European Safety and Reliability Association

Newsletter

http://www.esrahomepage.org

September 2011

Editorial

Enrico Zio
ESRA Chairman
Politecnico di Milano, Italy
École Centrale Paris,
Supelec, France

Dear ESRA Member,

I am pleased to open this issue by talking about our ESREL Conferences, one major activity of our association. I do it because I am still excited about the recent meeting at our ESREL 2011 Conference in Troyes, France. In a later issue you will read on some key facts and numbers about the Conference but I want to express my gratitude to all of you for your contribution at a successful event, rich of technical content and blessed by a very enjoyable ambience and a "community-feeling" environment. Along these lines, the Technical Committee and National Chapter Chairs joined the Officers in a business dinner during which ideas emerged, proposals were discussed and plans for future activities where laid down. Also, a meeting was held among the ESRA and ESREDA Officers to further discuss opportunities of joint initiatives: the result has been an agreed motivation for concretely carrying out work together, starting from a workshop associated to the ESREL Conferences and an yearly seminar (in addition to the existing two ESREDA seminars, also to which ESREL has been invited to participate from conception).

While we are still recovering from the intense days (and nights) of Champagne region, we are already preparing for the next time, ESREL 2012/PSAM 11 in Helsinki, which looks very promising as you can see from the brief report in this issue. And we are also projecting our imagination into the future, to ESREL 2013 in Amsterdam.

Finally, I am pleased to confirm the status of recognition of our Association as witnessed by the frequent contacts received by other Associations for joint initiatives and the request to increase our technical participation in, and contribution to the development of the European Technology Platform on Industrial Safety (ETPIS).

Enrico Zio
Chairman of ESRA

Feature Articles

Dependability, Risk and Trust

Massimo Felici
University of Edinburgh
EdinburghEH8 9AB
United Kingdom

Technologies, in particular, computer systems, involve an extent of *risk*, regardless our *knowledge* or *trust* in them. Any time we use, rely or *depend* on technologies we take risks. To be notice it is that the increasing dependence on software (generally, on

diverse system parts) stimulates interest in gaining confidence in system properties, in particular, in *dependability* [3]. Unfortunately, technical arguments for system dependability often fail to address completely subtle socio-technical complexities and contingencies [6]. That is, the (assessment of the) risk associated with socio-technical systems faces *knowledge uncertainty*. Therefore, it is important to understand how trust in technology mediates risk in presence of knowledge uncertainty (with respect to technology and its properties).

Technology and its uncertainty expose people and organizations to various *hazards*. Engineering *safety-critical systems* involves *risk analysis* as part of *safety analysis* in order to identify safety requirements, although assessing the benefit of technology exposes the limitations of pure technical arguments [2]. Understanding the nature of technological risk, or risk in technology, requires us to unveil subtle complexities [6]. The complexity of risk requires us to develop a comprehensive account of technology risk. It is important to analyze diverse aspects contributing towards multidisciplinary risk accounts. Understanding diverse risk accounts and how they relate each other enhances our ability to structure and perform risk analysis to different levels of granularity. It is possible to identify a wide spectrum of technological risk, from technical to social analysis of risk. Analyzing the relationships between diverse accounts of technology risks allows us to understand subtle technological complexities [1]. It unveils about how diverse accounts of technological risk relate each other. On the one hand, it extends and complements engineering accounts of technology risk. On the other hand, it overcomes the limitations of individual disciplines.

Whatever is the risk associated with technology, social aspects constrain *risk perception* [5]. Taking into account different perspectives on technology risk, therefore, requires us to understand and analyze how social and cultural aspects affect judgement and risk perception [5]. In particular, it is necessary to develop an account of how trust in technology mediates (or mitigates) risk (perception). For instance, *cultural theory* [5] of risk demonstrates how different constitutions of social groupings within organizations affect risk perception. The position with respect to risk in technology crosses organizational boundaries, classes and divisions of labour [4]. The analysis of potential risks in organizations requires us to understand how social relationships (e.g. trust) affect the perception of certain classes of hazards. This further stresses the necessity to understand the sociality of emergent trust (mistrust) in technology.

