



# European Safety and Reliability Association

# Newsletter

<http://www.esrahomepage.org>

June 2011

## Editorial



**Enrico Zio**  
*ESRA Chairman*  
*Politecnico di Milano, Italy*  
*Ecole Centrale Paris,*  
*Supelec*

I am pleased to confirm that the organization of the ESREL 2011 Conference is continuing with promise, in terms of number and quality of the papers and participants. Meanwhile, work is well underway with respect to PSAM 11-ESREL 2012, the conference that ESRA is organizing jointly with IAPSAM in Helsinki following the successful tradition of Crete 1996 and Berlin 2004. In this newsletter, you will find short updates on the status of these Conferences.

Also, the request for proposals of activities to be co-financed by ESRA was successful, as we evaluated positively 5 requests by “old and new” friends. A small synthesis is included in this newsletter, with the hope to stimulate your interest and participation for the selected activities and for future proposals by you.

Finally, I close this short message by noting that in the previous Newsletter I opened by saying:

“In today’s World characterized by fast-paced, fast-changing, multidisciplinary technical, financial and economical challenges it is an ethical duty for an Association like ESRA to play a reference and steering role.”

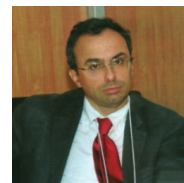
Since then, we indeed have witnessed the “fast dynamics” of our “Society of Risk”: the events of Japan have again changed the scenario for Natural and Technological Risks and posed renewed

challenges to the methods of assessment and the procedures of response to large-scale events. This gives additional motivation to our professional work and ethical mission of providing improved methods, procedures and standards for safety.

Enrico Zio  
Chairman of ESRA

## Feature Articles

### Risk Communication: An Essential Tool in Public Health Practice



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#### Introduction

During the past century, global health has changed profoundly. Life expectancy increased more than 30 years in more developed countries and elders have become an increasingly prevalent age-group. Mid-20<sup>th</sup> century witnessed the so-called epidemiologic transition, due to the control of infectious diseases and to the emergence of life-style related diseases and conditions.

The global pattern of ill-health has evolved, typically, in three stages: first generation diseases, related to “pestilence and famine” (maternal and childhood risks and nutritional deficiencies); second generation diseases (transitional diseases), associated to life-style health determinants such as nutrition, physical

activity and tobacco and alcohol use; third generation diseases related to stress and urbanization (violence, drug abuse and psychosocial illness) <sup>1</sup>. Developing countries are facing a double or even triple burden of disease <sup>2</sup> because of the co-existence of these diseases.

In spite of prevention and control of infectious diseases' effectiveness, due mainly to the improvement of living conditions and, additionally, to vaccines and antimicrobials, these diseases still represent a major challenge to public health services and to the public health itself.

Individual susceptibility (elders and immunocompromised patients), antimicrobial resistances, novel microbial agents (eg. SARS-coronavirus, avian influenza H5N1, pandemic influenza H1N1, etc) and bioterrorism are some of the factors responsible for the reemergence of infectious diseases. Intentional infectious outbreaks such as USA anthrax attacks (Sept 2001) raised the need for first responders' training and preparedness concerning bioterrorism.

Communicable diseases' prevention and control comprise pharmacologic and behavioral strategies. The latter include non-specific measures such as hand washing and respiratory etiquette and social distancing (self-imposed quarantine and isolation) during community outbreaks. H1N1 influenza pandemic has highlighted risk communication and rumor management as "critical control points" during major public health events.

On the other hand, chronic diseases are the major cause of death and disability worldwide <sup>3</sup>. These long-term diseases account for almost 60% of global deaths and half of global burden of disease<sup>3</sup>. They emerge in middle age and are, therefore, associated to ageing and to life-style determinants such as diet, physical activity and tobacco use (self-created risks).

In spite of presenting a high degree of preventability, chronic diseases are characterized by low cure rates <sup>2</sup>. The effectiveness of treatment (clinical outcome) critically depends on the adherence to health care guidance (therapeutics and self-management).

### **Risk Communication and Public Health**

Risk communication is an interactive exchange of information among individuals, groups and institutions regarding risks <sup>4</sup>. Its main goal is to empower stakeholders concerning actual or potential events including, whenever available or effective, the dissemination of risk reduction measures.

