



# European Safety and Reliability Association

# Newsletter

<http://www.esrahomepage.org>

March 2005

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## ESRA NEWS

### Letter from the Chairman



*Carlos Guedes Soares*  
*IST – Portugal*

### *ESRA National Chapters*

The ESRA National Chapters have been created in order to facilitate the contact among ESRA members in each country and to help creating a critical mass for initiatives at a National level.

This has its roots at the creation of ESRA, which being promoted by the European Commission has based itself in ensuring that all member states were represented and that the operating mechanisms would ensure for such representation independent of the size.

The ESRA Chapters have different characteristics in the various countries. In some, they are active in promoting initiatives such as National Conferences or series of seminars. In other countries, where National Associations are promoting these initiatives, the Chapter has more a role of keeping members in

contact, so that they can coordinate how they contribute to ESRA.

The National Chapters in addition to having its own national initiatives also elect their Chair who is a member of the ESRA Management Committee in addition to the elected officers. Because of this representative nature the ESRA Operating Rules have established a number of 5 members as a minimum for a National Chapter to be established.

ESRA has a number of countries such as France, UK, Italy, Portugal, Poland and Spain who have been comfortably above that number for several years.

There is a second group of countries that are around this number managing in some years to be above and others below depending on what happens with one of other new member. This is the case of Germany, Austria, the Netherlands, and Norway, which are countries with a significant numbers of experts in the subject area of interest to ESRA, but for some reason have not been very active at company level to become a member of ESRA.

There are then a reasonable number of countries with few members. It would be important to strengthen the ESRA membership in those countries where it has been less represented and I believe this can also be beneficial at National level as it will create a critical mass in that country and bring together universities with industrial companies and other service and research institutions. I suggest that a target for the near future should be to have ESRA National Chapters in all European countries, thus ensuring a minimum level of representation in each.

This is the challenge I leave with you all!

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# CONTRIBUTIONS FROM ESRA TECHNICAL COMMITTEES

## ESRA Technical Committee on Maintenance Modelling and Applications - First Workshop in Berlin!

June 14-18, 2004  
Berlin, Germany



*Enrico Zio, Politecnico di  
Milano, Italy*

*Chairman, ESRA Technical  
Committee on Maintenance  
Modelling and Applications*

The ESRA Technical Committee (TC) on *Maintenance Modelling and Applications* arranged its first event during the annual ESRA Conference, ESREL 2004 (jointly organized with the PSAM 7 Conference in Berlin on June 14-18, 2004) under the form of a workshop.

Managing an industrial plant entails evaluating and trading off the conflicting objectives of economic service and safe operation. In this context, maintenance plays a significant role: knowing when and how to inspect, repair and renovate the components of a system is fundamental to reduce failures (for safety reasons) and unplanned downtime (for economic reasons) and thus to achieve the optimal safety and economical system operation. Maintenance models aim at assessing all the costs and benefits associated to maintenance activities in an effort to finding the optimum balance between them [1] for maintenance practice. However, although maintenance modeling and optimization is a well developed research area, both among engineers and mathematicians, it has to be recognized that relatively few applications of sophisticated quantitative models have been reported, mainly because of the lack of data.

In this context, the purpose of the Technical Committee on *Maintenance Modelling and Applications*, chaired by Enrico Zio (Politecnico di Milano) is to provide a forum for discussion and experience-sharing with regards to the modelling and optimization of maintenance procedures for ageing and deteriorating engineering and structural components. Preventive, condition-based and

opportunistic maintenance schemes are considered, both from the modelling and practical points of view, in various industrial fields so as to consider the differences in practical needs, limitations and difficulties when applying the different approaches to the specific situations.

