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European Research Area

PROJECT PRESENTATION (PP)

Severe Accident Research Network of Excellence

SARNET2

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Author(s):

J.P. Van Dorsselaere (IRSN)

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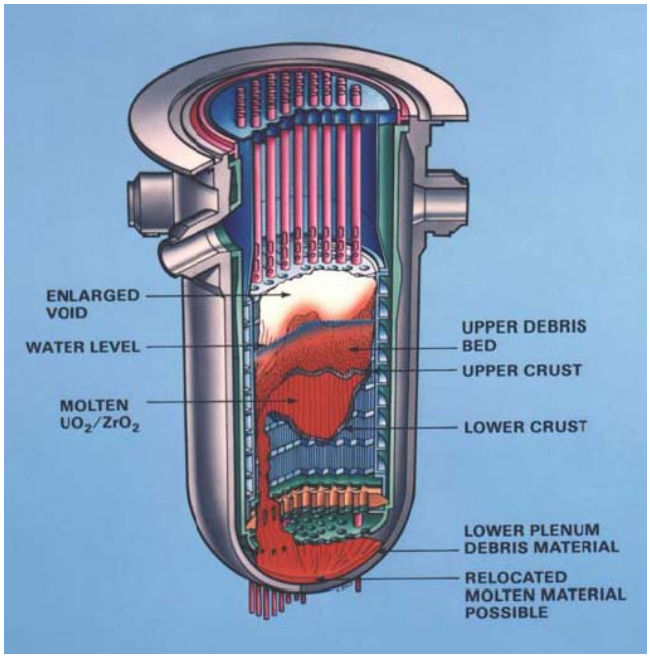
41 organisations network in the ***SARNET2*** project (follow-up of the SARNET FP6 project) their capacities of research in order to resolve the most important remaining uncertainties and safety issues for enhancing, in regard of Severe Accidents (SA), illustrated by the TMI2 core final state (see the picture below), the safety of existing and future water-cooled nuclear power plants (NPPs). This project has been defined to optimise the use of the available resources to share experience and knowledge and to constitute sustainable research groups. Except for 2 new partners from USA and Korea, all other ones participated to the SARNET FP6 project.



1. Nature and scope of the project

SARNET2 will continue to reduce the fragmentation that still exists between the different R&D national programmes, notably in defining common research programmes and developing common computer tools and methodologies for NPP safety assessment. It includes a large majority of the European actors involved in SA research plus a few non-European important ones. A few organizations are covering a wide range of competences, though not complete, whereas others are specialized in specific areas: this leads to develop complementarities. The critical mass of competences is achieved for performing small and large-scale experiments needed in the SA domain, analysing them, developing models and integrating them into the ASTEC integral computer code (jointly developed by IRSN and GRS to predict the NPP behaviour during a postulated SA). The ultimate aim is to ensure the long term self-sustainability of the network by creating a legal entity with a strong coordinating structure for work orientation in a “virtual centre of excellence”.

2. Activities

The Joint Programme of Activities can be broken in several elements:

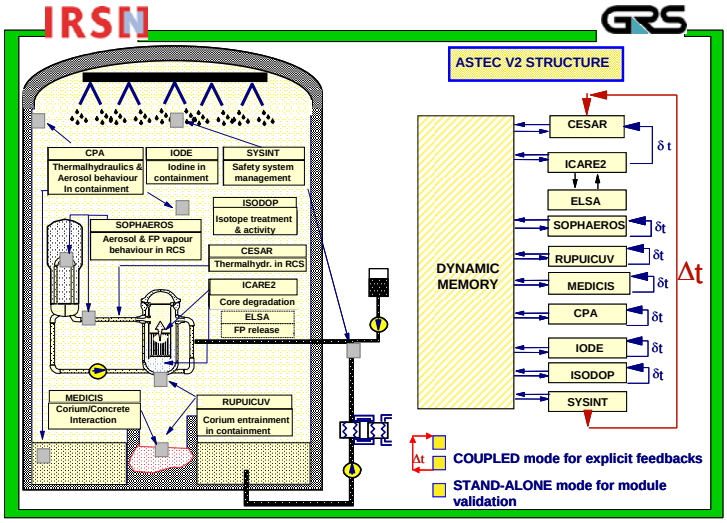
- Ranking periodically the priorities of the research programmes, harmonizing and re-orienting existing ones and jointly defining new ones when necessary. Six highest priority safety issues were identified: in-vessel core coolability, molten-core-concrete-interaction, fuel-coolant interaction, hydrogen mixing and combustion in containment, impact of oxidising conditions on source term, iodine chemistry;

- Performing experiments on the abovementioned issues and jointly analysing their results in order to elaborate a common understanding of the concerned physical phenomena;
- Developing and validating ASTEC, which capitalizes in terms of models the knowledge produced in the network; extending its applicability to BWR and CANDU NPP types;
- Storing all the experimental results in a scientific database;
- Developing educational courses and promoting personnel mobility between the various European organisations.

In order to preserve the interests of the different organizations, a clear policy in terms of knowledge management, notably regarding access rights, has been defined. Reports on "protected" data will only be distributed to members who, through the activity they offer, increase significantly the value of the data (production of analyses, model development and assessment). In any case, the outcome of these programmes will be models to be implemented in ASTEC, available for all the SARNET2 members or other organizations that would like to use it for NPP safety assessment or improvement.

