European Safety and Reliability Association

Newsletter

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CONTRIBUTIONS FROM ESRA TECHNICAL COMMITTEES

Vulnerability of Critical Infrastructures: a challenging problem of risk analysis

Irene Eusgeld, Wolfgang Kröger, ETH Zürich, Switzerland
Enrico Zio, Polytechnic of Milan, Italy

Problem Statement

Critical Infrastructures are 'a network of independent, large-scale, man-made systems (set of hard and soft structures)…that function collaboratively and synergistically to produce a continuous flow of essential goods and services' [1] and are essential for economic development and social well-being. They are subject to multiple, potentially asymmetrical threats (technical, intentional or unintentional human, physical, natural, cyber, contextual) and may pose risks themselves.

Critical infrastructures are dynamic, complex systems which are also highly interdependent, both physically and through a pervasive use of information and communication technologies.

The European electric power supply system serves as a good illustrating example, facing greater and tighter integration, also of new intermittent power sources, following the liberalization of most markets and being closely interconnected with other infrastructures, particularly the information and communication network.

Investigating risks and vulnerabilities for these kinds of systems has to go beyond the usual cause-consequence analysis to be able to focus on spill-over clusters of failures in case of strong interdependencies [2]. Indeed, the behavior of a complex system cannot be described as the sum of the behavior of its individual elements. This renders questionable the suitability of classical risk analysis methods, e.g. fault tree analysis, which are typically founded on a decomposition of the system into subsystems and basic elements and their subsequent recomposition for quantification. Furthermore, pre-defined causal chains, e.g. identified by event tree analysis, seem inappropriate to identify the hidden risks and vulnerabilities emerging in a complex infrastructure. On the other hand, simulation techniques may be recommended as 'scenario generators', but their computational cost may be excessive on real-size systems.

A General Framework of Analysis

In practice, there is no single 'silver bullet solution' to the problem of analyzing the risks associated to critical infrastructures. Rather a framework of analysis seems to be needed in order to effectively integrate the different methods in a problem-driven approach to solution.

A possible general framework for the vulnerability analysis of critical infrastructures may stand on a number of iterative steps, decision points and feedback loops, e.g. Figure 1 [3].

The central steps of the framework are "Screening Analysis" and "In-depth Analysis".

"Screening Analysis" leads off with a development of adequate system understanding; it is assumed that information provided from system owners assures general understanding of main functionalities, interfaces, (inter-)dependencies, etc. Topology-driven analysis of vulnerabilities can be used to support the screening analysis by identifying the system connection patterns, shortest connection paths, local and global specifics, etc. The techniques used are typically based on network theory (NT) (e.g. [4], [5], [6], [7]).

If the indications obtained by screening analysis are not 'clear-cut' and major hidden vulnerabilities are still expected, a more sophisticated "In-depth Analysis" (step 3, Figure 1) has to be launched. In this regard, object-oriented modelling (OOM) has demonstrated its attractiveness for the detailed simulation of infrastructures, as it allows one to integrate a comprehensive spectrum of different

phenomena and to derive stochastic, time-dependent event chains accounting for interdependencies and systems coupling [8].

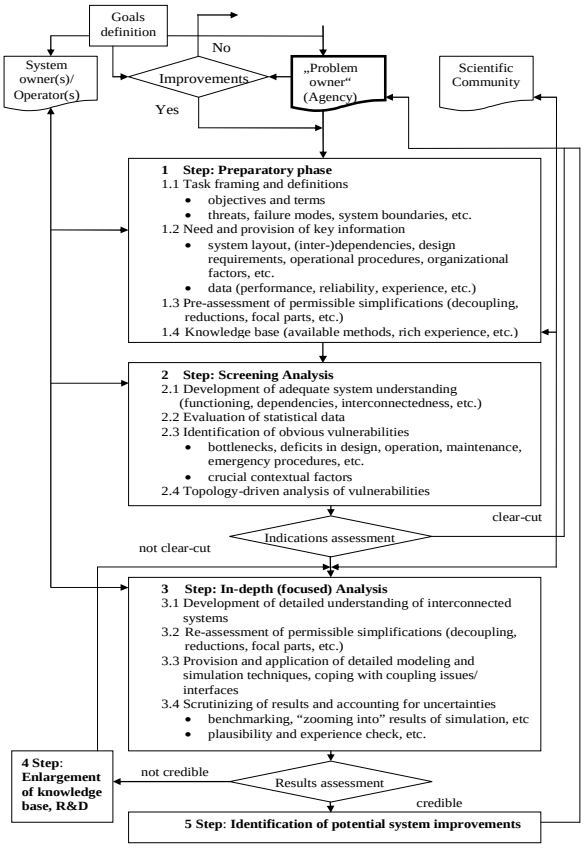

Figure 1. Framework for the vulnerability analysis of interconnected infrastructures (flow chart-type of illustration; double arrows represent two-ways interactions) [3]

Open Issues

The application of the phases of a screening analysis (by NT) and a detailed in-depth modeling (by OOM) on a realistic case study regarding the Swiss high voltage grid has shown that [9]:

1. In the screening analysis, the NT approach can be useful for identifying structural criticalities, e.g. the most connected nodes and shortest path lengths of connection.

