requested by the Nuclear Energy Act and is in accordance with the Strategic Research Agenda (SRA) established by the European Sustainable Nuclear Energy Technology Platform (SNE-TP).

ANSWERS TO MAIN QUESTIONS (4/6)

B2. Is the entire SAFIR2010 program balanced to all different fields in nuclear safety?

There is an effective balance between the experimental and analytical work as well as between scientific and applied research.

Comment

- A precise answer to this question is difficult to provide without considering together all Finnish safety research activities including those conducted outside the SAFIR2010 program.

ANSWERS TO MAIN QUESTIONS (5/6)

B3. Does it raise efficiently new experts?

Generally, SAFIR2001 is considered very efficient to attract newcomers to the nuclear safety field and train them conveniently.

Comment

- Specific effort should be made in some highly specialized and demanding areas, such as Reactor Physics, to maintain the critical mass of research teams and to provide the researchers with training over a sufficient period of time.

ANSWERS TO MAIN QUESTIONS (6/6)

C. Have 2006 evaluation results been implemented successfully into SAFIR2010 program?

Yes, almost fully.

Comment

The following recommendations have not received sufficient attention:

- the aging and condition monitoring of cables,
- the sensitivity and uncertainty analysis methods in the thermal hydraulics field.

CHALLENGES AND RECOMMENDATIONS (1/2)

- **A tight coordination between future SAFIR programs and other safety related research activities in the country should be established.**
- **A suitable review mechanism should be defined accordingly, to provide the whole system with a unique tight governance.**
- **Cross-cutting issues such as aging, modernizations, passive safety systems, should be considered systematically and explicitly in future programs.**
- **A systematic mechanism should be implemented to increase the flexibility of the program with regard to the consideration of new topics and changes of priority.**

CHALLENGES AND RECOMMENDATIONS (2/2)

- **The renewal of multi-year projects should be simplified in view of eliminating unnecessary bureaucratic burdens and to allow for more efficient planning.**
- **The Reference Group meeting procedures should be reconsidered to guarantee that such meetings provide the projects with administrative guidance and contribute to disseminate information efficiently.**
- **The evaluation criteria for the research proposals should be reconsidered for future projects in view of increasing further the weight of international cooperation.**
- **The organizations managing future SAFIR programs should strive for taking more often a leading role in international safety research cooperation.**

Group 1. Organization and human factors

- The area is of increasing relevance to safety and should be supported in the future program.
- Specific attention should be paid to subcontracting.
- Intercultural communication should receive attention in the research team and in the research itself.

Group 2. Automation and control room

- Model testing activity is considered as very innovative. Special attention should be paid to reduce the human factor weight in the modeling and the quality of input data.
- Future control room activity should aim at having strong link to future plants in Finland.
- Future research should emphasize the need for quantitative reliability assessment of digital I&C.

Group 3. Fuel and reactor physics

- Outstanding results achieved mainly in regard to development of Monte Carlo methodology and its application.
- Code coupling is not completely achieved. Future activity should include pin power calculation and system coupling.
- VTT should continue efforts to maintain the competence in the field taking into account the long time needed to build knowledge.

Group 4. Thermal hydraulics

- Experimental facilities and link to analytical work is a strong point and should be maintained.
- Uncertainty analysis seems to be less developed than in reactor physics fields and should be addressed.
- Growing role of CFD codes in safety design and licensing and unavailability of sources of commercial codes recommend to consider CFD code development as a Finnish or cooperative activity.

Group 5. Severe accidents

- In spite of small budgeted the area is remarkably well integrated in international networks. Participation of young people is very positive.
- Severe accidents during shut down conditions should receive more attention.
- There should be flexibility to address new designs.

Group 6. Structural safety of reactor circuit

- The combination of excellent experimental and analytical capacity is strong point. It is recommended that Finland takes the lead in some international projects.
- Taking into account the unique combination of LBB and emergency support, related integrity and inspection aspects should receive more attention.
- It is suggested to extend the scope of the area to include also integrity aspects of other than primary components.

Group 7. Construction safety

- Due to the unique experimental capacity Finland has taken an internationally leading role. This position is to be maintained and if possible reinforced.
- Availability of results should be taken into account in future program.
- Closer links to universities is recommended.

Group 8. Probabilistic safety analysis (PSA)

- The area addresses some very important issues such as extreme weather conditions (EXWE) and fire modeling (FIRAS). However, the set of PRA activities suffers from the inhomogeneous compilation of projects and the spread over several groups.
- The relevance of the PRA activities claims for a more homogeneous approach taking into the cross-cutting characteristics of the field and the need of coordination of different activities.
- It is recommended that future activities focus on smaller set of specific issues in tight connection with other stakeholders.