3. Expected results

SARNET2 will consolidate the sustainable integration of the European SA research capacities, already in progress in the 1st phase of the network. Capitalizing the acquired knowledge in ASTEC (see scheme below) and in the experimental database will produce necessary conditions for preserving the knowledge produced by thousands of person-years and disseminating it to a large number of end-users. By fostering collaborative work on developing and validating ASTEC, the role of this code for any kind of water-cooled NPP will be reinforced. Through a periodic review of priorities and co-programming of work amongst organisations, the use of available means and budget will be more efficient. Through an education and training programme addressing mainly young scientists, the European excellence in the SA domain will be consolidated on the long term.



4. Societal impact

As the end-products developed by the network (ASTEC, experimental database) may be used not only for R&D activities but also for industrial applications, many European industry and safety authorities (or technical safety organizations) are contributing to SARNET2. In return, the end-products that capitalize the large amount of knowledge acquired in this area will contribute to a better prevention and mitigation of SA in existing and future European NPPs of diverse types, and thus to the improvement of their safety.

European end-users are currently mostly using integral computer codes developed in the United States, which results in a strong dependence on the US technology. By fostering collaborative work on the ASTEC code, the role of Europe as world leader in this domain will be consolidated.
SARNET2 will clearly become a reference for SA research priorities and impact on national programmes and fund allocations. Progressively all the research activities in this field will become strongly coordinated by the network, which will contribute to an optimised use of European resources.
Through education and training programmes, SARNET2 will develop synergies with educational institutions and thus keep attractive the concerned domain of activity for students and young researchers. This will also contribute to enhance and preserve in a sustainable way the European scientific leadership. The network will also provide a wide panel of competencies for supporting the emergence of new nuclear countries.

5. Information about important public events

The work performed in SARNET2 will be periodically presented in the main nuclear events in the world, such as international conferences like ICONE, ICAPP or Forums like EUROSAFE. Once a year, the European Review Meeting on Severe Accident Research (ERMSAR) will be organised to become the major worldwide conference on severe accident research. A public web site will present up-to-date information to all people interested in the subject of severe accidents.

Project information

Website address: http://www.sar-net.eu

Project type: Network of Excellence

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EC project officer:
Michel Hugon
European Commission
Directorate-General for Research
Directorate Energy (Euratom)
Unit J.2 – Fission
CDMA 1/52
BE-1049 Brussels
Email: Michel.Hugon@ec.europa.eu

Coordinator:
Jean-Pierre Van Dorsselaere
IRSN
Direction de la prévention des accidents majeurs
BP3, FR-13115 Saint-Paul-lez-Durance Cedex
Email : jean-pierre.van-dorsselaere@irsn.fr
Tel : + 33 4 42 19 97 09
Fax : + 33 4 42 19 91 56

Partners:

Partner number	Partner full name	Short name	Country code
1	Institut de Radioprotection et de Sûreté Nucléaire	IRSN	FR
2	KFKI Atomic Energy Research Institute	AEKI	HU
3	AREVA NP GmbH	AREVA NP GmbH	DE
4	AREVA NP SAS	AREVA NP SAS	FR
5	Budapest University of Technology and Economics	BME	HU
6	Commissariat à l'Energie Atomique	CEA	FR
7	ENEA - RICERCA SUL SISTEMA ELETTRICO SpA	ERSE	IT
8	Chalmers tekniska högskola AB	CHALMERS	SE
9	Centro de Investigaciones Energeticas Medio Ambientales y Tecnologicas	CIEMAT	ES

10	National Centre for Scientific Research "DEMOKRITOS"	DEMOKRITOS	EL
11	Electricité de France SA	EDF	FR
12	Energy Institute JSC Sofia	EI	BG
13	Ente per le Nuove Tecnologie, l'Energia e l'Ambiente	ENEA	IT
14	Forschungszentrum Juelich GmbH	JÜLICH	DE
15	Forschungszentrum Karlsruhe GmbH	FZK	DE
16	Gesellschaft für Anlagen- und Reaktorsicherheit mbH	GRS	DE
17	National Autonomous Company for Nuclear Activities Nuclear Research Subsidiary Pitesti	INR	RO
18	Institute for Nuclear Research and Nuclear Energy	INRNE	BG
19	Inzinierska Vypoctova Spolocnost Trnava s.r.o.	IVS	SK
20	Jozef Stefan Institute	JSI	SI
21	Kungl Tekniska Högskolan	KTH	SE
22	Lithuanian Energy Institute	LEI	LT
23	National Nuclear Laboratory	NNL	UK
24	Nuclear Research & Consultancy Group v.o.f.	NRG	NL
25	Paul Scherrer Institut	PSI	CH
26	Ruhr-Universität Bochum	RUB	DE
27	Suez-Tractebel SA	TRACTEBEL	BE
28	Thermodata	THERMODATA	FR
29	Technical University of Sofia	TUS	BG
30	Urad Jadroveho Dozoru Slovenskej Republiky	UJD SR	SK
31	Ustav Jaderneho Vyzkumu Rez a.s.	UJV	CZ.
32	University of Newcastle upon Tyne	UNEW	UK
33	Dipartimento di Ingegneria Meccanica, Nucleare e della Produzione - Università di Pisa	UNIPI	IT
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36	VTT Technical Research Centre of Finland	VTT	FI
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