The question then is: *what is trust?* Trust affects diverse relationships or interactions between diverse entities (e.g. trust in people, trust in technology). Trust is critical in those situations of knowledge uncertainty. System failures often undermine our trust in technology. Trust relates to the risk associated with technology in presence of uncertainty. These are just few situations that highlight diverse accounts of trust, risk and knowledge uncertainty with respect to technology. The social aspects of trust and risk perception highlight the interaction between trust, risk and knowledge uncertainty. These relationships are relevant to the social and cultural aspects of trust in technology and risk perception. They affect individual behaviour (e.g. cooperation or competition). The problem, therefore, is how to characterize, or capture, these relationships in order to investigate trust properties – *Is there a characterization of the relationships between trust, risk and knowledge uncertainty?*

We are concerned with understanding the relationship between risk, trust, knowledge uncertainty and system dependability. Research and practice in safety-critical systems emphasize the relationship between safety and risk. The understanding of the relationship between safety and risk allows the development of risk assessment and management methodologies and their integration into industry standards (e.g. IEC 61508), concepts (e.g. ALARP) and practices (e.g. certification, construction of safety cases). Unfortunately, despite the progress in understanding the relationship between safety and risk, there is often a lack of confidence in safety argumentations – *How to trust system safety? How much trust in safety?* The relationship between trust and safety has been investigated, to a certain extent, in those application domains in which it appears how a lack of trust (or misplaced trust in automation) affects overall safety performances. Intuitively, a lack of trust exposes organizations to reduced safety performances as well as to an increased risk of failures. Therefore, it is necessary further to investigate the relationship between trust and risk, hence, understanding about how confidence, trust and risk relate each other. Our discussion highlights different research directions in order to clarify how risk, trust and system dependability relate each other. It has identified different points that provide new insights in the research debates about them. In particular, trust has a convenient role in order to link risk and system dependability. It extends our understanding of risk and system dependability.

References

[1] S. Anderson, M. Felici. Classes of socio-technical hazards: Microscopic and macroscopic scales of risk analysis. Risk Management, Palgrave Macmillan, Volume 11, Issue 3-4, pp. 208-240, 2009.

[2] T. Aven and V. Kristensen. Perspectives on risk: review and discussion of the basis for establishing a unified and holistic approach. Reliability Engineering & System Safety, 90(1):1-14, 2005.

[3] A. Avizienis, J.-C. Laprie, B. Randell, and C. Landwehr. Basic Concepts and Taxonomy of Dependable and Secure Computing. IEEE Transactions on Dependable and Secure Computing, 1(1):11-33, January-March 2004.

[4] U. Beck. Risk Society: Towards a New Modernity. SAGE Publications, 1992.

[5] M. Douglas and A. Wildavsky. Risk and Culture: An Essay on the Selection of Technological and Environmental Dangers. University of California Press, 1982.

[6] C. Perrow. Normal Accidents: Living with High-Risk Technologies. Princeton University Press, 1999.

Quantifying Fire Risk

A quantitative model for fire risk estimation

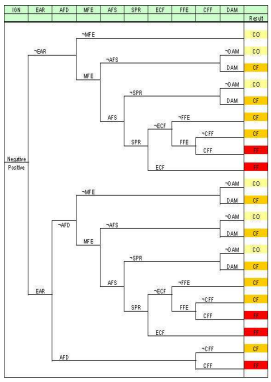
Gwen Kleijn van Willigen
Reliability Engineer,
Rijkswaterstaat, Ministry of Infrastructure and Environment,
The Netherlands

To meet the performance requirements for several of its objects, The Dutch Ministry of Infrastructure and Environment applies a probabilistic asset management method, based on a Quantitative Risk Analysis (QRA). By using a QRA an optimal asset management program can be developed, wherein the objects still comply to either reliability or availability requirements whilst optimising towards cost and effort.

External risks provide a significant influence on the (calculated) unavailability or unreliability of an object. Fire risk is one of the external risks that has to be taken into account. Rijkswaterstaat developed a new method to quantify fire risk on the reliability / availability of infrastructural objects. The quantification mentioned not only provides input for the quantitative risk assessment, but also provides a risk-cost comparison of the various fire-reduction measures applicable on an object.

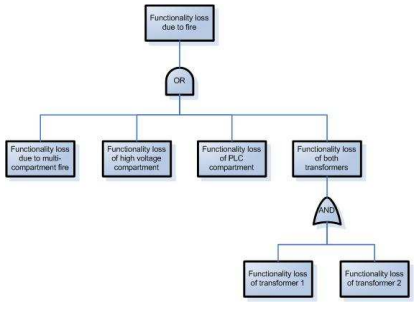
The used method is innovative because of the differentiation into fire-damage categories combined with the effect of fire-reducing measures. Based on the probability that an ignition will lead to damage within an object, the risk of damage from ignition depends on the fire reduction measures taken. Damage leading from ignition can be differentiated into three categories.