Risk communication integrates objective (science-based) and subjective (values, fears, perceptions, etc) information within a two-way process: risk communicator/target audience (primary flow of information) and target audience/risk communicator (feedback information).

Crisis and emergency risk communication comprises two dimensions: crisis communication (urgent

information release aiming to restore trust and credibility of the impacted organization) and risk communication (empowering information).

An example of crisis risk communication is related to the early management of an outbreak (eg. secondary to the isolation of the etiologic agent). Risk communication is suitable not only for the public health management of infectious diseases, but also for the control of non-communicable diseases related to life-styles (eg. tobacco-attributable diseases).

The significance of health communication relates to the fact that most adverse health events are preventable through the adoption of appropriate health behaviors (risk reduction behaviors). The prevention of domestic accidents during childhood by ensuring home safety (communication of "safety tips" to parents and care-takers) and the prevention of STI by promoting the use of condoms during active sex life (individual counseling or public campaigns) exemplify health and risk communication's health promotion potential.

Concerning chronic diseases, an effective communication between health care workers (namely doctors) and patients is essential to ensure the effectiveness of the therapeutic plan. Clinical trials warrant the (experimental) efficacy of the drug but patient's adherence to the medical guidance (pharmacological and non-pharmacological) ensures the effectiveness of the treatment (clinical outcome optimization).

The Regional Health Administration (RHA) of Central Portugal established, in April 2009, the Health Information and Communication Unit. This strategic communication structure, answerable to the Management Board of the RHA, is coordinated, at an operational level, by a public health doctor. It was established, as planned, within the regional pandemic preparedness and response.

Communication's efficacy is not synonymous to communication's effectiveness: the former is related to the risk message conveying and the latter to its behavioral outcome (intended change). Behavioral surveillance aims to assess risk perception and public's adherence to health recommendations <sup>5</sup> by collecting and analyzing "feedback" information.

### **Conclusions**

Public health is facing new health challenges due to the globalization of health risks. Most of the diseases and conditions are behaviorally determined and, simultaneously, information and communication technologies' access is widespread.

As chronic diseases and even acute infectious diseases prevention and control are behavior-sensitive and 21<sup>st</sup> society knowledge-based, risk communication is an essential public health tool in long term (chronic diseases) and short term (infectious outbreaks).

Doctors, the most respected and trusted health care professionals<sup>6</sup>, are ethically bound to the role of health educators. Communication must be faced, once and for all, as a primordial health resource, to be prescribed by MD (individual communication by clinicians and community communication by public health doctors) like a “regular” prescription.

Risk communication is a core competence of public health practitioners, enabling them to more effectively manage health risks and to promote community health. National health systems must ensure this capacity, strategically and within their workforce – the latter at an individual level (health care providers/”immediate care”) and at a community level (public health practitioners/”mediate care”).

*“At the turn of the twenty-first century, communication is an integral element of public health practice, promotion and preparedness. Over the years the arena of health communications has evolved into a powerful set of tools for reaching policy makers, politicians, and the public with messages that impact quality of life. [...] A significant proportion of the world’s disease burden is related to behavioral practices that can be influenced through communication.”*

*Haider & Rogers, 2005*

*In Haider M., Editor. Global public health communication: challenges, perspectives and strategies. Boston: Jones and Bartlett Publishers; 2005*

## References

1. Chen LC. World population and health. In: Institute of Medicine, editor. 2020 Vision: Health in the 21<sup>st</sup> century. New York: National Academies Press; 1996.
2. Yack D, Hawkes C, Epping-Jordan JE, Steyn K. Chronic diseases and risk. In: Merson MH, Black RE, Mills AJ, editors. International Public Health: diseases, programs, systems and policies. Boston: Jones and Bartlett Publisher; 2006.
3. WHO. Facts related to chronic diseases [Internet]. [cited 2010 Nov 23] Available from: <http://www.who.int/dietphysicalactivity/publications/facts/chronic/en/>.
4. National Research Council. Improving risk communication. Washington DC: National Academy Press, 1989.
5. Ekdahl K, Duncan B, Steffens I. New health communication unit in ECDC. Eurosurveillance [Internet]. 2007 [cited 2010 Nov 23]; 12(21):pii=3201. Available from: <http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=3201>. Date of submit.
6. Nicholson PJ. Communicating health risk. Occup. Med. 1999; 49 (4): 253-256.

