European Safety and Reliability Association

Newsletter

http://www.esrahomepage.org

March 2006

CONTRIBUTIONS FROM ESRA TECHNICAL COMMITTEES

Goal Based Standard and Formal Safety Assessment. Will the two developments converge?

by Dr. Rolf Skjong, Chief Scientist,

DET NORSKE VERITAS

The maritime industry has seen two remarkable initiatives, with perspectives of radically changing the maritime regulatory system, the last decade, Formal Safety Assessment and Goal Based Standards. Both initiatives were taken at the International Maritime Organization (IMO), the UN organization responsible for developing international safety and environmental protection regulations.

The FSA Initiative

IMO has now developed the second version of 'Guidelines for Formal Safety Assessment (FSA) for use in the IMO rule making processes'. The Guidelines are available as circulars both from the Marine Safety Committee (MSC) and the Marine Environmental Protection Committee (MEPC). This standard is, as far as the author knows, the first risk assessment standard adopted in an UN organization. The work with developing this standard was initiated in 1995 based on an UK initiative.

For readers of the ESRA newsletter, there should not be much need to explain what FSA is. It is simply a standard risk assessment, with the aim of developing regulations. It is not a risk assessment for a specific ship, or a ship's safety case. FSA may better be described as a safety case for the rules and regulations. FSA is described as a 5 step process

- Identification of hazards;
- Risk analysis;
- Risk control options;
- Cost benefit assessment; and
- Recommendations for decision-making.

Paralleling the development of the guidelines there has been a number of applications of the guidelines, recently focusing on bulk carrier safety, safety of large passenger ships and the global implementation of Electronic Chart Display and Information System (ECDIS). Relevant studies have been submitted by UK, Japan, Norway, Denmark, the International Confederation of Free Trade Unions (ICFTU), and by the International Association of Classification Societies (IACS). The main conclusion is that the maritime industry has made a lot of progress, quite fast, in the use of risk assessment as part of the decision making process. This being the case, despite the many communication problems that arises in discussing risk issues in international forums. Furthermore, the FSA has helped balancing the often conflicting interest of the flag states and non-governmental organizations present in IMO. However, unfortunately, most nations have not started using FSA when they propose amendments to the regulations. For example the initiative on maritime security, which resulted in the International Ship and Port facility Security code (ISPS) was not based on any formal risk assessment or FSA. There have also been a number of other initiatives resulting in regulatory changes where no FSA was carried out. For example, so far no initiative on environmental protection has been supported by FSA.

Achievements

FSA work

Generally IACS, Japan, Norway and others have demonstrated that rather extensive FSA studies may be carried out in about a year's time. If well coordinated a comprehensive FSA study for a ship type may take two to three years. The reason is that many ship types are more complicated to analyze, more modeling work and search into reliability and incident data may therefore be required. Bulk carriers are particularly simple designs, the fleet is very large

and there have been (too) many accidents that make up the experience base. Still FSA, even with studies taking more than a year to plan and complete such studies may be carried out within the time span that is normally available at IMO for such tasks – it is quite common that a dedicated work group need two to four years to complete a tasks.

FSA methods

Most FSA studies presented at IMO have used standard risk models using fault trees and event trees. Fault trees have not been large or detailed. When detailed fault trees have been prepared, e.g. by France (2002) as part of the UK/International project, the analysts have sometimes had to give up on populating the fault trees with relevant data. This happened with the UK/Int. study. The result of this was that the UK/Int. study had no models for quantifying risk reduction based on risk models, but resorted to expert judgment of risk reducing effects for each event tree scenario.

For the prediction of collision and grounding probabilities, which require integration of environmental, technical, organizational, procedural and human reliability issues Bayesian network models have successfully been used (Norway, 2004).

Both IACS(2001) and Japan(2002) used rather detailed structural reliability models to be able to quantify risk reducing effects, and Norway/ICFTU(2001) used detailed fault and event trees populated by data from many sources.