More than 30 participants attended the first TC Workshop on the subject « Can Modelling Really Help the Practice of Maintenance? ». This question is certainly of central importance both for maintenance modelers and maintenance practitioners if they want to solve real maintenance real problems and improve the performance of maintenance policies. In this sense, this workshop could be seen as a contribution to the effort initiated by P.A. Scarf and R. Dekker through several papers of « *discuss[ing] the factors which may have hampered application [of maintenance optimization models]* » [2] and « *appeal[ing] maintenance modellers to work with maintenance engineers and managers on real problems, such collaboration [being] essential if maintenance modelling is to be accepted within the engineering community [and] also particularly important in the design and building of maintenance management information systems if such systems are to be used to manage and operate maintenance policy in the new millennium* » [3].

The workshop was opened by three plenary speakers who proposed their own vision and shared their experience on the subject with the audience (presentation slides available on the ESRA website). Prof. A. Dubi (Ben-Gurion University of the Negev - Israel) questioned the audience on the fact that a model is not a mathematical method, but rather the only way for us to look at the world. In that sense, the only question is not whether we should use a model, but rather what kind of model should we use (“the transport equation is the only model!”), what approximation are legitimate and what method should we use to solve the model. For Prof. Dubi, “the only mathematical method which is insensitive to the two difficulties of dimensional curse and mathematical curse is the Monte Carlo method” and, consequently, it should necessarily be adopted “to advance towards a proper analysis of modern complex system” and maintenance practice. Prof. R. Bris (Technical University of Ostrava (TUO), The Czech Republic) gave a broad presentation on “Multiobjective Preventive Maintenance Optimization”, involving a Monte Carlo evaluation of the maintained system performance within Genetic Algorithms-maximization procedures. Prof. L. Fedele (University of Rome “La Sapienza” – Italy) gave a more practice-oriented presentation involving soft computing approaches to maintenance, entitled “Neural Networks based tools for precedence criteria definition in infrastructures maintenance management”. The aim of the presented work was to simulate human judgment on railways infrastructures defects, particularly bridges and to demonstrate the effective applicability of the neural network approach on maintenance management activities.

These presentations served as a basis for a lively panel discussion within the audience: not surprisingly, in a one and a half hour workshop, this discussion raised more questions than it solved problems. A lot of work remains to be done on this issue of maintenance modelling and applications and everyone is welcome to join the Technical Committee and to participate in its forthcoming meetings.

The next events organized by the Maintenance TC are scheduled during the next Annual ESRA Conference ESREL 2005, June 27-30, 2005, Tri City, Poland: a new workshop "Maintenance Modelling: Analytical vs. Simulation" (Organizer: E. Zio), and two special sessions "Maintenance Modelling and Optimisation" & "Modelling Maintenance Practice" (Organizer: E. Zio).

## References

[1] Rommert Dekker and Philip A. Scarf, On the

impact of optimization models in maintenance decision making: the state of the art, *Reliability Engineering & System Safety*, Volume 60, Issue 2, May 1998, Pages 111-119.

(<http://www.sciencedirect.com/science/article/B6V4T-45TYTBH-4/2/1030dbcff0362cca8a574a721492d6c3>)

[2] Philip A. Scarf, On the application of mathematical models in maintenance, *European Journal of Operational Research*, Volume 99, Issue 3, 16 June 1997, Pages 493-506.

(<http://www.sciencedirect.com/science/article/B6VCT-3SWYB982/2/c77ae2bc972d64c18423b5138e5e04c1>)

[3] Rommert Dekker, Applications of maintenance optimization models: a review and analysis, *Reliability Engineering & System Safety*, Volume 51, Issue 3, March 1996, Pages 229-240.

(<http://www.sciencedirect.com/science/article/B6V4T-3VWV0SY-1/2/e8017363e10e69f00d3cbf2044e67722>)

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## FEATURES

### Summary and recommendations from the JRC/OECD seminar on emergency & risk zoning around nuclear power plants

April 26-27, 2004

Petten, the Netherlands



Christian Kirchsteiger  
European Commission  
DG JRC – Institute for Energy  
The Netherlands

### Background and Overview

Within the Institute for Energy (IE) of the Joint Research Centre (JRC) of the European Commission (EC), located at Petten, The Netherlands, a project on *Benchmarking and Harmonising Strategic Planning Practices for Risk & Emergency Zoning around Nuclear Power Plants and Information to the Public* has recently been developed with the objectives to evaluate the corresponding status in Europe and beyond, and to determine whether it would be possible to move towards a greater level of international harmonisation.