## Availability management of advanced professional systems based on system traces



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Advanced professional systems are products that are used in the core processes of businesses. Examples of such products are medical systems, manufacturing or assembly machinery, baggage handling systems in airports, professional printers etc. These systems are *capital producing*. They play an integral role in the productivity of businesses by affecting the output of consumer goods or services. The interruption of normal operation of these systems, planned or unplanned, can have serious effects not only on the health of the businesses but to wider groups of society.

Recently an unexpected shutdown of a Canadian nuclear reactor (Chalk River, Ontario) that coincided with the scheduled maintenance of the Petten nuclear reactor in the Netherlands caused a worldwide shortage of medical isotopes. In a different example, system fault of the baggage system of a new terminal in Heathrow airport caused thousands of bags being stranded and flights being cancelled and delayed.

To achieve high availability of these systems, original equipment manufacturers and system owners rely on two levers: system design and maintenance. System design is enhanced by the use of redundancy of critical components. Designs are backed by preventive maintenance policies during operational life, to provide a defence against the costly downtimes of unpredicted failures. The basic principle of preventive policies is the replacement of components for which failure is eminent. To facilitate the decision making of replacement and the efficiency of preventive maintenance policies, awareness on the state of components is required. Condition based monitoring techniques, such as the measurement of vibrations, noise or temperature, provide the necessary insight to the component's state to support replacement decisions.

The digital revolution brought by computer and information technology in the last 30 years had its impact on the design of capital goods. Most professional systems are now computer based. Software applications are to great extent responsible for providing the system's functionality. Embedded software is controlling the operation of hardware components, and software abstraction layers are establishing the communication between hardware

components and software applications. Besides that a new design characteristic, *resilience*, has been introduced to the system's design. Resilience refers to the system's ability to return to fully operational state or to reduce the loss of functionality in the event of failure. Systems operating in critical environments such as healthcare are required to become more resilient to failures.

Although the design of professional systems has changed, the two levers for effective availability management remain the same and decision making still relies on acquiring insight into the components' states. But the methods used to achieve that insight have changed drastically. Traditional condition based monitoring techniques are not suitable for digital components. Computer technology came with the ability to monitor and record the state of digital components during system operation. System *traces* is a computer generated data form that contains semantic information on the states of digital components. Each record is time stamped and together they form an ordered sequence of recordings that represents the states of multiple digital components over long periods of operating time.

Traces can provide information on the failures of digital components and the recovery operations of the system. The analysis of traces can reveal availability bottlenecks due to either frequent component failures or insufficient system resilience. Both are valuable input for the effective availability management of advanced professional systems.

However, traces in their raw format are not ready to be used as input for analytical tools. Traces usually contain noise and consist of a variety of semantic information. Single physical events, such as failures and recoveries, can be represented by multiple data instances, and recorded as various components in the system experience the same event. To apply analytical tools, traces are cleared from irrelevant recordings and transformed in such a way that single physical events can be clearly identified.

A methodology is proposed that consists of two phases, *preprocessing* and *transformation*. During preprocessing the raw traces undergo cleansing where irrelevant and noisy entries are removed. The detection of noise in traces is done with the use an efficient algorithm that is searching for "unwanted" data structures. Preprocessing is completed with the removal of these structures without disturbing the remaining data entries. During the transformation phase, first the data entries are clustered to formations that represent single physical event *instances*. In the second step of transformation, clusters are compared and matched to form groups of physical event *types*. Both steps are completed without compromising the semantic content of traces. The transformation achieves two objectives:

- a) physical events can now be identified in the traces by point representations

- b) point representations refer to event types rather than event instances increasing the informative density of the trace

Once the transformation is complete, analysis can begin. Analytical tools can now make use of the point representations and the semantic content of those representations. This is the first end-to-end methodology that focuses on taking raw traces and making them fit for analysis. The methodology relies on the behavioral characteristics of the modular designs of professional systems and the sequential nature of traces. It is a generic methodology, allowing it to be implemented on a wide range of systems. Similar solutions so far have been relying on system specific knowledge to extract information from traces. Another advantage of this methodology is that it allows the processing of the data as they are being generated, making it a close to real-time approach.