Remaining Controversies

There are some issues that are still unresolved and subject to debate. For example there seems to be two different views on the use of Net and Gross Cost of Averting a Fatality (NCAF/GCAF). When risk reduction is small and economic benefits are large, this may result in large negative NCAF.

$$GCAF = \Delta Cost / \Delta PLL \quad (1)$$

$$NCAF = (\Delta Cost - \Delta Benefit) / \Delta PLL \quad (2)$$

Some seem to conclude that such risk control options should be implemented in mandatory instruments, whilst others are of the opinion that there is no need to regulate, as it is reasonable to assume that the owner can take care of own economic interest, and if the risk reduction in terms of Potential Loss of Life (PLL) is small there are no good reason for mandating the RCO. At MSC 76, various questions relating to coating came in this category. All studies showed that it is in the owner's best interest to coat and maintain coating, and that this also have safety implications. Still it was decided not to regulate this at IMO level. Later, during the debate on GBS, this decision was changed.

There are also controversies on how FSA studies should be verified. The verification of the FSA on helicopter landing areas for non-Ro/Ro passenger ships was a case of detailed verification. The international FSA on bulk carrier safety was not verified. The study was open to anyone, but there are no records of any independent verification. This is very unfortunate, as properly reviewed FSA studies will be very important in later risk based design studies for innovative designs. It is now clear that verification of FSA studies will be on the agenda for future IMO meetings, the next time at MSC 81 in May 2006.

Finally, the risk acceptance criteria will be an issue of future discussions. On environmental risks there has not so far been any proposal on how to deal with this issue. The only indication from the previous debates is that delegates prefer a criteria based on cost of averting spills, and a parameter Cost of Averting a Ton of oil Spill (CATS) has been proposed.

Risk acceptance criteria

The FSA guidelines are sufficiently specific on the format of the risk acceptance criteria for safety relating to loss of life. Individual risk and societal risks are supposed to be analyzed, and societal risk should be presented as FN diagrams. The ALARP criterion is referred to, but no criteria have been given for intolerable risk or negligible risk. Still, during the FSA on bulk carriers safety the reasoning by Norway (2000) was adopted. This document concluding that most ship types (including bulk carriers) are in the ALARP area, and that cost effectiveness criteria should be used to reach a final recommendation. The final decision making process at IMO referred only to this criterion and implemented all risk control options with a cost of averting a fatality less than $3m. This is the criterion suggested by Norway (2000) in cases where a fatality is used as an indicator which in addition to representing the fatality risk also represents injuries.

The FSA Process

Most risk analysts see the FSA process as a method to coordinate all activities relating to the decision making process. This is still not a widespread view in the maritime industry. A number of risk issues with large cost implications have been put on the agenda during the last couples of years, without considering FSA studies. For example, both security issues and large passenger ship safety issues have been considered without FSA.

Even during the decision making process for bulk carriers there were a number of risk control options implemented without FSA, for example issues relating to the revision of the Load Line Conventions or the UK proposal to strengthen all bulkheads on existing bulk carriers UK (2002c). Furthermore a large number of separate studies, e.g. model tests, were never integrated into the FSA studies, although some studies used structural reliability models that could easily include e.g. new hatch cover load distributions in the risk estimation and estimation of risk reduction.

The U-turn by IMO on the controversies of single or double side skin was very damaging for FSA. IMO had first decided to mandate double side skin bulk carriers based on the FSA studies. This decision was changed at the subsequent MSC meeting based on questionable analysis. Many now use this case to substantiate their view that FSA can be doctored to give any result wanted. However, it seems more

obvious to state that IMO have not yet learned how to use FSAs. To base decisions on FSAs without reviewing assumptions, data, models, scenarios etc. is certainly not the way risk assessment is used in other industries. As pointed out by IACS (2004), IMO should organize reviews prior to decision making. Fortunately MSC 79 agreed to this proposal, and there will be a debate at MSC 81 (May 2006) on exactly how this should be organized.