The knowledge resulting from this project should help Regulatory Authorities, Civil Protection Institutions, European Institutions such as EC Policy Services, the various PSA users and developers and, last but not least, the general Public to get a clear picture on the relevance of the issue in a comparative view (e.g. versus corresponding practices of the

chemical process industries), on the consistency of current approaches and on related research and development needs.

The original idea for this project consisted in the view that PSA is currently already mature enough to be used also for NPP Emergency and Risk Zoning (ERZ). However, at present it can be stated that not much is being done in EU Member States in application of Level 2 or 3 Probabilistic Safety Assessment (L2 or L3 PSA) results to emergency planning (EP). The approach to EP is, in general, strongly deterministic. The usual approach is that a Reference Accident is defined to be used as basis for drawing up the emergency plans. In EU Member States, the practical application of L2 PSA results for accident management is very limited and, effectively, very little risk-based information is used. In the course of this project, from the participating countries<sup>1</sup> only the Czech Republic and the UK informed about some cases where L2 PSA results were used in a formal way as an input to EP. The UK is the only EU Member State, which has been carrying out research on how L2 PSA outcomes could be used in a systematic way for EP purposes.

As a next step, JRC approached a large number of PSA experts on the one side and EP experts on the other side to ask whether incorporation of risk-informed support into NPP EP is currently a sufficiently relevant and mature topic to be treated by a seminar investigating prospects towards international harmonisation.

JRC received a large number of very positive responses, only a few ones being reserved or sceptical. While this is certainly not an exhaustive feedback, it was nevertheless reasonably found to

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<sup>1</sup> The following countries were involved in the information collection exercise: Belgium, Czech Republic, Finland, Hungary, The Netherlands, Slovak Republic, Spain and the United Kingdom. In addition, some information was obtained from Japan and the USA.

organise together with OECD a *JRC Seminar on Emergency & Risk Zoning around NPPs*, which was held on 26–27 April 2005 at JRC's Institute for Energy in Petten, The Netherlands. The Seminar attracted a wide participation from EU and non-EU countries. More than 20 technical presentations in the area were given by participants from Europe, USA, South Africa and India (<http://www.energyrisks.jrc.nl>).

The objectives of this Seminar were:

- to provide a forum for presentation and discussion of status of EP and PSA, safety policies as well as current and possible future requirements for ERZ,
- to provide an opportunity for sharing of experience in the field on both good practice and identification of problem areas, including comparison to other major-hazardous industries, such as the chemical process industries, and thus
- to help relevant stakeholders (i.e. Regulatory Authorities, utilities, emergency response organisations as well as PSA users and developers) on both national and international levels
- to decide on the relevance of this issue at this time,
- to decide on related research and development needs, and
- to consider needs for international harmonisation.

## **Main Conclusions and Recommendations - Current Approaches to Emergency Planning**

It was clear from the ERZ Seminar's presentations and discussions that there are many similarities but also some significant differences in the way that EP is drawn up and EPZs are defined in different countries.

The "standard" approach to EP is mainly deterministic and uses a Reference Accident approach (consideration of Design Basis Accident or selected reference scenarios) and almost no risk information is used. Sometimes a blend of deterministic and probabilistic approaches is used. The ERZ Seminar has gone some way to investigating these similarities and differences. However, it was clear that further work is required to provide a better understanding of the national approaches to EP and to determine whether it would be possible to move towards a greater level of harmonisation.