2. On the other hand, the findings by the NT analysis of the system structure do not necessarily match those obtained by the detailed, in-depth modeling of the system physical behavior by OOM. This suggests that additional investigation must be carried out to identify appropriate static indicators of the physical behavior of the system, to be used as representative weights of the connections in the network structure. These indicators should capture the main physical characteristics of the transmission load capacities and reliabilities of the network elements so that their criticalities are evaluated accounting also for these physical aspects. In this definition of the appropriate indicators, the in-depth, detailed analysis of the physical behavior by OOM should serve for providing insights on the operational aspects to be captured in the indicators and for verifying whether such indicators indeed lead to identifying the critical elements of the infrastructure. Of course, it is still to be shown that it is indeed possible to identify static indicators representative, in a lumped manner, of the system physical behaviour which is dynamic in nature.

3. OOM has been shown to offer an attractive modeling paradigm for describing the dynamic system operational behavior with close adherence to the reality of the coupled processes involved. On the other hand, this simulation-based approach becomes highly computer intensive for complex realistic infrastructures. The challenge in this respect is to reduce the computational burden, e.g. making use of rare event simulation techniques or by substituting some objects with empirical models, like neural networks, while quantifying the uncertainty introduced in the approximation of the empirical models.

In the end, there is the usual inevitable compromise between adherence to reality and the budget of resources/costs available for the analysis. The availability of data for estimating the model parameters also plays a decisive role. The combination of a screening stage followed by a zoom with a more in-depth analysis on the screened critical areas may in principle be effective in optimizing such compromise. However, research is still needed to show how the two phases of analysis can be carried out in a meaningful way and then combined with efficacy.

In this regard, the ESRA Technical Committee on *Operational Safety and Security of Interconnected Critical Infrastructures* (www.esrahomepage.org) provides a forum for discussion and experience-sharing with regards to the development and application of methods for the modelling of distributed network systems and interconnected critical infrastructures and the analysis of their vulnerability and safety and the availability of service they provide. The activities of the Committee include the organization of workshops, technical sessions and roundtables at ESREL Conferences. A meeting of the Committee is foreseen at the next ESREL 2009 conference in Prague, 7-10 September (www.esrel2009.org) to discuss research issues and related future activities.

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FEATURE ARTICLES

Acceptable Risk in the Norwegian Fishing Fleet

Ingrid Bouwer Utne
SINTEF Technology and Society, Safety and Reliability
Norway

1 Introduction

Fishing has always been a prerequisite for the coastal settlements in Norway, and is by far more effective now than a few decades ago. Norway has a differentiated fishing fleet with respect to size and type of catching gear; from small conventional coastal vessels to large ocean-going factory trawlers. Sustainable management of renewable resources, as well as safeguarding coastal settlements, are fundamental in Norwegian fisheries policies. Nevertheless, parts of the Norwegian fisheries are not sustainable [1].

The high accident risk in the fisheries is one of the major threats to sustainability. Even though fisheries management tries to increase safety onboard fishing vessels, being a fisher is still one of the most dangerous occupations in Norway. Improved sustainability in the fishing fleet presupposes regular evaluations of the gap between the present performance and the desired performance. The challenge is to establish criteria for determining "acceptable sustainability" or goal thresholds, which in the case of accident risk means deciding on whether there is an acceptable risk level or not.

The accident risk level in the fishing fleet should be compared with other industries, such as the petroleum sector and the mining industry. To manage risk in the Norwegian oil and gas industry, it is common to use risk acceptance criteria. A risk acceptance criterion may be: "The FAR value should be less than 10 for all personnel on the installation, where the FAR value is defined as the mean number of fatalities per 10^8 exposed hours". Risk analysis is used to confirm that the risk acceptance criteria are met so that the need for risk reducing measures can be determined. Nevertheless, pre-determined criteria may cause too much focus on meeting these criteria instead of obtaining overall good and cost/effective solutions. Another issue is that the risk analyses used to verify that the criteria are met are not precise enough for that kind of use. The solution to these problems may be to put more emphasis on the ALARP (As Low As Reasonable Practicable) principle, more in line with how the UK sector has adopted it. Still, the ALARP principle is also controversial, for example, the time horizon may influence the cost analyses.