1) Unavailability of a single component due to fire (CO)
2) Unavailability of more than one component within a single fire compartment. In this case the conservative assumption is made that the functionality of all objects in the fire compartment is lost. (CF)
3) Unavailability of multiple compartments due to fire. In this case the conservative assumption is made that the functionality of the entire object is lost. (FF)



Using an event tree the probabilities can be calculated per category that an ignition will cause damage corresponding to this category. The event tree takes the reliability, availability and effectiveness of various fire reduction measures into account.

Next, the probability of damage due to fire can be calculated per component, compartment and entire object by determining the (summed) ignition frequency and the probability of damage within the applicable category. Combining these figures with the time to repair in a fault tree finally leads to the quantification of the fire risk on the object.



Assessing the Potential Risks of Nano-Materials – Emerging Tools for Emerging Risks

Khara D. Grieger, Technical University of Denmark Denmark

Introduction

Research efforts are actively underway in order to understand and assess the potential environmental, health, and safety risks of engineered nano-materials (NM). These novel materials present significant challenges to scientists, researchers, governments, and policy-makers not only in terms of understanding their behaviour in biological and environmental systems but also in terms of how to assess the potentially also new and novel risks for health and the environment. Moreover, the exact definition of what constitutes a "nano-material" is also subject of continued debate and scrutiny (e.g. Lövestam et al. 2010; SCENIHR 2010), hampering on-going efforts for effective regulation of NM among other aspects. Despite this uncertainty however, NM are largely been considered thus far to be a material having "one or more external dimensions in the nano-scale or which is nano-structured" (British Standards Institute 2007).

The use of NM in various applications has grown significantly in the past decade with currently more than 1300 manufacture-identified products containing NM on the market (Project on Emerging Technologies 2011). These applications are within categories such as health and fitness, electronics, automotive, as well as toys to name just a few. At the same time that NM are increasingly finding their way into consumer markets, scientists, researchers, and regulatory agencies are also increasingly becoming concerned regarding whether standard approaches to assessing the health and environmental risks of conventional substances (e.g. bulk chemicals) may be applicable and suitable to NM. So far, it has not been fully clear if standard risk assessment approaches may be applied to NM or if other risk analysis methods may be better suited for NM. This information is imperative to protect health and the environment from the potential adverse consequences of using NM in a range of products and applications.

Risk analysis methods for nano-materials

Applying standard risk assessment approaches to NM has been extremely challenging thus far. These challenges have been documented in various aspects of risk assessment, including for instance measuring and characterizing NM in different environmental media, modelling environmental concentrations following release, and a lack of toxicological and eco-toxicological studies in a wide range of species (SCENIHR 2009). Other challenges include difficulties in e.g. detecting NM in the environment as well as the lack of e.g. information on the influence of coatings, surfactants, and solvents (Stone et al. 2010). While it is considered that eventually these methodological limitations will eventually be resolved with due time and research efforts (RCEP 2008; Grieger et al. 2009, Grieger et al. 2010), it has been estimated that this process is likely to be extremely time-consuming and expensive. For instance, it has been estimated that testing the nano-particles on the US market alone is likely to cost between millions and billions of US dollars and take several decades (Choi et al. 2009; Maynard 2006). Others have also expressed their concerns regarding the applicability and suitability of applying standard risk assessment to NM (e.g. Hansen 2009; Linkov et al. 2009a).

Given these serious challenges, other scientists and regulatory agencies have proposed that perhaps other risk analysis methods may be better suited for NM. Among others, these include Multi-Criteria Decision Analysis (MCDA), Nano Risk Framework, and Precautionary Matrix. Grieger et al. (2011) did a first evaluation of these "alternative" frameworks for NM, in which they evaluated a total of eight frameworks against 10 criteria which were considered to be important for a successful risk analysis framework for NM. The frameworks that were chosen for this analysis were the following: Risk Governance Framework, Nano Risk Framework, MCDA, Precautionary Matrix, Comprehensive Environmental Assessment, Nano Screening Level Life Cycle Risk Assessment framework, CENARIOS, and XL Insurance Database Protocol. These were evaluated against the following criteria: 1. Flexible for variety of nano-materials, 2. Suitable for multiple decision contexts, 3. Incorporate uncertainty analysis, 4. Include life cycle perspectives, 5. Ability to be iterative or adaptive, 6. Enable more timely decision making, 7. Transparent in objectives, steps for completion, and application, 8. Ability to integrate various stakeholder perspectives, 9. Ability to integrate precaution, and 10. Ability to include qualitative or quantitative data.