Practical results of FSAs

The final decisions for bulk carrier safety seems as a good package of preventive and risk mitigating measures, and have a large risk reduction potential of some 60-70%, for new ships, according to the studies. This is a good achievement, and it is not likely that all these decisions would be possible without an FSA. The FSA on navigation of large passenger ships safety proposed RCOs with a potential of reducing the risk by about 1/3 for collision and grounding, and the ongoing FSA on ECDIS indicate a risk reduction of 1/3 in the grounding scenario. This shows the great potential for practical results of using FSA systematically at IMO.

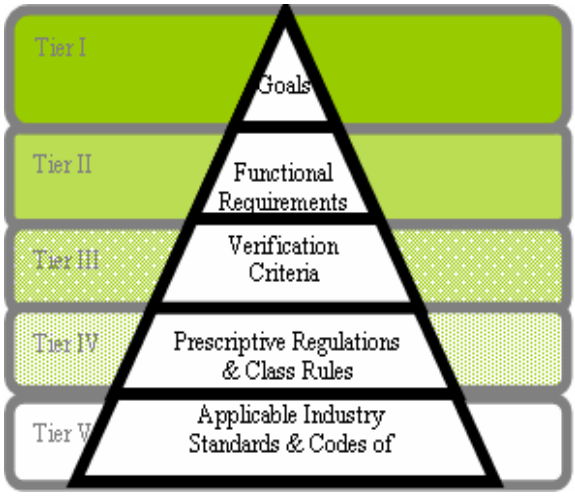
Goal Based Standard

In 2002, a new initiative was taken on developing Goal Based Standards at IMO. This initiative was taken by Greece and Bahamas, and has now been debated at three meetings of MSC. So far a definition has been agreed, that the IMO GBS are:

1. Broad, over-arching safety, environmental and/or security standards that ships are required to meet during their lifecycle
2. The required level to be achieved by the requirements applied by class societies and other recognised organisations, Administrations and IMO
3. Clear, demonstrable, verifiable, long standing, implementable and achievable, irrespective of the ship design and technology
4. Specific enough in order not to be open to differing interpretations.

Even at this level, the definition or description may be confusing. For example, referring to Item 1 above, it is now clear that the GBS is a standard for standards (rule for rules) and not for ships, so the reference to ships may be confusing. Item 2, and the reference to recognized organizations (Classification societies) is currently very important, as the main motivation for many delegates at IMO for developing GBS seems to relate to the possibility of defining goals for the Classification Rules (traditionally taking care of safety relating to hull strength, machinery and electrical systems), and organizing review of the Classification Rules at IMO, verifying that the Rules satisfies the goals and functional requirements in the GBS. This will be a radical change, as currently it is the individual flag states that recognized the classification societies.

The GBS is proposed as a tiered system, as follows:



So far the goals have tentatively agreed as follows:

Ships are to be designed and constructed for a specified design life to be safe and environmentally friendly, when properly operated and maintained under the specified operating and environmental conditions, in intact and specified damage conditions, throughout their life.

1. *Safe and environmentally friendly means the ship shall have adequate strength, integrity and stability to minimize the risk of loss of the ship or pollution to the marine environment due to structural failure, including collapse, resulting in flooding or loss of watertight integrity.*
2. *Environmentally friendly also includes the ship being constructed of materials for environmentally acceptable dismantling and recycling.*
3. *Safety also includes the ship's structure being arranged to provide for safe access, escape, inspection and proper maintenance.*
4. *Specified operating and environmental conditions are defined by the operating area for the ship throughout its life and cover the conditions, including intermediate conditions, arising from cargo and ballast operations in port, waterways and at sea.*
5. *Specified design life is the nominal period that the ship is assumed to be exposed to operating and/or environmental conditions and/or the corrosive environment and is used for selecting appropriate ship design parameters. However, the ship's actual service life may be longer or shorter depending on the actual operating conditions and maintenance of the ship throughout its life cycle.*