An application based on the proposed methodology would allow the monitoring of fleets of geographically distributed systems in close to real-time manner. For availability management such an application would provide the information necessary to support the decision making processes on operational and tactical level.

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## PhD Degrees Completed

### Monte Carlo Simulation in the Marine Environment



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When continued operation and function of a ship's systems are required, unforeseen system failure or



breakdown can often have disastrous and costly consequences. Ship owners and operators require ships to be operating at full capacity as often as possible in order to remain profitable. This places the ship's engineering department under pressure to plan maintenance schedules which optimise reliability and minimise downtime. The industry as a whole has been slow to respond to the need for better maintenance planning, often relying on manufacturer's recommendations for the setting of service intervals and the replacement of parts.

Monte Carlo Methods have proved to be a powerful tool in the nuclear sector and for around three decades remained exclusive to that industry. In recent years researchers have realized the vast potential and flexibility contained in the methodology and its possible application in other fields. One of the problems which is inherent to Monte Carlo Methods is the handling of rare events. Often to remain statistically significant, variance reduction techniques need to be implemented.

One of the principal methods is the use of forced simulation. In the marine industry, due to the high levels of salinity, this problem of rare events becomes less significant. It is also the case that often the process mediums used are of a much lower quality than in other industries. This all contributes to the failure probabilities being much higher, negating the need for any forced simulation.

The majority of current reliability and maintenance practice is based on mean time to first failure, or mean time between failures. Delay-time modelling is a concept which has been developed to be relevant in the operating culture of today's industry. Delay-time analysis provides engineers with a tool which can help to minimise downtime of a machine or plant item, based on an inspection period. Classical delay-time analysis is mathematically arduous and takes time, however the benefits of implementing the technique are well proven and recognised.

Monte Carlo Methods lend themselves well to delay-time techniques and could offer an automated analysis tool which requires very little user input. The availability of such a tool to marine engineers would allow for better inspection and maintenance scheduling based on minimising downtime.

This research work is evidence of the implementation of Monte Carlo Methods in the creation of a simulation based maintenance methodology in the marine environment. The Monte Carlo Methods have been used to provide a measure of the unreliability of a complex marine cooling system. The unreliability measure has been used to perform a delay-time analysis using Monte Carlo Methods to suggest an inspection regime based on minimising downtime. The complex Monte Carlo Method has been extended to give an indicator as to the optimum staff level based on system downtime and a staff cost.

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## News from ESRA Chapters

### Levee Safety in the United States compared to the Netherlands



**Alex Roos**  
*Senior Advisor on Levee Safety,  
US Army Corps of Engineers &  
Dutch Rijkswaterstaat (RWS)  
The Netherlands*

The Dutch Rijkswaterstaat (RWS, Government Agency responsible for maintenance of main Road & Water Network in the Netherlands) and the U.S. Army Corps of Engineers (USACE) have cooperated within a Memorandum of Agreement since 2004. After Hurricane Katrina struck New Orleans in 2005, the cooperation has intensified. It has been especially specific and fruitful within the field of Levee Safety.

In the Netherlands, the safety of all the primary flood defences is assessed every six years. The result of these assessments is reported to Parliament, and levees that don't satisfy the safety standard are strengthened. Also studies are performed to prepare a risk based approach, like the project FLORIS in which the current probability of flooding and the associated consequences are calculated. Also a policy study for adopting new safety standards is executed based on loss of life calculations and cost benefit analysis. In the U.S. the USACE established a Levee Safety Program. Within this program, the safety of the levees is assessed with the LST, the Levee Screening Tool. This will cover the entire portfolio of USACE owned and operated levees of 15,000 miles, and will prioritize further assessment of the levees associated with the highest risk. For this further assessment a more detailed, risk based method will be used.

Since 2010 the cooperation between RWS and the USACE has progressed into a new phase with the implementation of a staff exchange program. Alex Roos, working with the Water Management Centre of RWS has moved to the U.S. to work for the Risk Management Center for 16 months. During this time, knowledge and experiences from the Netherlands can help the development of tools and procedures in the US, and vice versa.

Interesting lessons so far are that both countries are moving toward a risk-based approach, and that both are experiencing problems assessing the safety of larger levee systems. The use of a national database in the US has proven to offer considerable possibilities,

but in the Netherlands a national database has not been established. A learning experience of a different scale is the use of new media during the recent flood fights along the Mississippi river. The USACE has informed the public and other agencies using twitter, facebook and websites. These media were also used to interact with the public.