2 Risk in the fishing fleet

SINTEF Fisheries and Aquaculture [2] has registered 105 fatal accidents in the Norwegian fishing fleet from 1997-2006, an average of approximately 10 fatal accidents every year. This is much higher than in similar industries, such as farming, forestry, the petroleum sector, and mining. In 2006 there were 4 fatal accidents in farming and forestry, out of a total employment of 63 000 [3], [4], and none fatalities in the petroleum industry and in the mining industry out of respectively 31 000 and 4000 employees [3], [5]. In the fishing fleet, 12 fatal accidents were registered out of 11 061 employees. The smallest vessels have most fatal accidents, and shipwrecking is the most frequent cause.
In 1986, the accident risk and safety problems in the fishing fleet were evaluated by a Norwegian official report [6]. At that time, an average of 32 persons died each year in occupational accidents. The report stated that the average number of fatalities should be comparable to other industries, such as ship transportation, the petroleum industry, and mining industries, suggesting that the expected number of fatalities should be 9 with the 1984 level of employees. Table 2 shows that in 20 years the number of fatalities in the fishing fleet has been reduced by

60-70%, whereas the number of employees has been halved. Based on the recommendations from the 1986-report, it would be reasonable to expect that the accident risk level in the fishing fleet should be about 4-5 fatalities a year.

Table 1. Fatal accidents and employees, 1980-1984 and 2001-2005, own calculations based on statistics from [2], [3], [6].

Time period	Fatal accidents	Man-labour years (1984 and 2005)	Mean catch/year (1000 tons)
1980-1984	156	19233	2240
2001-2005	42	9117	2580

However, the risk level, for example, in the oil and gas industry has also been reduced since the 1980's, indicating that an "acceptable" number of fatalities in the fishing fleet should be even lower. The statistics also show that the number of fatal accidents is not equally distributed among the different vessel groups. Due to the fact that 67% of the smallest vessels (6m<l<10, 67m) in the coastal fleet were reported to have critical safety defects in 2005, the Norwegian Maritime Directorate is now considering the following efforts to increase safety:

- Information campaign in the fisheries industry.
- Introduce two year mandatory self certification and increase the number of unannounced inspections.
- Introduce requirements to initial inspection when constructing.
- Introduce requirements to integrated emergency stop-device in hauling equipment and other rotating machinery.
- Introduce vessel instructions and periodical control of the vessels.

3 Conclusions

When and to which extent the above efforts may be introduced, are not determined yet, but costs and resources have to be evaluated. Twenty years ago, similar areas of priority were discussed in the Norwegian official report. Since then, the number of fatal accidents has been reduced, even though the current level is still much higher than suggested in that report. According to UK Health and Safety Executive, when comparing the benefits of the measures to prevent risk against the costs of the measures (cost-benefit analysis), there should be a "gross disproportion" between the costs and the benefits, skewing the balance towards the benefits, if measures are not to be implemented. In the case of the Norwegian fishing fleet, the many fatal accidents, causing high socio-economic costs, indicate that the authorities should increase funds to reduce the risk, and that the current accident risk level is far from being acceptable.

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New Austrian code for design of structures against torrential risks

Dirk Proske, University of Natural Resources and Applied Life Sciences, Austria

Alpine regions are exposed to several gravitational hazard processes. Such processes are debris flows, landslides, rock falls and rock avalanches, flash floods or avalanches. Human settlements in alpine regions are exposed to such processes. To protect the human settlements against such processes in many cases mitigation measures are installed. There exists a great diversity of mitigation measures reaching from early warning systems over hazard zone mapping to structural protection measures (Bergmeister et al. 2008). In most cases the protection measures are chosen and designed arbitrarily. Therefore it seems to be useful, to provide standardization and a common design basis preferable based on the Eurocode concept. Therefore in Austria in the last years much effort has been undertaken to develop and provide a new code as basis for the design of protection works for torrent control and specifically torrential barriers (Fig. 1). This code will be the new ONR 2480X series. The X states for different numbers of the codes. In general, the code series will provide a basis not only for the design engineers but also for the mountain risk engineers how mainly deal with the hazard process itself. To provide a common understanding of the used terms and to ease communication between these two different professions the ONR 24800 mainly deals with common terms used in these fields. Not only terms from the different natural processes, but also terms common in structural engineering are defined. One can find definitions of acceptable risk, types of