Especially, there is a large variety in approaches and data used for EPZ in different countries. As shown in *Table 1*, current EPZs range from less than 10 km up to 80 km. The reasons for these differences need to be fully understood. In addition, the issue needs to be addressed on whether there is any advantage in defining larger EPZ or if there are any disbenefits from defining large EPZs. In many countries the relevant IAEA documents are used.

**Recommendation 1:** It is recommended that further work be carried out towards understanding the

reasons for differences in the EP in different countries.

**Recommendation 2:** It is recommended that further work be carried out on how the uncertainties inherent in the L2 PSA can be taken into account in defining EP and EPZs.

## **Current & Future Use of L2 PSA for Emergency Planning**

It was agreed that the proper response to an emergency requires understanding of the underlying hazards. The results of L2 (and L3) PSAs provide important information in this area. The standard emerging worldwide is full scope L2 PSA to be carried out for all NPPs. Such analyses are of sufficiently mature nature to be used for a wide range of applications and could also be used as one of the inputs into EP as part of an overall risk-informed approach.

However, uncertainties in PSA are large and are likely to be greater in L2 PSA (derivation of the source terms) and greater still in L3 PSA (calculation of the off-site consequences of a release of radioactive material) as compared to L1 PSA. Further consideration needs to be given as to how these uncertainties are taken into account in proper EP.

A distinction should be made between full-scope L2 (and L3) PSA and restricted scope, when not all power levels or hazards are included (e.g. it may only address internal initiating events). Further consideration needs to be given as to how a restricted scope PSA could be used as an input to EP.

The approach used so far is to use L2 PSA information retrospectively in order to provide a justification for choice of Reference Accident(s) used to derive EP and EPZs. Where a Reference Accident approach is used based on L2 PSA information, consideration needs to be given to the number of Reference Accidents that need to be defined to characterise severe accident progression and release characteristics.

It was agreed that L2 PSA information could be used as a basis for EP and there is the potential to do this in a more proactive way. However, apart from the aspect of the above-mentioned uncertainties, consideration needs to be given on the methodology, i.e. how this is to be done in a risk-informed way that takes account of other factors so that it is not based on PSA information alone. L2 PSA provides an understanding of how a severe accident would occur, the accident management measures that could be used to mitigate the effects of the accident, and the resulting source terms and frequencies of releases from the plant. This provides the detailed information that would be required as input from PSA to definition of EP and EPZs.

One of the important issues is how to understand from the evolution of the accident which source term would happen. L2 PSA typically contributes to model accident management measures that can be carried out to mitigate the consequences of a severe accident.

Severe Accident Management Guidelines could effectively contribute to extending time for emergency response, i.e. this would extend the period of time available before a release of radioactivity would occur from the NPP and hence increase the time available to put the EP into action.

**Recommendation 3:** It is recommended that further work shall be carried out to determine how the L2 PSA information could be used in a systematic way as an input to defining EP and EPZs, taking into account the corresponding uncertainties. It is recommended that JRC should undertake a pilot study to produce a scheme for use of L2 and L3 PSA information for EP. This could be within the framework of or as a spin-off from JRC's involvement in the SARNET Network of Excellence (<http://www.sar-net.org>).

### **Full scope L3 PSA**

Full scope L3 PSA is available only for very few NPPs in the EU. However, they are being developed in a number of countries (including Netherlands, UK, USA, Japan, South Africa, India). One of the reasons could be one rather specific aspect of L3 PSA: while conducting L1 and partially also L2 PSA study is, or can be, in favour of nuclear operators / licensees due to their plant-internal character and related potential for improvement, they do not have any incentive to perform L3 PSA studies as these address exclusively plant-external effects. To have L3 PSA study available is, more or less, the concern of nuclear Regulatory Authorities and/or Radiological Protection Authorities.

### **PSA Quality Requirements**

To be useable as one of the inputs to EP, it is recognised that a high quality PSA is required that is suitable for this specific application. As mentioned, one particular aspect here is that the source terms need to be well defined in terms of the quantities of radioactive material released and the release profile (start of the release, duration, height, energy, etc.). The PSA that is used to provide an input to EP needs to be complete and address all the contributions to the risk in terms of the hazards considered and the operational modes addressed.