Finally, the experiences with the use of the Morganza Floodway and the New Madrid floodway (by blowing up a 2 mile long levee section with explosives) in the lower Mississippi tributaries are interesting for the Netherlands. The idea of using less populated areas as sacrificial flooding area to reduce the risk downstream has been studied early this century. In the Mississippi case, the use of these floodways has prevented damages in the cities of Baton Rouge and New Orleans.

The staff exchange program between RWS and USACE will continue with a USACE employee working with Rijkswaterstaat for a year starting in the summer of 2011. The exchange of experiences with using risk based approaches will continue...

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## Safety and Reliability Events

### **Continuing education course: “Advanced methods for reliability, availability, maintainability, diagnostics and prognostics of industrial equipment”**

*Piero Baraldi*

Since 1998, Politecnico di Milano has been organizing a professional one week training course on advanced methods for reliability, availability, maintainability, diagnostics and prognostics of industrial equipment. The goal of the course is to provide participants with the methodological competences and the computational tools necessary to tackle critical problems in the areas of reliability, availability, maintainability, diagnostics and prognostics. To this purpose, the course presents proven methods to improve safety, increase efficiency, manage equipment aging and obsolescence, automate maintenance and reduce maintenance costs of industrial systems. Since the beginning, the course has been officially supported by ESRA and since 2005 an official scholarship has been offered; the last recipient in 2010 has been a young Chinese researcher of Beihang University.

The first part of the course is devoted to the presentation of advanced methods for the availability, reliability and maintainability analysis of complex

systems and for the development of Prognostics and Health Management (PHM) and Condition Based Maintenance (CBM) approaches. In this respect, the basics of Monte Carlo Simulation, nonlinear regression and filter models (Artificial Neural Networks, Principal Component Analysis, Auto Associative Kernel Regression, Ensemble Systems) and evolutionary optimization methods (Genetic Algorithms) is illustrated. In the second part of the course, exercise sessions on Monte Carlo simulation, Artificial Neural Networks and Genetic Algorithms provide the participants with the opportunity of directly applying the methods to practical case studies. Finally, in the last part of the course, real applications of the advanced methods are illustrated. The applications range from the evaluation of maintenance costs taking into account the reliability and availability of equipment, to the application of Monte Carlo Simulation for availability analysis and condition-based maintenance management and of regression and classification techniques to fault detection, classification and prognosis in complex industrial plants.

This year the course will be held between September 26 and 29 at the Energy Department of the Politecnico di Milano, Italy. For further information and registration you can send an email to [piero.baraldi@polimi.it](mailto:piero.baraldi@polimi.it).

### **The 40<sup>th</sup> Winter School of Reliability 2012: “Technical systems’ and processes’ dependability” 8-14 Jan., 2012 in Szczyrk, Poland**

*Sylwia Werbinska*

This year the conference focuses on summary of the complex technical systems’ reliability engineering theory development. The Conference is addressed to universities and research institutes, to scientists, industry and transport employees, government and municipal authorities, safety and reliability consultants and other persons interested in the Conference topics.

The Congress offered 5 working days. Conference organizers expect new research area development connected with e.g. modeling or designing of existing systems and processes in the aspect of their safety and reliability requirements. The main future research directions may be connected with:

- effectiveness analysis of systems with partial failure occurrence,
- survivability or vulnerability modeling,
- security issues designing,
- software reliability development.

Papers are to be presented at Plenary Sessions. The deadline for submission of full-length papers and abstracts is 3<sup>rd</sup> October 2011. The Conference language is Polish.

The Congress Place of Winter School of Reliability –Szczzyrk is a town in the Beskid Śląski mountains of southern Poland, situated in the valley of the Zylica river. It is a part of the Silesian Voivodeship.

The town is a popular winter sports centre, with over 60 km of ski routes served by 30 ski lifts. The two mountain ranges that surround the valley are dominated by the peaks of Skrzyczne (1,257m) and Klimczok (1,117m), both of significant interest to tourists. There are commanding views from either peak. Moreover, either peak is accessible to most people, in one day's hike, via the tourist routes marked on any tourist map available in most kiosks or mountain shelters.