torrential barriers or intensity of processes. The second code, the ONR 24801 defines certain types of loading on such structural mitigation measures. For example two different formulas to estimate the impact forces of debris flows against torrential barriers made of structural concrete are presented. Much research work has been carried out in this field not only in terms of laboratory tests, but also in terms of field tests. The background documents heavily discuss the many different approaches currently available in scientific literature (Proske et al. 2008a). Based on the investigation into the different approaches and comparison with field data two formulas were chosen. Besides the deterministic models also probabilistic investigations have been carried out to calibrate the safety elements such as the partial safety factor (Proske et al. 2008b). The code also refers to other structural loads for example water pressure or dead load and relates the loads of the special structures to other common structural engineering codes.

Usually after the assessment of the life load the structure can be designed. Therefore the next code, ONR 24802 deals with the design of such structures. It gives recommendations for special structural and reinforcement requirements, such as minimum reinforcement.

In comparison to normal structures torrential barriers experience a very special type of loading: very rare but with high intensity. As an example, it can happen that such structures do only experience dead load for several decades and then a major impact occurs causing heavy damage. Therefore after the construction such structures have to be monitored and maintained, too. The ONR 24803 deals with this topic.

In general, the new Austrian code series provides a sound background for the planning, design and maintenance of protection works against torrential hazard processes. This code is strongly related to probabilistic methods and risk techniques applied to deal with natural hazards in mountain regions.

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Figure 1: Torrential barrier

BOOK REVIEW

Semi-Markov Chains and Hidden Semi-Markov Models toward Applications

Their Use in Reliability and DNA Analysis

Series: Lecture Notes on Statistics, Vol. 191

Barbu, Vlad, **Limnios**, Nikolaos .

This book is dedicated to reliability of multi-state semi-Markov systems in discrete time. It is presented not only the detailed probabilistic modelling of reliability, availability, maintainability, mean time to failure, etc. but also their statistical estimation. Adapted algorithms for numerical calculus as well as numerical examples are also presented.

The models presented in the book are specifically adapted to reliability studies and DNA analysis. The book is mainly intended for applied probabilistics and statisticians interested in semi-Markov chains theory, reliability and DNA analysis, and for theoretical oriented reliability and bioinformatics engineers.

It can also serve as a text for a six month research-oriented course at a Master or PhD level. The prerequisites are a background in probability theory and finite state space Markov chains.

Publisher: Springer-Verlag New York Inc.

Publication date: September 30th, 2008

SSARS 2007
1st Summer Safety and Reliability Seminars

Krzysztof Kolowrocki, Technical University of Gdynia, Poland

The First edition of the Summer Safety and Reliability Seminars – SSARS 2007 was held in the Hotel "Prawdzic" in Gdańsk/Sopot-Jelitkowo from 22nd of July 2007 until 29th of July 2007.

The motivation beyond the organization of the annual, one-week *Summer Safety and Reliability Seminars* is to provide a forum for discussing, advancing and developing methods for the safety and reliability analysis of the complex systems and processes, which form the backbone of our modern societies.

The subjects of the Seminars are chosen each year by the Programme Board in an effort to dynamically represent the methodological advancements developed to meet the newly arising challenges in the field of safety and reliability analysis.
This year the emphasis was addressed to the following subjects:

- Natural Hazards Analysis and Environment Protection Modelling;
- Reliability and Safety Data Collection and Analysis;
- System Safety and Reliability Modelling, Dependence, Dynamic Reliability;
- Risk Assessment and Management;
- Maintenance Modelling and Optimisation.

The Advisory, Editorial and Organising Boards have primarily performed the evaluations of all 52 contributions: as a result, recommendations have been sent out to help the authors improving their work. In all, 48 papers and lectures have been accepted for presentation during the Seminar and for publication in the Seminar Proceedings.

The extended abstracts of all lectures and technical papers were collected in the SSARS Proceedings composed of 2 Volumes of around 200 pages, each one containing 12 contributions.

The Seminar was attended by 46 participants and 2 accompanying persons from 14 countries (Canada, Czech Republic, Italy, Germany, Greece, Lithuania, Netherlands, Poland, Portugal, Slovakia, South Africa, South Korea, Tunisia, and United States).

Both 1-2 hours lectures on advanced methods (accompanied by a corresponding full text of up to 12 pages) and technical presentations of 20-30 minutes on applications of such methods (with corresponding full text of up to 8 pages) were offered during the plenary sessions and the seminar sessions, respectively. Namely, 1 keynote speech, 12 plenary lectures and 29 seminar papers were presented.