Results from this analysis showed that the investigated frameworks in fact represented a broad span of different methods, ranging from risk governance frameworks to more specific assessment tools, and that not all frameworks were equally applicable or appropriate for different NM risk contexts. Most of the investigated frameworks contained a number of criteria which were considered to be important for successful risk analysis, including: flexibility for multiple NM, suitability for multiple decision contexts, inclusion of life cycle perspectives, inclusion of precautionary aspects, transparency, and handling of qualitative and quantitative data. However, it was also found that most frameworks were primarily applicable to occupational health settings with minimal environmental risk considerations. It is also unclear if the applications of these frameworks were indeed successful, since there

were a limited number of concrete applications to specific NM or nano-products. This analysis concluded that it seems to be particularly challenging to test new materials at the same time that new risk analysis tools are also tested.

Future perspectives

Since the analysis by Grieger et al. (2011), the International Organization for Standardization (ISO) has also released its own risk analysis framework (ISO 2011). It is very similar in content, structure, and format to the Nano Risk Framework developed by Environmental Defence and Dupont (2007). Thus far, there have been no published applications of the ISO framework to specific NM or nano-products, although it is expected that applications will be published relatively soon given ISO's international status.

In light of these findings, it is recommended that research is dedicated to establishing and testing different risk analysis frameworks for NM based on NM which have real-world relevancy. For instance, since many risk analysis frameworks have only been applied to a very limited number of concrete applications, it is urgently needed to increase documented applications of these frameworks in order to further continue their development to handle the complex challenges of NM. Furthermore, testing these frameworks on similar case studies would also help compare the results of these applications across frameworks. Finally, since the development of risk assessment strategies for NM is likely to be a lengthy process in order to generate meaningful results, it is recommended that various risk analysis methods are incorporated early into NM and nanotechnology innovation schemes. In this way, it is likely to be much easier to shape the development of NM and nanotechnology in a more sustainable manner during its early innovation stages rather than after post-market.

References

British Standards Institution. 2007. Terminology for nanomaterials. London: British Standards Institution. Report No. PAS 136:2007.

Choi J, Ramachandran G, Kandlikar M. 2009. The impact of toxicity testing costs on nanomaterial regulation. Environmental Science & Technology 43(9):3030-3034.

Environmental Defense and Dupont. 2007. Nano risk framework. Washington DC: Environmental Defense - Dupont Nano Partnership. Available: http://www.environmentaldefense.org/documents/6496_Nano%20Risk%20Framework.pdf.

Grieger K, Hansen SF, Baun A. 2009. The known unknowns of nanomaterials: Describing and characterizing uncertainty within environmental, health and safety risks. Nanotoxicology, 3(3): 1-12.

Grieger K, Baun A, Owen, R. 2010. Redefining risk research priorities for nanomaterials. Journal of Nanoparticle Research, 2(2):383–92.

Grieger, K., Linkov, I., Hansen, S.F., Baun, A. 2011. Environmental risk analysis for nanomaterials: Review and evaluation of frameworks. *Nanotoxicology*, (Published online 2011-04-13, DOI: 10.3109/17435390.2011.569095)

Hansen SF. 2009. Regulation and risk assessment of nanomaterials : Too little, too late? PhD Thesis. Kongens Lyngby: Technical University of Denmark, Department of Environmental Engineering.

International Organization for Standardization (ISO). 2011. Nanotechnologies – Nanomaterial risk evalution. ISO/TR 13121:2011.

Linkov I, Steevens J, Adlakha-Hutcheon G, Bennett E, Chappell M, Colvin V, Davis JM, Davis T, Elder A, Foss Hansen S, et al. 2009. Emerging methods and tools for environmental risk assessment, decision-making, and policy for nanomaterials: Summary of NATO advanced research workshop. Journal of Nanoparticle Research 11(3):513-527.