However, there was no agreement on the extent to which external hazards (such as severe seismic events) and security related events (such as terrorist attacks on the plant) should be taken into account in defining EP and EPZs. Further consideration is required of these topics.

**Recommendation 4:** To support the current IAEA activity on PSA Quality for Applications and the Proposal for a Co-ordinated Research Project on PSA of nuclear facilities in relation to external events (into which the issue of security related events could be included).

### **Future Nuclear Power Plants**

The trend is to improve the level of safety for future NPPs. This would significantly reduce the potential for severe accidents and releases of radioactive

material from the plant to occur. In principle, this could be considered to reduce, or perhaps eliminate, the need for EP.

**Recommendation 5:** Further considerations needs to be given on how EP and the EPZs would be defined for future NPPs where the risk from the plant in terms of large off-site releases of radioactivity would be very much lower than for current plants. This needs to be reconciled with the expectations of the Regulatory Authorities and the Public. Consideration needs to be given on whether the moral obligation to provide an EP would outweigh the technical conclusion that this would not be required.

### **Risk Communication**

There is a need to be able to communicate risk information to the Public both before and following an accident. In addition, there is a need to educate the Public on that they can understand risk information. Further consideration needs to be given to how this can be done. Care must be exercised while communicating risk-related information and insights on potential vulnerabilities to the Public in the view of security issues and prevention of malevolent acts. Education of the Public on risk considerations is important for enhancing the general understanding of risk implications and better acceptance of risk from nuclear industry. Comparative consideration of emergency planning and associated risks for nuclear and other industries, as well comparison with general risks from daily life may be helpful in communicating risk information to the Public.

**Recommendation 6:** It is recommended that further work be carried out on risk communication and how this can be done in relation to EP.

### **European Risk Map**

There was discussion of the development of a European risk map for all potentially major hazardous industries. It was unclear what was intended and further details were required before this could be agreed.

**Recommendation 7:** It is recommended to explore the possibilities as to how such an initiative could be linked to supporting implementation of some of the provisions of the EU Environmental Impact Assessment Directive or other international framework legislation in the area, such as the so-called "Aarhus Convention" (<http://www.unece.org/env/pp/welcome.html>). On an EU level, such a support activity would have to be conditional to the request of the corresponding EC Policy Directorate General.

### **International Topical Working Group**

It was agreed that the current EP practices for NPPs could be enhanced by moving towards a more risk-informed approach, where the process of defining the EP and EPZs takes account of the information provided by the L2 PSA. This would supplement the purely deterministic approach. However, the discussion showed that there is no guidance on how this should be done in general, though this has



already been done in some countries where the source terms and frequencies produced by the L2 PSA have been used to check the choice of the Reference Accident(s) that have been used as the basis for EP. This is an example of a retrospective use of PSA.

**Recommendation 8:** It was recommended that JRC should set up an international topical working group to address risk-informed EP, incl. the above mentioned related topics of risk communication, risk mapping etc. Not only EU Member States should be involved, but also wider international framework and co-operation would be desirable, such as together with IAEA or OECD.

## Follow-up

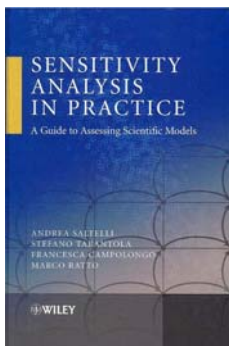
Based on this summary report and the therein included recommendations, feedback is sought from interested institutions in order to develop a possible follow-up initiative. More information on these developments will shortly be added to <http://www.energyrisks.jrc.nl>

## Acknowledgement

This report is largely based on rapporteurs' notes of the Seminar, produced by C. Shepherd, HSE, UK and I. Kouzmina, IAEA. JRC would like to acknowledge the very good co-operation with both rapporteurs before, during and after the Seminar.