It is noted that whilst these goals may be very open to interpretations, they are not quite in agreement with a risk based approach. For example, stating an objective of minimising loss lacks the typical reference to a decision criteria, whilst for example the alternative 'minimising loss without entailing excessive costs' would be sufficient to associate GBS with the standard FSA approach of using agreed

decision parameters and the ALARP principle. In any case, the majority are of the opinion that GBS is not to be risk based, whilst a relatively large minority consisting of the North West European countries, Japan and maybe some other Flag states are of the opinion that GBS should be based on FSA (and Structural Reliability Analysis for structural rules). It is further noted, in the GBS documentation, that the concern is ship safety and pollution, and there is no explicit concern for the crew or passengers, which has largely been the concern in FSA studies.

A draft Tier II (functional requirements) has also been tentatively agreed, but so far only for bulk carriers and tankers. For example, a 25 years design life has tentatively been specified. This is new, as rules previously expressed minimum requirements irrespectively of age; and life length was viewed as a result of how well the ships were maintained and how the ships were used (sees reference above on coating). However, already today most bulk carriers and tankers have an actual commercial life until scrapping of approximately 25 years (although there have been poorly designed ships scrapped before 15 years, when the market has been low). When the majority insisted on specifying 25 years design life this was perceived as an increase from 20. However, this is probably on a misunderstanding. The 20 years in the Classification rules refers to the return period for extreme wave loads (and not design life), and the difference between 20 and 25 years extremes (North Atlantic) is only 1.4%. Other Tier II elements relates to environmental loads, intact strength, fatigue, residual strength, coating, corrosion addition, structural redundancy, watertight integrity, design transparency, construction, construction surveys and maintenance.

The GBS development is current without a well defined approach. For example there is no requirement indicating the acceptable safety level, which could be used e.g. to determine the net scantling.

Tier III relates to the verification of the Rules that are intended to meet the goals and functional requirements. A debate is now ongoing in a correspondence group, and for example relates to the question of what should be submitted to IMO, how it should be reviewed and also who should review it. As for the FSAs, the majority wish a group of experts to review, and based on the submissions of the Rules and a Rule Commentary explaining the basis for the rules. Obviously, if such a Rule Commentary was an FSA (or SRA for structural Rules), the two activities of GBS and FSA would be convergent. However, whether FSA and GBS are converging or diverging is not yet known. Those of us favouring rational approaches are working hard for convergence and the use of risk bases approaches.

FEATURES

Center of Quality and Reliability of Production (CQR) – new research project in Czech Republic

Radim Briš, Pavel Praks & Gejza Dohnal

The centre was founded on 1st March 2006 on the basis of the presented project and obtaining a support for its development from the means of Ministry of Education, Youth and Sport of the Czech Republic (research and development project No. 1M06047). Ministry of Education, Youth and Sport of the Czech Republic support is provided for a time period 2006-2009. The centre joins together eight working places from four technical universities, one from the institutes of Academy of Sciences of the Czech Republic and from two private Czech companies.

The CQR aim is a method development for a quality improvement, diagnostics and increase reliability of production, products and technological procedures, mainly paying attention to their application and the development of complex analytical methods which lead to an increase of competitiveness among companies.

CQR joins leading research working places which concentrate on a certain issue (two members of CQR are also members of ESRA, see VSB - Technical University of Ostrava & Technical University of Liberec). Thus an expedient possibility of a direct cooperation of these working places is ensured as well as their close contact with a recipient of a research result with a thought of bringing the effectiveness and unity of experts at solving common problems. CQR enables a mutual coordination and research complementariness in the field of the quality improvement, diagnostics and reliability in production with applications above all in the area of manufacturing procedures, production, transportation and services.