As a further development, some suggestions on improvements of the works presented were done during thorough discussion sessions, aiming at advancing the work to the scientific quality and relevance necessary for publication in frontier research journals.

The attendance diplomas were given to the Seminar participants confirming their activity.

A lot of special events was organised for the Seminar participants (Welcome Dinner, Picnic and Folklore, Seminar Dinner, Farewell Dinner).

At the end of the Seminar the participants were asked to evaluate SSARS 2007 with respect to its scientific contents, location and logistics. The results of this evaluation were very positive in all aspects.

Our final comment is: "We are obliged to continue and to develop the Seminars, of course, with our great pleasure and honour and with all contributors significant help".

More details on SSARS 2007 may be found on the Website: http://ssars2007.am.gdynia.pl

SSARS 2008
2nd Summer Safety and Reliability Seminars

Krzysztof Kolowrocki, Technical University of Gdynia, Poland

The Second edition of the Summer Safety and Reliability Seminars – SSARS 2008 was held in the Hotel "Dwór Prawdzica" in Gdańsk/Sopot-Jelitkowo from 22nd to 28th June 2008.
The motivation behind this annual event is to provide a forum for discussing, advancing and developing methods for the safety and reliability analysis of the complex systems and processes, which form the backbone of our modern societies.
The subjects of the Seminars are chosen each year by a Programme Board of selected experts in an effort to dynamically represent the methodological advancements developed to meet the newly arising challenges in the field of safety and reliability analysis.
This year the following subjects were chosen:

- Maintenance Modelling and Optimisation;
- Modern Methods of Risk Analysis;
- Modelling Safety and Reliability of Complex Systems and Processes;
- Multi-State Safety and Reliability Models.

The Advisory, Editorial and Organising Boards have carried the preliminary evaluation of the 52 contributions selected for this year Seminars and sent out to the authors, recommendations to improve their

work. In all, 47 of the 52 papers and lectures have been published in the Seminars Proceedings, composed of 2 Volumes of around 200 pages each.
The Seminar was attended by 48 participants and 5 accompanying persons from 12 countries (China, Czech Republic, France, Germany, Greece, Italy, Norway, Poland, Singapore, South Africa, Spain, and United States).
Both 1 hour lectures on advanced methods (accompanied by a corresponding full text of up to 12 pages) and 20-minutes papers (with corresponding full text of up to 8 pages) were offered during the plenary sessions and the seminar sessions, respectively. More precisely, 1 keynote speech, 10 plenary lectures and 37 seminar papers were presented. Additionally, two Educational and Training Courses (Markov Processes Applications in Safety and Reliability Modeling – Course I, Monte Carlo Simulation for System Safety and Reliability Modeling – Course II) were offered and one ongoing research project (Safety and Reliability of Complex Industrial Systems and Processes) was presented as well.
Attendance diplomas were given to the Seminars and Educational Courses participants in appreciation of their activity.
A major initiative during the Seminars was the development of informal discussion sessions during which suggestions on improvements of the works presented were offered to the authors by experienced researchers, with the aim of advancing the works to the scientific quality and relevance necessary for publication in frontier research journals.
Several special events were organised to foster a team spirit among the Seminar participants (Welcome Party, Picnic and Dancing, Visiting Malbork Castle, Farewell Dinner).
At the end of the Seminars, during the Farewell Dinner, the participants were asked to evaluate the event with respect to its scientific contents, location and logistics. The results of this evaluation could be summarised that the SSARS 2008 was a great youthful success. Our final comment is: We feel obliged to continue developing this Seminars series, with great personal pleasure and professional honour and counting on all dedicated contributors for their significant and expert help".
More details on SSARS 2008 may be found on the Website: http://ssars2008.am.gdynia.pl
The 3rd Summer Safety and Reliability Seminars – SSARS 2009 will be held in Gdansk/Sopot-Jelitkowo in July 19-25, 2009. Details on SSARS 2009 may be found on the Website: http://ssars2009.am.gdynia.pl.