	Evacuation	Sheltering	Stable iodine intake/Quick actions	Deterministic	Risk-informed	Internal zone	EPZ
<b>Belgium</b>	10 km	10 km	20 km	✓		?	?
<b>Czech Republic</b>	10 km Dukovany; 5 km Temelin	✓	✓	✓ Dukovany	✓ Temelin	5 km Dukovany 10 km Temelin	20km Dukovany; 13km Temelin
<b>Finland</b>	?	?	5 km	✓		?	20 km
<b>Hungary</b>	?	?	?	✓		3 km	30km (urgent) 80km ( long-term)
<b>Japan</b>	✓	✓	✓	✓	✓	?	8 - 10km
<b>Netherlands</b>	5 km	20 km	10km	✓	✓	?	?
<b>Slovakia</b>	✓	✓	✓	✓		?	30km Bohunice 20km Mochovce
<b>Spain</b> Too specific	?	?	?	✓	✓	?	?
<b>UK</b> Too specific	?	?	?	✓	✓	?	?
<b>USA</b>	✓	✓	✓	✓	✓	?	16km (plume) 80km (ingestion)

## BOOK REVIEW



*Sensitivity Analysis in Practice - A Guide to Assessing Scientific Models,*

by A. Saltelli, S. Tarantola, F. Campolongo, M. Ratto

The authors introduce this book as being a primer in global sensitivity analysis (SA) aiming at enabling the readers to apply global SA to a mathematical or computational model. It offers a description of a few selected techniques for global sensitivity analysis, used for selecting the importance of model input

factors, the interesting ones being those that are uncertain.

The book does not deal with sensitivity analysis methods that are based on the local properties of the input/output relationships such as derivative based analysis. Both diagnostic and prognostic uses of models are considered and bayesian tools of analysis are applied in conjunction with sensitivity analysis. Factors are defined as anything that can be changed in a model prior to its execution including thus structural or epistemic sources of uncertainty.

The models used are model-free in the sense that their application does not rely on assumptions on the behaviour of the model.

The book bases itself on examples which are used based on software for sensitivity analysis which is made available through the Internet.

The book deals with multi-dimensional uncertainty parameters and discusses how a reduced set of scalar factors need to be identified in order to characterise the multi-dimensional uncertainty in a condensed

form. The main methods presented are all based on the method of Maurice for factors screening and variance based measures.

The book describes the method of Maurice and how to implement it, and then discusses methods based on decomposing the variance of the output.

It also discusses Monte-Carlo filtering, and regionalised sensitivity analysis as well as Bayesian uncertainty estimation.

The book has several examples, and includes one chapter describing how to use the SIMLAB software, which is the one used to solve the examples.

A mathematically orientated reader may find the book somewhat "light", but practically orientated user that wants to have tools for global sensitivity analysis of models will find this book a good starting point to obtain results that may give him some feeling on how to pursue to more complicated issues.

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## **CALENDAR OF SAFETY AND RELIABILITY EVENTS**

### **EURODYN 2005 – 6<sup>th</sup> European Conference on Structural Dynamics**

**4th-7th September, 2005**

**Paris, France**

**Conference Website:**

<http://www.eurodyn2005.univ-mlv.fr>

### **TEHOSS 2005 - IEEE International Conference on Technologies for Homeland Security and Safety**

**28<sup>th</sup> – 30<sup>th</sup> September, 2005**

**Gdansk, Poland**

**Conference Website:**

<http://www.tehoss2005.gda.pl/>

### **PSAM 8 - International Conference on Probabilistic Safety Assessment and Management**

**14<sup>th</sup>-19<sup>th</sup> May, 2006**

**New Orleans, Louisiana, USA**

**Conference Website:**

<http://www.psam8.org/index.html>

### **OMAE 2006 – Safety and Reliability Symposium**

**4<sup>th</sup>-9<sup>th</sup> June, 2006**

**Hamburg, Germany**

Hamburg is the host of OMAE-2006. Following on the tradition of excellence of previous OMAE conferences, OMAE-2006 will be held to advance the development and exchange of information regarding ocean, offshore and arctic engineering. It will be the ideal forum for researches, engineers, managers, technicians, and students, to discuss new and advanced technology developments and their applications in industry. It will also help promote international cooperation.