Expected contributions of the project

We can find a main contribution in a coordination and effective development of methodology for quality management and assignment and verifying reliability of complex systems in the field of production, transportation and services. CQR activities mainly concentrate on

- Creating of a broad basis for consultant and advisory work, aimed at quality improvement and

effectiveness in the operation of users of centre results – industrial companies
- Improvement of communication among producers and customers and increasing of competitiveness regarding EU
- Transmitting of experience and new knowledge into pedagogical work, as many pedagogues of a few universities participate in the project and CQR results are immediately implemented into the teachings
- Methodology development directly on the data coming from the operation, thereby real needs of recipients are respected

Research work of CQR

The research work of CQR is divided into a few levels according to the content and time: *collection and data analysis, model planning and methodology creation, algorithmization and programming, implementation in actual premises.*

Collection and data analysis

A great attention is paid to gathering files of real operation data, their classification and recording. A database of real measurements is created to serve for the analysis, verifying of models and new methods. Methodology elaboration of a test and experiment assignment is connected with it. Selective plans – regimes for reliability tests will be optimized.

Stochastic modelling of unreliable system activity

Stochastic models of unreliable device and system activity serve mainly for an estimation and verification of failure-free parameters and a new methodology creation for practical application. A great part of the paper deals with reliability research in semimarkovian systems of bulk service with applications in manufacturing systems and in transportation.

New technologies for monitoring and modelling device failure intensities are being developed, also with a use of a device of stochastic point processes and their regressive models (e.i. with factors affecting the intensity), and complex processes describing a gradual degradation of the system or an influence of stochastic shocks. Modelling and monitoring of device states with a use of Markov chains or marked point processes are parts of these reliability schemes. For the use of analysis, modelling and optimization itself, a Monte Carlo simulation technique is used, including algorithms solving bayesian problem formulation.

In the field of system analysis new trends in reliability research (algorithmization as well) of more general multi-state systems are systematically studied and applied, with a main interest in simulation approaches, which are also planned to be improved in the research. Procedure development for a calculation of reliability indicators of multi-state objects and for reliability object calculation with variable level of functionality is an activity result in these fields. Together with a solution of this issue CQR will aspire to implement new knowledge about reliability into industrial practice. It is currently very up-to-date in the Czech Republic, because an interest of industrial objects in reliability application is becoming greater on a "lower" solving level. Data capture, their evaluation and application to RRM processes (Risk and Reliability Management) and Asset Management belong to them. The research activity of the working place will not be focused only on special reliability methods but also on implementation of easier methods into common industrial practice.

The emphasis will be given on fuzzy models of quantities, systems, and processes with a dominant vagueness of quantitative and qualitative data, further on modelling, optimization, diagnostics and reliability of complex manufacturing and management systems by "crisp" method development (cross-industry standard process for data mining), methods of artificial intelligence and heuristics.

It is certain that new models will be verified on testing series of products from the practice.

Flaw detection

In material industry (dimensional glass production, plastic, rolled steel section, textile industry) flaw detection and its classification has substantial importance for the management of quality production. The elaboration of suitable methods for evaluation and quality controlling is a main aim of the research activity in the area of material engineering. Methods which support automatic visual quality inspection are preferred in the first place. The inspection is based on the processing analysis of digital picture which is of a main interest in recent years. Generally, this process contains two levels, the flaw detection and its classification into responsible category. The information about exact classification of the detected flaw is necessary for online controlling of manufacturing process.

Development and professional application of statistic methods into quality controlling in the manufacturing companies and in services

Development of methods DOE, FMEA, SPC and others is the preferred aim. From a methodological point of view it involves:
- Statistic regulation and eligibility assessment of those manufacturing processes which do not meet the needs of classic Shewhart 's diagram
- Comprehensive dynamic quality optimization with a use of substandard plans of experiments and conception of generalized loss functions
- An analysis of resources of processes unstability and with a use of multidimensional statistical methods
- Characterization of a variety (order of interactions) of processes and an analysis of nonlinear time series

Expected results

The main focus of the work is on the interaction between the research and development of mathematical - statistical methods and application in

industrial technologies. This research offers more general methods to a generation which enable potential producers of infallible products and systems to react promptly to demanding requirements of a customer regarding the quality and reliability.