Joint ESREL 2008 and 17th SRA-Europe Conference

Sebastian Martorell, University of Valencia, Spain

The 19th European Safety and Reliability Conference, ESREL 2008, was held in Valencia, Spain, between 22 and 25 September 2008. This year the Conference stemmed from a European initiative merging the ESRA (European Safety and Reliability Association) and SRA-Europe (Society for Risk Analysis – Europe) annual conferences into the major safety, reliability and risk analysis conference in Europe during 2008. This was the second joint ESREL (European Safety and Reliability) and SRA-Europe Conference after the 2000 event held in Edinburgh, Scotland. This Joint Conference confirmed the expectations insofar as the technical programme and number of participants is concerned. All presentations were of high quality and very relevant to current academic and industrial trends. These presentations have been published as a four volume set of Conference Proceedings: *Safety, Reliability and Risk Analysis: Theory, Methods and Applications – Martorell et al. (eds) © 2009 Taylor & Francis Group, London, ISBN 978-0-415-48513-5.*

ESREL is an annual conference series promoted by the European Safety and Reliability Association. The conference dates back to 1989, but was not referred to as an ESREL conference before 1992. The Conference has become well established in the international community, attracting a good mix of academics and industry participants that present and discuss subjects of interest and application across various industries in the fields of Safety and Reliability. SRA-Europe was founded in 1987, as a section of SRA international founded in 1981, to develop a special focus on risk related issues in Europe. SRA-E emphasizes the European dimension in the promotion of interdisciplinary approaches of risk analysis in science. This was the 17th edition of its annual conference that takes place in various countries in Europe.

The Conference Programme was a result of the enthusiasm and efforts of the many authors (376) who have contribute with their papers, special session organizers, technical programme committee members (101), technical area coordinators (34), conference webmaster, local organising committee (11) and the conference secretariat and technical support (14) at the Universidad Politécnica de Valencia. All these initiatives and efforts are gratefully acknowledged.
The scientific scope of the Conference embraced the thematic areas of:

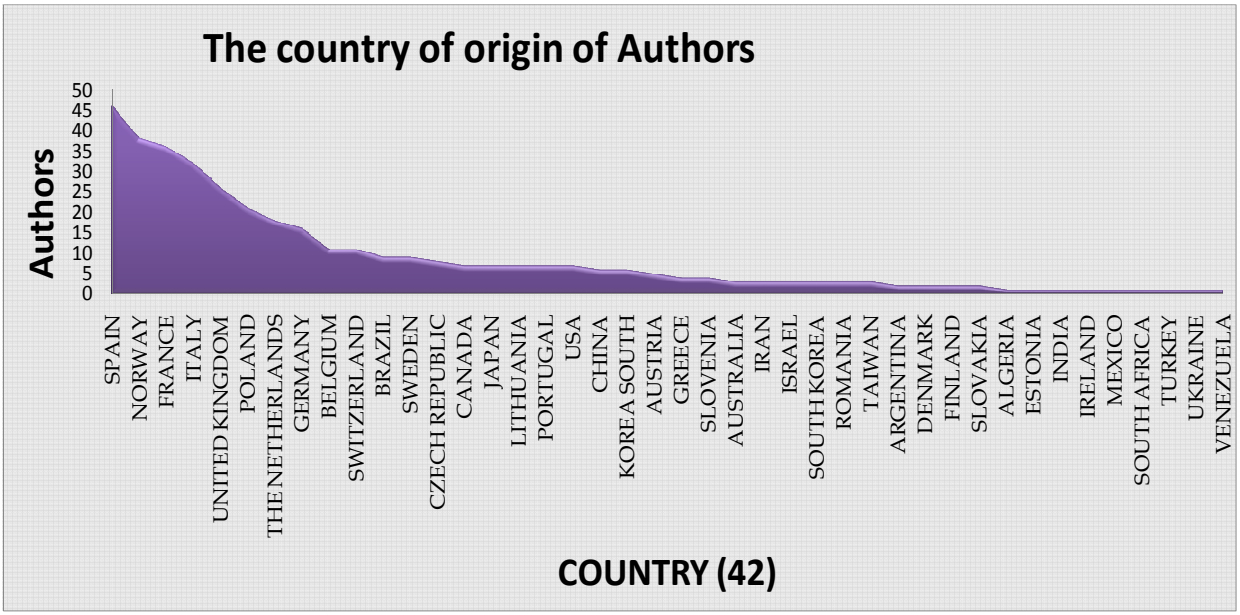
- Accident and Incident Investigation
- Crisis and Emergency Management
- Decision Support Systems and Software Tools for Safety and Reliability
- Dynamic Reliability
- Fault Identification and Diagnostics
- Human Factors
- Integrated Risk Management and Risk-Informed Decision-making
- Legislative dimensions of risk management
- Maintenance Modelling and Optimisation