More than 400 technical papers shall be presented at the conference distributed in its symposia:

- Offshore Technology
- Safety and Reliability
- Materials Technology
- Pipeline Technology
- Ocean Space Utilization
- Ocean Engineering
- Polar and Arctic Sciences and Technology

Also, industry workshops, special sessions and keynote lectures will be included in the technical program. National and international companies are expected to sponsor and participate in the conference.

**Conference Website:**

<http://www.ooae.org/omae/omae2006/omae2006.htm>

### **Third International ASRANet Colloquium Integrating Structural Analysis, Risk and Reliability**

**10<sup>th</sup>-12<sup>nd</sup> July 2006 - Glasgow, UK**

Following the success of the second ASRANet International Colloquium held in Barcelona, Spain in July 2004, which attracted around 70 delegates from 17 countries around the world, the Organising

Committee now invites papers from researchers and practitioners in Structural Analysis, Risk and Reliability for the third Colloquium, to be held in Glasgow on 10-12 July 2006.

**Conference Website:**

<http://www.asranet.com>

## **ESREL 2006 – The European Safety and Reliability Conference**

**18<sup>th</sup> – 22<sup>nd</sup> September, 2006**

**Estoril, Portugal**

The purpose of the conference is to present and discuss innovative as well as traditional methods and applications for improving the design and operation of products, processes, equipment and installations from a safety point of view, while taking into account also the realistic constraints on the available physical and economical resources. Consideration is also given to the societal factors influencing the use of risk assessment and risk management methods. Safety and Reliability Workshops will also be organized to provide additional forums for an open exchange of ideas.

Authors are encouraged to submit an abstracts directly to the ESREL 2006 Conference Secretariat or through the dedicated webpage. The abstract should be divided into three separate sections presenting context, innovative aspects and results of the proposed paper.

The abstracts will be accepted after a reviewing process performed by the members of the Conference Technical Program Committee. The template and an exemplary abstract are given at Conference Website.

### **Thematic Areas**

- Methods of Hazard and Risk Analysis
- Monte Carlo Methods in System Safety and Reliability
- Dynamic Reliability
- Reliability and Safety Data Collection and Analysis
- Software Reliability and Security
- Uncertainty and Sensitivity Analysis
- Human and Organizational Factors in Safety and Reliability
- Decision Support Systems and Software Tools for Safety and Reliability
- Safety and Reliability Education and Training
- Accident and Incident Investigation
- Emergency Natural Risks Planning
- Fault Identification and Diagnostics

**Conference Website:**

<http://www.esrel2006.com/index.aspx>

## **SEIF-CV - Safety and Security of Energy Infrastructures in a Comparative View**

**14<sup>th</sup>-16<sup>th</sup> November 2005**

**Brussels, Belgium**

The structure of the Conference has been prepared with a view to reach consensus on further harmonisation and research needs in the EU regarding the following issues:

- status of the important factors ensuring / threatening reliable supply of energy products (electricity, heat) for Europe for the different types of fuel,
- further international needs for policy, research and standardisation on criteria and methods to ensure reliable supply, and
- how to promote and improve risk communication at EU and international levels.

It is co-organised by the European Commission's Directorate-General for Energy (DG ENERGY) and the Institute for Energy of the Directorate-General Joint Research Centre (DG JRC).