Lövestam G, Rauscher H, Roebben G, Klüttgen B, Gibson N, Putaud JP, Stamm H. 2010. Considerations on a definition of nanomaterial for regulatory purposes. Luxembourg: European Commission Joint Research Centre.

Maynard A. 2006a. Nanotechnology: A research strategy for addressing risk. Washington DC: Project on Emerging Nanotechnologies, Woodrow Wilson International Center for Scholars, Report No. PEN 3. Project on Emerging Technologies 2011.

Royal Commission on Environmental Pollution (RCEP). 2008. Novel materials in the environment: The case of nanotechnology. Norwich: TSO, Report No. 27.

Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR). 2009. Risk assessment of products of nanotechnologies. Brussels: European Commission Health and Consumer Protection Directorate- General, Directorate C - Public Health and Risk Assessment, C7 - Risk Assessment.

Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR). 2010. Scientific basis for the definition of the term "nanomaterial." Brussels: European Commission Health and Consumer Protection Directorate- General, Directorate C – Public Health and Risk Assessment, C7 - Risk Assessment.

Stone V, Aitken R, Aschberger K, Baun A, Christensen FM, Fernandes TF, Hansen SF, Hartmann NB, Hutchison G, Johnston H, et al. 2010. Engineered nanoparticles: Review of health and environmental safety (ENRHES). ENRHES EU FP 7 project, Final report.

RAMS Impact on Asset Management Stakeholders
ESReDA Project Group

Lead by: Mohammad Raza, ALSTOM Power

1. Introduction

The dynamic swings of the market, environmental and safety laws, financial crises, wars and terrorism are impacting on industrial working methods. Efficient and safe ways of operating a productive industry and reaching target goals, whether on environment, profitability or safety of products and people, is becoming more and more complex. In such an environment, organizations continue to serve societies in delivering technology and maintaining it through their services. Asset management is of primary importance for capital intensive assets. Especially when the cash availability is scare and optimisation has to be carried out within restricted budgets.

Parameters such as Reliability, Availability, Maintainability and Safety (RAMS) play a decisive role in such organisations today as they determine the functionality of the system and directly have an effect on profitability of running the project. This is a major challenge, on one hand, for the Original Equipment Manufacturers (OEM) to consider life time issues at the design stage and on the other hand for the Operators to operate and maintain the equipment safely at the highest possible level of availability within this demanding time of operating assets.

This lead to the formation of this project group. The main aim is to

- Understand the asset owner's priorities.
- Assess the asset owner's understanding of RAMS impact to his asset.
- Study the gap between the understanding and the application
- Prioritize and bridge the gap through a series of well connected chapters
- Ultimately release a book which will act as a guide and particularly useful for an asset owner.

To start a Project Group (PG) in ESReDA, the requirement is that at least 4 ESReDA board members should provide their support to it. ESReDA General Assembly officially approved the Project Group in May 2010 during the 38th ESReDA seminar.

2. Project Plan and Schedule

2.1 Status Update

- ESReDA BoD approval received in May 10.
- Quarterly team conference calls held (last in August 11)
- Face to face meeting during ESReDA seminars or once with asset owners
- Draft Proposal confirmed with individual task leaders (chapter owners).
- Asset management questionnaire finalised with ETN.
- This questionnaire results will then be used gap analysis.
- Scope of enlargement feasible based on results

Currently (as of Oct. 11) we are in phase of consolidating the feedback and also consolidate with other European partners with the same quest. This will be ongoing till end of this year. Parallel to it, the work on chapters will be initiated but finalized only after the survey has been completed.

2.2 Next steps

- Involve all relevant members or associations into the group with the aim that efforts done in this area are optimised and not re-invented.
- Questionnaire will be filled and consolidated by end of the year 11.
- Draft chapters prepared from now onwards until March 12.
- Status to be checked and decide on expansion of work
- Aim is to involve all relevant partners in this task (like EFNMS, ETN, ESRA) and proceed further with comprehensive guideline for the Industry.
- Project anticipated to be completed with a Seminar in 2013 / 14.

The results of the Project group will be consolidated into a book, which shall be published by International publications. Each contributor will be part of co-author's list. The copyright remains with ESReDA and the publisher with author's work clearly stated.

This shall mean the end of the activity and it is planned to happen by Dec 2012. Hence a period of 3 years (2010-2012) is planned. But depending on the work, it can be extended by a year.