All necessary information about this event can be found on the Conference website at: [www.it.pw.edu.pl/szkolazimowa2012](http://www.it.pw.edu.pl/szkolazimowa2012)

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## Safety and Reliability Publications

### Misconceptions of risk

*Terje Aven*

Professor Terje Aven has recently published his book *Misconceptions of Risk*. The book reviews common perspectives related to the risk concept, risk assessments, uncertainty analyses, risk perception, the precautionary principle, risk management and decision making under uncertainty. The Author discusses these perspectives, their strengths and weaknesses, and concludes that they are often best judged as misconceptions of risk. The book is relevant for different types of applications, including engineering and business. It is available from Wiley. For further information see,

<http://www.wiley.com/WileyCDA/WileyTitle/productCd-0470683880.html>

ISBN: 978-0-470-68388-0  
Hardcover, 248 pages  
January 2010

### Risk management and Risk governance: Concepts, Guidelines and Applications

*Terje Aven and Ortwin Renn*

No single discipline can grasp the full meaning of risk. Investigating risk requires a multidisciplinary

approach. The authors, coming from two very different disciplinary traditions, meet this challenge by building bridges between the engineering, the statistical and the social science perspectives. The book provides a comprehensive, accessible and concise guide to risk assessment, management and governance.

It includes formal approaches to risk analysis without assuming a high level of mathematical proficiency but it also offers reflection and deliberation about the socio-political context in which risk issues are embedded. A basic pillar for the book is the risk governance framework proposed by the International Risk Governance Council (IRGC).

This framework offers a comprehensive means of integrating risk identification, assessment, management and communication. The authors develop and explain new insights and add substance to the various elements of the framework. The theoretical analysis is illustrated by several examples from different areas of applications. The book is available from Springer. For further information see,

<http://www.springer.com/economics/r+%26+d/book/978-3-642-13925-3>

2010, 270 p.

Hardcover, ISBN 978-3-642-13925-3

### Quantitative risk assessment: The scientific platform

*Terje Aven*

This book builds a framework for analysing and discussing the quality of the risk assessments using the scientific requirements of reliability and validity. The reliability requirement is concerned with the consistency of the “measuring instrument” (analysts, experts, methods, procedures), whereas validity is concerned with the assessment’s success at “measuring” what one set out to “measure”.

The quality of a risk assessment relates to the scientific building blocks of the assessment but also to the role of the assessment in the decision-making process. The book is general and relevant for all types of applications, but safety engineering has the main focus. It is available from Cambridge University Press. For further information see,

[http://www.cambridge.org/no/knowledge/isbn/item5960732/?site\\_locale=no\\_NO](http://www.cambridge.org/no/knowledge/isbn/item5960732/?site_locale=no_NO)

ISBN: 9780521760577, Publication date: March 2011, 224 pages

## Applied Nonparametric Statistics in Reliability

*Gámiz, M.L., Kulasekera, K.B., Limnios, N., Lindqvist, B.H.*

Nonparametric statistics has probably become the leading methodology for researchers performing data analysis. It is nevertheless true that, whereas these methods have already proved highly effective in other applied areas of knowledge such as biostatistics or social sciences, nonparametric analyses in reliability currently form an interesting area of study that has not yet been fully explored.

*Applied Nonparametric Statistics in Reliability* is focused on the use of modern statistical methods for the estimation of dependability measures of reliability systems that operate under different conditions. The scope of the book includes:

- smooth estimation of the reliability function and hazard rate of non-repairable systems;
- study of stochastic processes for modelling the time evolution of systems when imperfect repairs are performed;
- nonparametric analysis of discrete and continuous time semi-Markov processes;
- isotonic regression analysis of the structure function of a reliability system, and
- lifetime regression analysis.

Besides the explanation of the mathematical background, several numerical computations or simulations are presented as illustrative examples. The corresponding computer-based methods have been implemented using R and MATLAB®. A concrete modelling scheme is chosen for each practical situation and, in consequence, a nonparametric inference procedure is conducted.

*Applied Nonparametric Statistics in Reliability* will serve the practical needs of scientists (statisticians and engineers) working on applied reliability subjects.

Series: Springer Series in Reliability Engineering

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## ESRA News

### ESRA Officers Meeting 28<sup>th</sup> October, 2010

*Pieter van Gelder, ESRA General Secretary*

At the ESRA officers meeting of October 28th 2010, a decision was made to fix for 2011 a budget of

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15,000 Euro for support of initiatives by TCs, National Chapters and individual members related to organization of workshops, courses and other activities in the field of safety and reliability.