Thanks to contractual partners - users of a result centre – it will be possible to establish a research on a constant flow of real data and current real problems from an industrial and company research. The quick interconnection of research results into a reality supplies a high effectivity of the research and development. The issue of complex systems of the quality in organizations will be solved on the working places as well as development processes will be solved from the point of assignment, method application and their subsequent improvement including interactions with other processes. In the scope of solving of system processes of organization management the issue of economic effectivity and analyses of partial processes within whole systems will be dealt with. Applied new technologies of statistic quality management will be results in at least 10 significant industrial entities in the Czech Republic and EU which will lead to savings, dynamic technological development increase and contributes to a maintainable development.

SAFETY AND RELIABILITY EVENTS

Theo Logtenberg
The Netherlands Society for Risk Analysis and Reliability (NVBR)

Last year activities (2005)

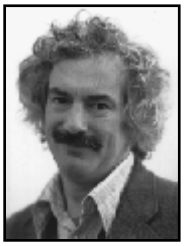
Below I give an over view of the activities of our society for Risk Analysis and Reliability in order to inform the ESRA members what our topics were the foregoing year. We organised as we usually do 5 evening meetings and the university day. The meetings were attended by some 20 to 40 members of in total 250 society members. The university day is one of the main meetings each year and was attended by 100 members.

The topics of the meetings were:

1. Learning of accidents
2. Safety of tunnels
3. Food safety, neither fish nor flesh
4. Financial risk management
5. Human factors
6. University day: decisions under uncertainty
7. All meetings are summarised in a yearbook that are society is issuing for its members.

Our special day the university day organised together with the Society for Risk Management was devoted to presentations and discussions regarding decisions under uncertainty. This aspect was presented by different speakers for several practical situations such as when to evacuate during a threat of flooding or storm and how to handle the aftermath of an accident, or how to decide in medical surgery in cases when the probability of recovery is questionable.

Part of the university day is the yearly presentation of awards by our society. The awards are presented in the categories: oeuvre, company, and study. The oeuvre award is presented to a person who has brought with studies and/or projects our profession to a higher level.



Prof. Dr. Roger Cooke of the Technical University of Delft was the winner of the oeuvre award this year, also for his magnificent work on expert opinions.

The company award is for a company that has incorporated new ideas with respect to risks or reliability in their production process. This year an award was presented to an army department which improved the process of security guidelines. The study award is presented to a student who according to the award committee has an outstanding thesis. Three pre-selected students have to defend their work for the participants of the university-day. A jury decides who will be the winner. This year the student award was for Marieke Habraken of the University of Eindhoven for her project “Improvement of accident reporting in hospitals”.

Send an e-mail to activiteiten@nvrb.nl for more information about the presentations or any other question related to our society.

Conclusions and recommendations form the 1st European Conference on Injury Prevention and Safety Promotion

Vienna, 25th-27th June, 2006

The conference highlighted available evidence as regards both the size, nature and impact of injury in Europe and the availability of simple and cost-effective solutions. The statistics confirm that the injury issue is still a large problem and burden for European society, but we have learned over the past decades that focused actions, such as have been taken over the past decades in relation to the area of traffic safety and work safety, can save many lives, public money and human suffering. Similar focused actions are needed in other priority areas. The policy initiatives taken by the European Commission and World Health Organization-Office of the European