2.3 General Rules to be followed by each participant:

- The main aim is to make sure that the work (or ultimately the chapter in the book) should consistently be connected to each other. That could mean that each participating co-author should make sure that the end of his part of work should naturally lead to the next chapter in the order.
- Commercialization or naming of companies should be reduced to bare minimum.
- The Order of the chapters will be discussed and finalized during the teleconference / face-to-face meetings by end of Dec 2011.
- Once structure and its content are agreed, the completion date for each individual lead member

in respective chapters shall be finalized during Q1-2012.

- All editing and consolidation work will be carried out by Q1-2012 for it to be ready for printing by Q4-2012, with the copyright of the book remaining with ESReDA with clear indication of each author's contribution in it.

2.4 Invitation to join Asset Management group:

In case the readers find the work proposed as interesting and could be able to contribute on any of the topics which is part of their daily work, then kindly contact mohammad.raza@power.alstom.com and inform. As the work is under progress, a response to this call will be considered till end of Nov 2011. For more details, refer to www.esreda.org

Safety and Reliability Events

ESREL 2012- PSAM 11

European Safety and Reliability Conference

International Probabilistic Safety Assessment & Management Conference

Helsinki, Finland, 25-29 June 2012

Reino Virolainen, Conference General Chair
Terje Aven, Program Committee Chair

We have received 777 abstracts from about 50 countries by 1st August. A number of special sessions will be organized covering topics like uncertainty treatment, vulnerability of critical infrastructures, safety systems, maintenance modeling, PSA in aviation, assessment of radioactive waste repositories, and system health monitoring, fault diagnosis and prognosis.

This is great, but we are happy to receive even more abstracts. The web system is still open for late submissions, but not longer than 26 September. Submission deadline for the full-length papers is 30 January 2012.

The work has now started to organize the abstracts/papers into relevant areas and sessions. Track leaders for the main topics and application areas have been appointed. The organizing committee and the track leaders will meet in Helsinki, September 29th-30th.

ESREL 2012 & PSAM 11 will be the major international event in the safety, reliability and risk fields in 2012, and we look forward seeing you in Helsinki.

Website: www.psam11.org

Past Events

2nd GTPIS WORKING MEETING
Athens, 20 May 2011

Zoe Nivolianitou, Demokritos, Greece

On May 20, 2011 the second working meeting of the Greek Technological Platform for Industrial Safety (GTPIS) has been organised at the NSCR "DEMOKRITOS" headquarters, in Athens in collaboration with the National Technical University of Athens (NTUA) and of the Technical University of Crete (TUC).

The GTPIS is the Greek branch of the European ETPIS and aims to improve (by a 25 %) the reduction of accidents and diseases at work, control of environmental risks and in production losses due to accidents, as it is stated in its 2020 vision for future industrial systems . It all will have contributed to keep the industrial systems in permanent and steady sustainable growth and ensure the transfer of knowledge to the industrial companies, SMEs in particular. It will have developed an "incident elimination" culture where safety is embedded in design, , maintenance, operation and management at all levels in enterprises in everyday activities.

This will be achieved by the coordinated production of new knowledge, methodologies and processes; improvement of industrial safety will also occur by a better transfer of existing knowledge towards the companies notably the Small and Medium Enterprise (SME) and by better training and education of all the actors concerned by the environmental and professional risks, contributing in parallel to the European strategic research agenda.

The GTPIS will intensify networking and stimulate technological and organisational improvement in risk management by working on education, standardisation, and transfer to industry and by interactions with other TP concerned by risk issues (e.g. Sustainable Chemistry, Hydrogen etc.). The improvement of the situation will be benefit to both Greek and European citizens, to industrial companies and to workers of several industrial sectors (processes, chemistry, manufacturing industry, construction and others) contributing also to the so wanted development.

More that 100 participants have assisted the working meeting coming from all over Greece and from deferent disciplines, like industry, public administration and academia.

As key-note speaker to the meeting has been invited Mr. Javier Larraneta, Technical Secretary of the very successful PESI (the equivalent Spanish Platform),

who has explained the networking techniques used among the Spanish industry.