A call for proposals was launched, where the ESRA officers invited members for the submission of a one-page description of the initiative for which financial support was requested.

The requests submitted were evaluated by the ESRA Officers and evaluation was made on the basis of the fitness of the initiative with the objectives of ESRA and the expected impact in their achievement.

The ESRA received excellent proposals and the following 5 proposals were accepted:

- To support the Workshop “Digital Technologies” (DT) at the University of Zilina in Slovakia. One of principal topics of the workshop is “Reliability analysis and risk estimation”.
- To support a professional one-week training course entitled ‘Advanced methods for reliability, availability, maintenance, diagnostics and prognostics of industrial equipment (XIV edition)’ to be held in September 2011 during 4 days at the Energy Department, Politecnico di Milano, Milan, Italy.
- To support the participation of experts to a Norwegian workshop to explore proactive indicators of risks and resilience in exploration and operation of oil and gas installations.
- To support the 9th International Probabilistic Workshop (9. IPW) to be held at the Technische Universität Braunschweig from 17 to 18 November 2011.
- To support the 5th Jubilee Summer Safety & Reliability seminar, from 3-9 July 2011, in Sopot, Poland.

The ESRA Officers were very pleased with the submitted proposals and a new call for proposals for 2012 is planned at the end of this year.

## New ESRA Members

*Pieter van Gelder, ESRA General Secretary*

ESRA welcomed 5 new members in the first quarter of 2011:

- Facultad de Ingenieria Universidad Central de Venezuela, Caracas, Venezuela
- Paul Scherrer Institut, Switzerland
- INERIS, France
- Pontificia Universidade Catolica, Brazil
- Private membership of Dr Chen En Wu from Taiwan



ESRA is an association made of people: that is why we value the membership so highly. The ESRA hopes to continue offering the services that members need, at the level of quality which members may expect.

ESRA is continuously looking for attracting new members from universities and research organizations, associations, companies and professional organizations, who are interested in sharing their experience and competence with and within our community.

For this reason, we ask you to take the initiative of looking for potential new members.

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## Calendar of Safety and Reliability Events

### Structures, Safety and Reliability Symposium at OMAE 2011 Rotterdam, 19-24 June 2011

The Structures, Safety and Reliability Symposium of the 30th International Conference on Ocean, Offshore and Arctic Engineering (OMAE 2011) will be held at the World Trade Center in Rotterdam, The Netherlands. Europe's largest port is in Rotterdam and it is base for a large number of world renowned offshore companies.

The theme of this Conference is 'The Offshore Experience'.

Visit the Conference website at the following address [www.asmeconferences.org/omae2011](http://www.asmeconferences.org/omae2011) to find out more, or contact the Symposium Coordinator, Carlos Guedes Soares, at [guedess@mar.ist.utl.pt](mailto:guedess@mar.ist.utl.pt).

### ESREL 2011 European Safety and Reliability Conference Troyes, 18-22 September 2011

Safety, reliability and risk management become more and more important in an always more challenging and competitive environment, in every industry and human activity: multidisciplinary approaches to safety & reliability engineering and risk management become more and more necessary and attractive. ESREL 2011 conference will provide a forum for presentation and discussion of scientific works covering theories and methods in the field of risk, safety and reliability, and their application to a wide range of industrial, civil and social sectors and problem areas. ESREL 2011 will also be an opportunity for researchers and practitioners,

academics and engineers to meet, exchange ideas and gain insight from each other.

#### Important Dates:

Submission of Abstracts: 15 January 2011

Submission of full-length paper: 31 March 2011

Website: [www.esrel2011.com](http://www.esrel2011.com)

### RISK 2011 NATO Risk-Based Planning Conference Salisbury, UK, 3-5 October 2011

Defence planning is posed with many risks which are multifaceted in nature (e.g., perception, communication, impact) emerging from the increasing complexity of the security environment driven by the global pace of change, the need for transparency; and interdependencies within and between nations and organisations.

Risk-based planning is not unique to defence. This NATO SAS Task Group wants to explore and utilise this broader (non-defence) source of knowledge to identify and adapt developments in risk-based planning for use in defence departments, and risk analysis in general.