Region, highlighting injury prevention as a major health priority for the coming years, provide a strong impetus for actions in view of reinforced safety promotion planning and actions within countries in Europe. Current available resources, infrastructures and networks, although fragmented and sparsely funded as they are, need to be realigned towards the common objective of creating a safer Europe. The public health sector needs to facilitate intersectoral exchange and collaboration by applying public health values and approaches and by strengthening systems through integration and network building. It needs to provide leadership by identifying priority issues to respond to and cost-effective good practices to address them and by facilitating joint national planning and action. This requires enhanced advocacy and communication efforts under the leadership of European bodies, including EuroSafe, and their partner organizations in the member states. The conference delegates identified a great number of actions to be developed with regards to the various specific areas of concern, such as injury data collection and reporting, sharing and dissemination of good practices, and specific safety themes, such as child safety, adolescent risk taking, interpersonal violence, consumer safety, and safety for seniors. These suggestions and recommendations for actions will be considered by the respective task forces and programmes within the EuroSafe organization, in partnership with EC and WHO-Euro. As regards the role of international organizations, such as EC, WHO and EuroSafe in supporting regional, national and local actions on injury prevention, the conference delegates recommends the following actions in particular:

1. Strategy and national planning
   a. Continue to have policy directions and priorities as defined by EC, WHO and EuroSafe, being in line with each other;
   b. Help governments to implement the commitments made in recommendations and resolutions (including the commitment to develop and implement national action plans) by providing guidance and support;
   c. Make countries' progress and bottlenecks transparent by requiring annual national progress reports, that provide the input for annual European progress reports;

2. Enhanced injury data and good practice information
   a. Work to have more up to date and more comprehensive injury data (including data on disabilities) available, that is specific enough as regards risk group and risk factors and encompasses all countries in the region;
   b. Ensure proper injury data clearance at European level and public assess to these data. Have a center for analysis and advocacy being established in each of the countries as well as a European level;
   c. Coordinate the access to and dissemination of good practices as well as the tools and intervention methods that are promising in prevention;
   d. Increase the knowledge of cost-effectiveness of cost efficiency of safety measures in order to allow resources to be allocated where the greatest gains can be achieved;
   e. Report regularly to stakeholders and media on injury risks identified through national injury reporting and European data exchange and on solutions that work, and incite them into actions related to these risks;

3. Development and research
   a. Promote joint explorative studies (mapping exercises) into areas of interest that are relative new for the injury field: try to define the role of public health in preventing violence or in preventing suicide and self harm;
   b. Improve the methodologies for identifying and recording good practices for safety practitioners; ensure a more consistent documentation and sharing of these good practices;
   c. Help to develop tool kits for practitioners in countries in view of assisting them in proper documentation of prevention measures, their selection, implementation and outcomes;
   d. Provide a forum of debate between researchers, practitioners and policy makers in view of aligning their research activities towards the common objectives with respect to creating a safer Europe.

4. Action and capacity building
   a. Promote coalition building efforts within countries by providing guidance to these processes based on previous experiences and good practices;
   b. Assists in national capacity building through the promotion of Teach-VIP and the introduction of training and mentoring programmes at national level;
   c. Facilitate the creation of European wide networks that are dedicated to one of the priority themes identified by EC and WHO and that serve roles analogous to EuroSafe's European Child Safety Alliance.

The conference delegates expressed their commitment to reinforce national and local actions in the framework of the strategies proposed by European Commission and the World Health Organization. They call upon EC and WHO as well as EuroSafe to provide joint leadership to the process at European level and to ensure proper facilitation and coordination to pan-European exchange and collaboration in view of injury prevention and safety promotion.

CALENDAR OF SAFETY AND RELIABILITY EVENTS

PSAM 8 - International Conference on Probabilistic Safety Assessment and Management

14th-19th May, 2006

New Orleans, Louisiana, USA

Conference Website:
http://www.psam8.org/index.html

OMAE 2006 – Safety and Reliability Symposium

4th-9th 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 are expected to be presented at the conference distributed in various symposia, one of which is:

- Safety and Reliability

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

10th-12nd 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

ICEFA-II - Second International Conference on Engineering Failure Analysis

13th -15th September, 2006

Toronto, Canada

Conference Website:
www.icefa.elsevier.com

The Second International Conference on Engineering Failure Analysis (ICEFA-II) will provide a forum for the presentation, advancement and dissemination of the latest research in all aspects of the analysis of engineering failures including:

- The analysis of engineering disasters, accidents and failures.
- Designing, manufacturing, operating and maintaining artifacts to avoid failure.
- Examples of technology transfer.
- The structure, properties and behavior of engineering materials involving detailed application of material parameters to problems in structures, components and design.