Other speakers have presented the current legislative situation in Greece regarding safety; the initiatives of the ETPIS; the industrial experience from safety Law application; and the current open calls of the EU on industrial safety related maters.

a) The main results of the working meeting can bee summarized as following:

b) The participants found very helpful the existence of such a no-profit organisation, as safety matters constitute a "horizontal" issue among all industrial sectors.

c) The guidance offered by the Greek state authorities is much needed in the implementation of all relevant legislation, regarding safety.

d) The role of academia (Universities and research centers) could be most important in the involvement of the industry in EU funded research proposals.

e) The creation of a relevant site for quick communication and information diffusion among interested parties has been considered as a possible positive action.

f) The frequency of these working meetings has to be established in at least one per year, so as to give to the participating members the possibility to interact with each other a d to not loose the momentum for closed collaboration.

More information of the meeting can been found in the following site (in Greek): http://www.ipta.demokritos.gr/GTPIS/. or directly from Dr. Zoe Nivolianitou, zoe@ipta.demokritos.gr, tel: +30-2106503744.

The HRA Society at ESREL

L. Podofillini (PSI), ESRA and the HRA Society

The Human Reliability Analysis (HRA) Society gathers HRA professionals (practitioners, developers, and researchers) with the goal to improve safety in our society through its contributions to risk assessment and, in particular, to enhance qualitative and quantitative human performance prediction in safety analyses. (www.hrasociety.com)

The ESREL 2011 conference (18-22 Sept. 2011, Troyes, France) hosted the second workshop of the HRA Society, combining a special session and a panel discussion. The technical session included high-profile presentations that underscore some of the most recent trends in HRA: methods for non-nuclear domains (air traffic management), new roles for simulators and data, and context-based HRA approaches.

The panel, "HRA and Human Factors – a bridge over troubled water", addressed the relationship between these two closely related disciplines. They are often perceived as distant in terms of goals as well as approaches and methods. The discussion sparkled because the panelists noted that, paradoxically, both disciplines are aimed at understanding and improving human performance. To non-specialists and decision-makers, this distance may be hard to understand, and possibly confusing. One consequence is that the benefits resulting from the complementary perspectives of these disciplines may be overlooked.

The panelists and the audience discussed their perceptions of this gap, their experiences with bridging it, and suggestions as to how HRA and Human Factors practitioners can better work together. To give a flavor of the discussion, it was pointed out that common misperceptions, e.g. HRA's fixation with quantification and the sole interest of Human Factors on general behavioral tendencies, are partially rooted in their aims related to risk assessment and design solutions, respectively. However, HRA's quantitative focus, its insights on "what could cause failure", and its natural integration in a probabilistic /quantitative risk assessment framework can be partnered with Human Factors findings to build a stronger case for recommendations, by helping decision-makers understand the specific gains in safety that can be expected from a modification. This includes insights into the factors affecting human response during very rare, but extreme, situations that are often found in accidents.

The young HRA Society, presented as a concept in a workshop for interested practitioners at PSAM in June 2010 (PSAM 10, Seattle), organized its first event at ESREL 2011, with the support of ESRA. To continue to establish its presence in the events of the safety and reliability assessment community, the Society will organize a technical event during the joint ESREL 2012 / PSAM 11 conference in Helsinki, 25-29 June (www.psam11.org). The Society invites those who share its goals and vision to its website for information on planned activities and membership (www.hrasociety.com).

Calendar of Safety and Reliability Events

9th 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), and Dr. Dirk Proske (dirk.proske@boku.ac.at)

ESReDA Seminar on Risk and Reliability for Wind Energy and other Renewable Sources

Glasgow, UK, 15-16 May 2012

ESReDA is organising its 42nd Seminar in Glasgow, 15-16 May 2012 on this topic. The Seminar is hosted by the University of Strathclyde.

The coming decade should see a huge expansion of renewable energy systems, in particular of offshore wind systems. Many risk and reliability related problems for such systems are open and many may still be unarticulated. The ESReDA seminar brings together system operators, manufacturers, insurers, maintainers, government, regulators and university researchers from a variety of relevant disciplines, in order to gain a holistic view of the state of knowledge around wind energy and other renewable systems risk and reliability issues. In addition to considering renewable systems themselves, the scope of the seminar includes the embedding of such systems within the network, and the risk and reliability issues that arise as a consequence.

Papers for the seminar are invited from all stakeholders. Relevant topics for papers are:

- Reliability, availability and maintainability of renewable energy systems
- Network stability risk analysis
- Investment risk and economic uncertainties for renewable systems

The keynote speaker will be Andrew Donaldson of SSE Renewables, one of the key companies involved in offshore wind.