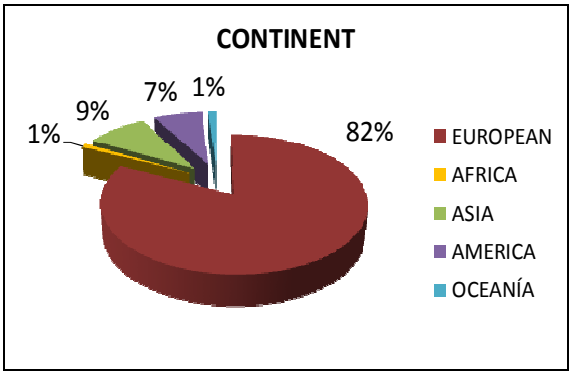
- Monte Carlo Methods in System Safety and Reliability
- Occupational Safety
- Organizational Learning
- Reliability and Safety Data Collection and Analysis
- Risk and Evidence Based Policy Making
- Risk and Hazard Analysis
- Risk Control in Complex Environments
- Risk Perception and Communication
- Safety Culture
- Safety Management Systems
- Software Reliability
- Stakeholder and public involvement in risk governance
- Structural Reliability and Design Codes
- System Reliability Analysis
- Uncertainty and Sensitivity Analysis

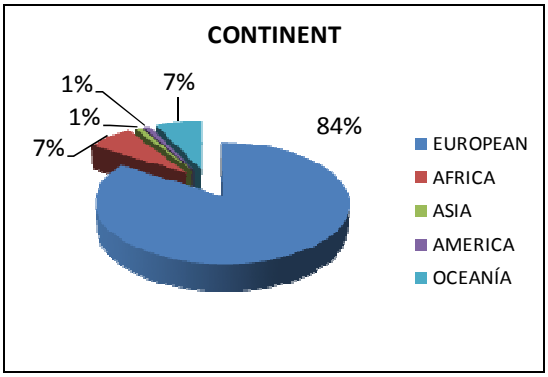
and the following industrial and service sectors:

- Aeronautics and Aerospace
- Automotive Engineering
- Biotechnology and Food Industry
- Chemical Process Industry
- Civil Engineering
- Critical Infrastructures
- Electrical and Electronic Engineering
- Energy Production and Distribution
- Health and Medicine
- Information Technology and Telecommunications
- Insurance and Finance
- Manufacturing
- Natural Hazards
- Nuclear Engineering
- Offshore Oil and Gas
- Policy Decisions
- Public Planning
- Security and Protection
- Surface Transportation (road and train)
- Waterborne Transportation

The Technical Programme consisted of 425 papers from prestigious researchers coming from all over the world resulting from approximately 800 submitted abstracts, which were presented in nine parallel sessions. It consisted also of 2 poster sessions including 27 poster presentation and 4 plenary talks. The country of origin of authors and co-authors was widespread. The Authors distribution is shown in the figure below.

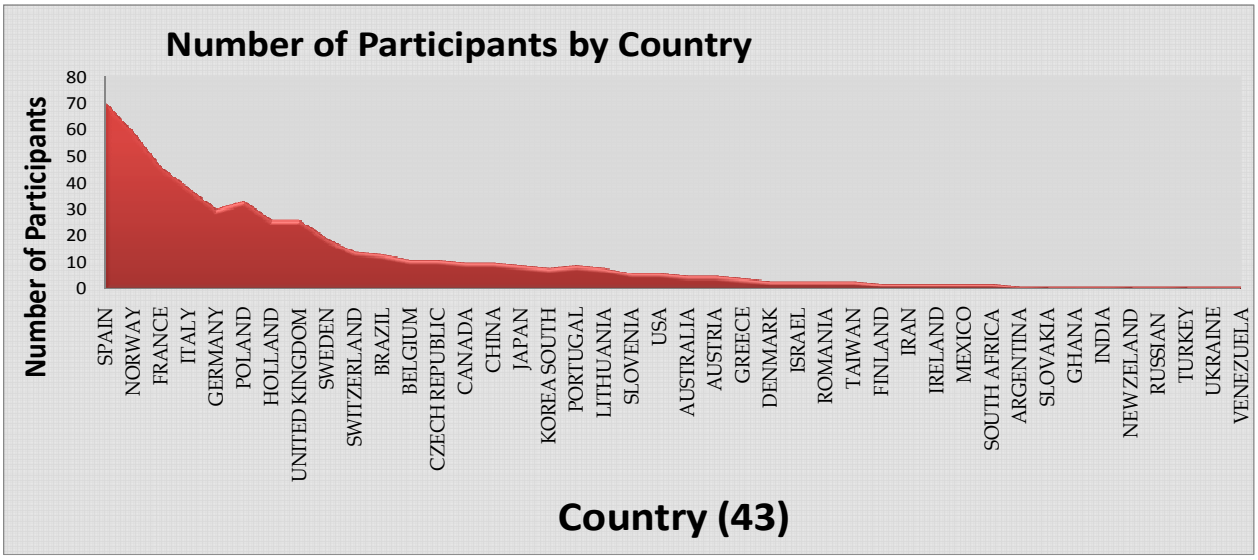






Of the around 500 participants who attended the Conference, 53 % were drawn from Academia, 25% from industry and 22 % from other institutions such as governmental services, national research laboratories, etc. Almost 17 % of participants were no authors, which shows the relevance of the Conference.
Approximately 16% of participants were PhD students, which shows that there is a new generation of researchers coming up. The Conference was principally attended by participants from Europe, but also from other continents all over the world. The country distribution of participants is shown in the figure below.