SEIF-CV is envisaged to be the spark of a process where dialogue and information exchange between the various stakeholders in the field of energy is promoted. Thus, the **purpose of the conference** is to present and discuss about **pressures** (safety and security risks, economical, socio-political, etc.) on the EU energy arena, and **actions** (standardised methods, research, policy measures, etc.) implemented to address this dynamic and inter-connected landscape.

The medium- to long-term vision is that if successful, SEIF-CV will be the launching of a series of Conferences/Seminars/Workshops on Energy-related topics, in support to SEIF-CV partners' needs, particularly DG TREN.

The 3 days Conference will be organized with parallel sessions on the above listed energy supply, safety and security topics for the different energy technologies (fossil energy carriers, nuclear, renewables) and joint cross-cutting sessions with themes common to all energy systems.

**Conference Website:**

<http://www.energyrisks.jrc.nl/>



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# ESRA INFORMATION

## 1 Membership

### 1.1 National Chapters

- French Chapter
- German Chapter
- Italian Chapter
- Polish Chapter
- Portuguese Chapter
- Spanish Chapter
- UK Chapter

### 1.2 Professional Associations

- The Safety and Reliability Society, UK
- The Danish Society of Risk Assessment, Denmark
- ESReDA
- French Institute for Mastering Risk, France (IMdR-SdF)
- ESRA Germany
- The Norwegian Risk and Reliability Association (ESRA Norway)
- SRE Scandinavia
- The Netherlands Society for Risk Analysis and Reliability (NVRB)
- Polish Safety & Reliability Association, Poland
- Asociación Española para la Calidad, Spain

### 1.3 Companies

- TAMROCK Voest Alpine, Austria
- ARC Seibersdorf Research GmbH, Austria
- VTT Industrial Systems, Finland
- Bureau Veritas, France
- INRS, France
- Total, France
- Commissariat à l'Energie Atomique, France
- GRS, Germany
- VEIKI Institute for Electric Power Research Co., Hungary
- Autostrade, S.p.A, Italy
- D'Appolonia, S.p.A, Italy
- IB Informatica, Italy
- TECSA, SpA, Italy
- SINTEF Industrial Management, Norway
- Adubos de Portugal, Portugal
- Central Mining Institute, Poland
- Transgás - Gás Natural, Portugal
- Companhia Portuguesa de Produção Electrica, Portugal
- Siemens SA Power, Portugal
- Caminhos de Ferro Portugueses, Portugal
- ESM Research Institute Safety & Human Factors, Spain
- IDEKO Technology Centre, Spain
- TNO Defence Research, The Netherlands
- HSE - Health & Safety Executive, UK
- Railway Safety, UK
- W.S. Atkins, UK

### 1.4 Educational and Research Institutions

- University of Innsbruck, Austria
- Université Libre de Bruxelles, Belgium
- University of Mining and Geology, Bulgaria
- Technical University of Ostrava, Czech Republic
- Technical University of Liberec, Czech Republic

- Tallin Technical University, Estonia
- École de Mines de Nantes, France
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The Management Board is composed of the ESRA Officers plus one member from each country, elected by the direct members that constitute the National Chapters.

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This committee aims at establishing the general policy and format for the ESREL Conferences, building on the experience of past conferences, and to support the preparation of ongoing conferences. The members are one leading organiser in each of the ESREL Conferences.

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This committee has the responsibility of interfacing with Publishers for the publication of Conference and Workshop proceedings, of interfacing with Reliability Engineering and System Safety, the ESRA Technical Journal, and of producing the ESRA Newsletter.

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ESRA is a non-profit international organization for the advance and application of safety and reliability technology in all areas of human endeavour. It is an "umbrella" organization with a membership consisting of national societies, industrial organizations and higher education institutions. The common interest is safety and reliability.

For more information about ESRA, visit our web page at <http://www.esrahomepage.org>.

For application for membership of ESRA, please contact the general secretary **Pieter van Gelder**, E-mail: [P.van.Gelder@ct.tudelft.nl](mailto:P.van.Gelder@ct.tudelft.nl).

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