Papers are arranged within the following sessions: Railway and Automotive Failures; Environmentally-Assisted Failures; Weld Failures; Materials Testing to Avoid Failure; Risk Reduction and Forensic Analysis; Polymer Failures.

Keynote lectures will be given by:
- Karl-Heinz Schwalbe, GKSS Forschungszentrum, Germany
- Lawrence Eiselstein, Exponent Failure Analysis Associates, USA
- Bernard Ross, Exponent Failure Analysis Associates, USA
- Sam Brown, Quest Engineering Development Corporation, USA
- A F Grandt, Purdue University, USA

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ESREL 2006 – The European Safety and Reliability Conference

18th – 22nd 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
- Analytical Methods for System Safety and Reliability
- Dynamic Reliability
- Maintenance Modelling and Optimisation
- 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
- Consequence Modelling
- Risk Perception and Communication
- Information Systems for Safety and Reliability

Industrial & Service Sectors

- Aeronautics and Aerospace
- Chemical Process Industry
- Civil Engineering
- Energy Production and Distribution
- Environmental Engineering
- Food Industry
- Health and Medicine
- Information Technology and Telecommunications
- Insurance and Finance
- Manufacturing
- Natural Hazards (seismic, fire, flood, etc)
- Nuclear Engineering
- Offshore Oil and Gas
- Security and Protection
- Surface Transportation (road and train)
- Waterborne Transportation
- Waste Management

Conference Website:
http://www.esrel2006.com/

4th International Probabilistic Symposium

12 -13th October, 2006

Berlin, Germany

The series of probabilistic conferences for safety and risk, which originally started in Dresden with the 1 Dresdner Probabilistik Symposium, continues this year with the 4th Probabilistic Symposium on the 12 - 13 October 2006 in Berlin. The conference will take place at the BAM (Federal Institute for Material Research and Testing) in Berlin, Germany and will be organized by the BAM, the University of Natural Resources and Applied Life Sciences Vienna and the Maritime University of Szczecin, Poland.

Whereas the last conference in Vienna heavily focused on natural risks, this year the main topic will be uncertainty of material properties and material behavior. One day is scheduled for this topic.

In addition, on the second day the discussion of other topics of safety and risk, such as natural risks, technical risks and risk perception will be continued.

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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 Inst. 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 á l'Energie Atomique, France
- GRS, Germany
- VEIKI Inst. 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 Inst. 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
- Faculté de Polytechnique de Mons, France
- Henri Poincaré University, France
- ISI, France
- LAAS, France
- Université de Bordeaux, France
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- Technische Universität Muenchen, Germany
- Technische Universität Wuppertal, Germany
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- DICMA, Italy
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- Universita Degli Studi di Pavia, Italy
- Universita Degli Studi di Pisa, Italy
- Technical University of Delft, The Netherlands
- NTNU, Norway
- University of Stavanger, Norway
- Gdansk University, Poland
- Gdynia Maritime Academy, Poland
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1.5 Associate Members

- Nuclear Consultants International, South Africa
- Fulminese Federal University, Brazil
- Universidad Central de Venezuela, Venezuela

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3 Management Board

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.

3.1 Conference Standing Committee

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.

3.2 Publications Standing Committee

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.

4 Technical Committees Technological Sectors

4.1.1 Offshore Safety

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4.1.8 Uncertainty and Sensitivity Analysis

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4.1.9 Human Factors

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4.1.10 Stochastic Modeling and Simulation Techniques

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4.1.12 Safety Management

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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.
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