The host of the Conference was the Universidad Politécnica de Valencia (UPV), under the high patronage of the Ministerio de Educación y Ciencia (DPI2007-29009-E), Generalitat Valenciana (AORG/2007/091 and AORG/2008/135) and Ajuntament de Valencia. Thanks also to the support of our sponsors Iberdrola, PMM Institute for Learning, Tekniker, Asociación Española para la Calidad (Comité de Fiabilidad), CEANI and Universidad de Las Palmas de Gran Canaria.
It was a great pleasure to have the opportunity to co-operate with you all during the Conference, both at the planning stage and during the Conference in September. We hope you all enjoyed the programme and the Conference.



6th International Probabilistic Workshop in Darmstadt

Dirk Proske, University of Natural Resources and Applied Life Sciences, Austria

On the 26-27 November 2008 the 6th International Probabilistic Workshop took place in Darmstadt. This workshop continues a conference series started in 2003. The workshop deals heavily with probabilistic methods in the field of structural safety but has also extended to further topics such as natural hazards and safety of nuclear power plants. Prof. Graubner, the chairman, welcomed more then 50 participants from different European countries, but also from oversee, such as Canada, USA and Mexico. Since the workshop features only single sessions, the audience does not have to change between different presentation rooms and in combination with longer then usual presentation and discussion time intensive and interesting discussions arose. For example Dr. Hinrichs from Braunschweig, Germany, mentioned that the presented work was based on a discussion with Prof. Holický at the former International Probabilistic Workshop in Ghent, Belgium. After the introduction the first presentation of the workshop was given by Prof. Frangopol from the Lehigh University, USA. He discussed various life-cycle performance and redundancy measures for structures. The following conference presentations dealt with topics reached from durability, monitoring and deterioration of structures, to safety elements of existing concrete structures, safety of masonry structures, some earth quake related topics, off-shore structures, safety of dams, cracking of reinforced concrete elements, concrete quality and random field simulation, to mention a view. Interested reader may consult the readable proceedings under http://hsss.slub-dresden.de/documents/12289156758 33-2685/1228915675833-2685.pdf.
Besides the scientific program, the two day workshop included a conference dinner with a special surprise. All participants of the workshop had the opportunity to practise the new findings in the field of stochastic by gambling roulette. Unfortunately the gained new knowledge did not yield to an extra income for the participants (in average). Despite that the organisers hope that the participants enjoyed the workshop. The next workshop will take place in 25-26 November 2009 in Delft, The Netherlands.

ESREL 2009
European Safety and Reliability Conference,
Prague, 7-10 September 2009

Prague has been selected as the venue for upcoming ESREL 2009. Prague, the capital city of the Czech Republic, lies in the heart of Europe and ranks amongst the most impressive historical cities in the world. The Clarion Congress Hotel Prague is predominantly a congress centre attempting to provide the utmost comfort to their guests and ensure the top rate quality conference services.
Details will be included on the conference web page www.esrel2009.org.

Important Dates:
Submission of Abstracts: 30 November 2008
Notification of Abstracts: 31 December 2008
Submission of full-length paper: 31 March 2009

3rd International Conference on Hydrogen Safety (ICHS)
Ajaccio, 16-18 September 2009

Information about this event can be con-sulted on the Conference website at:
http://conference.ing.unipi.it/ichs2009/

10th International Conference on Structural Safety and Reliability (ICOSSAR)
Osaka, 13-17 September, 2009

Information about this event can be con-sulted on the Conference website at:
http://www.sc.kutc.kansai-u.ac.jp/icossar2009/

18th SRA-Europe Meeting
Karlstad, 28 June - 1 July 2009,

Information about this event can be con-sulted on the Conference website at:
www.sraeurope.org

13th International Symposium on Loss Prevention and Safety Promotion in the Process Industries
Brugge, 6-9 June 2010

Information about this event can be consulted on the Conference website at:
www.lossprevention2010.com

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

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- 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)
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- Asociación Española para la Calidad, Spain

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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.
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