The purpose of the conference is to present current and ongoing efforts in risk-based planning (including relevant research for non-defense organisations) to address some of these questions, in order for them to be applied to the enterprise, service and operational levels within defence, security, and related organisations.

#### Important Dates:

- |              |                                                     |
|--------------|-----------------------------------------------------|
| 22 Jul 2011  | Notification of paper/abstract acceptance/rejection |
| 23 Sept 2011 | Submission of final manuscript for accepted papers  |
| 14 Nov 2011  | Submission of final chapter contributions for book  |

Website: [www.mar.ist.utl.pt/risk2011](http://www.mar.ist.utl.pt/risk2011)

### 9<sup>th</sup> International Probabilistic Workshop 17-18 November 2011

**Organization:** Technische Universität Braunschweig, Germany & University of Natural Resources and Applied Life Sciences, Vienna, Department of Civil Engineering and Natural Hazards

#### Submission:

Abstracts: 1 May 2011

Full papers: 19 August 2011

**Conference location:** Technische Universität Braunschweig, Germany

**Audience:** The conference is intended for civil and structural engineers and other professionals concerned with structures, systems or facilities that require the assessment of safety, risk and reliability. Participants could therefore be consultants, contractors, suppliers, owners, operators, insurance experts, authorities and those involved in research and teaching.

**Further information from Conference Chairmen:**  
Prof. Harald Budelmann ([h.budelmann@tu-bs.de](mailto:h.budelmann@tu-bs.de))  
and  
Dr. Dirk Proske ([dirk.proske@boku.ac.at](mailto:dirk.proske@boku.ac.at))

## **ESREL 2012- PSAM 11 European Safety and Reliability Conference International Probabilistic Safety Assessment and Management Conference Helsinki, Finland, 25-29 June 2012**

ESREL 2012 & PSAM 11 will be the major international event in the safety, reliability and risk fields in 2012. The Conference brings together experts from various industries, research organisations, regulatory authorities and universities. It offers a platform for contacts between different fields from nuclear, process and chemical industries, offshore and marine, space and aviation, IT and telecommunications, bio and medical technology, civil engineering and financial management. The multi-disciplinary Conference is aimed to ensure the cross-fertilization of methods, technologies and ideas.

The program will be a blend of ESREL - PSAM traditions and *Nordic Footprints* in the safety, reliability and risk areas.

### **Important Dates:**

Submission of full-length papers: 30 January 2012  
Abstracts: 31 July 2011

**Website:** [www.psam11.org](http://www.psam11.org)

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## **ESRA Information**

### **1 ESRA Membership**

#### **1.1 National Chapters**

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

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### **1.2 Professional Associations**

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

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- ARC Seibersdorf Research GmbH, Austria
- TAMROCK Voest Alpine, Austria
- IDA Kobenhavn, Denmark
- VTT Industrial Systems, Finland
- Bureau Veritas, France
- INRS, France
- Total, France
- Commissariat à l'Energie Atomique, France
- Eurocopter Deutschland GmbH, Germany
- GRS, Germany
- SICURO, Greece
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- Segretario generale CNIM, Italy
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- PRIO, Norway
- SINTEF Industrial Management, Norway
- Central Mining Institute, Poland
- Adubos de Portugal, Portugal
- Transgás - Gás Natural, Portugal
- Cia. Portuguesa de Produção Electrica, Portugal
- Siemens SA Power, Portugal
- Caminhos de Ferro Portugueses, Portugal
- ESM Res. Inst. Safety & Human Factors, Spain
- IDEKO Technology Centre, Spain
- TECNUN, Spain
- TEKNIKER, Spain
- TNO Defence Research, The Netherlands
- BP International, UK
- HSE - Health & Safety Executive, UK
- Railway Safety, UK
- W.S. Atkins, UK

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- University of Innsbruck, Austria
- University of Natural Resources & Applied Life Sciences, Austria
- Université Libre de Bruxelles, Belgium
- University of Mining and Geology, Bulgaria
- Czech Technical University in Prague, Czech Republic
- Technical University of Ostrava, Czech Republic
- Technical University of Liberec, Czech Republic
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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.

## 4 Standing Committees

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The aim of this committee is to establish 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.

### 4.2 Publications Standing Committee

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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**,  
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