More details are available on the ESReDA website, www.esreda.org. ESRA is supporting this seminar through the involvement of the ESRA Technical Committee on Energy. The first call for abstracts is now out, with a deadline of 16 January 2012.

CISAP-5: an arena for new research trends in safety, reliability and risk assessment

Milan, 3-6 June 2012

The Italian Committee for Safety and Reliability in the Process Industry is organizing **CISAP-5**, the fifth edition of the International Conference on Safety and Environment in the Process Industry that will be held in Milan on June 3rd to 6th, 2012 (www.aidic.it/cisap5). The initiative is strongly supported by the members of the Italian Chapter of ESRA, that are contributing both to the organization and the scientific success of the initiative. The high number of abstracts received warrants that **CISAP-5** will be successful forum on process safety, risk assessment and HSE management. The conference will provide a unique opportunity to share and gain experience on open research topics in safety assessment, risk management and reliability. **CISAP** aims to become a prominent biennial forum on safety and sustainability, contributing to the consolidation of a safety culture aiming at a sustainable growth of the enterprise value based on the safeguard of the health of employees and population, the safety of operations and the environmental protection.

However, the main ambition of **CISAP** is to become an arena mainly devoted to the discussion of new and emerging research topics in safety, reliability and risk assessment. Besides the main conference, dedicated

workshops will be organized on "hot" topics in emerging risk assessment and management, as the assessment of accident scenarios caused by natural hazards and the safety of energy systems and infrastructures. The experience of ESRA members is welcome both to join the conference and to propose and participate to the dedicated workshops.

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.

About 1000 abstracts from about 50 countries have been received. A number of special sessions are planned covering topics like uncertainty treatment, vulnerability of critical infrastructures, safety systems, maintenance modeling, PSA in aviation, assessment of radioactive waste repositories, and system health monitoring, fault diagnosis and prognosis.

Abstracts/papers are being organized into relevant areas and sessions. Track leaders for the main topics and application areas have been appointed.

Important Dates:
Submission of full-length papers: 31 January 2012

Reino Virolainen, *Conference General Chair*
Terje Aven, *Program Committee Chair*

Website: www.psam11.org

ESRA Information

1 ESRA 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
- 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

1.3 Companies

- ARC Seibersdorf Research GmbH, Austria
- TAMROCK Voest Alpine, Austria
- IDA Kobenhavn, Denmark
- VTT Industrial Systems, Finland
- Bureau Veritas, France
- INRS, France
- Total, France
- Commissariat á l'Energie Atomique, France
- Eurocopter Deutschland GMbH, Germany
- GRS, Germany
- SICURO, Greece
- VEIKI Inst. Electric Power Res. Co., Hungary
- Autostrade, S.p.A, Italy
- D'Appolonia, S.p.A, Italy
- IB Informatica, Italy
- RINA, Italy
- Segretario generale CNIM, Italy
- TECSA, SpA, Italy
- Dovre Safetec Nordic AS, Norway
- PRIO, Norway
- SINTEF Industrial Management, Norway
- Central Mining Institute, Poland
- Adubos de Portugal, Portugal
- Transgás - Gás Natural, Portugal
- Cia. Portuguesa de Producção 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

1.4 Educational and Research Institutions

- 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
- University of Defence, Czech Republic

- Tallin Technical University, Estonia
- Helsinki University of Technology, Finland
- École de Mines de Nantes, France
- Faculté de Polytechnique de Mons, France
- Université Henri Poincaré (UHP), France
- LAAS, France
- Université de Bordeaux, France
- Université de Technologie de Troyes, France
- Université de Marne-la-Vallée, France
- INERIS, France
- Fern University, Germany
- Technische Universität Muenchen, Germany
- Technische Universität Wuppertal, Germany
- University of Kassel, Germany
- Nat. Centre Scientific Res. 'Demokritos', Greece
- University of the Aegean, Greece
- Universita di Bologna (DICMA), Italy
- Politecnico di Milano, Italy
- Politecnico di Torino, Italy
- University of Rome "La Sapiensa", Italy
- Universita Degli Studi di Pavia, Italy
- Universita Degli Studi di Pisa, Italy
- Technical University of Delft, The Netherlands
- Institute for Energy Technology, Norway
- NTNU, Norway
- University of Stavanger, Norway
- Gdansk University, Poland
- Gdynia Maritime Academy, Poland
- Institute of Fundamental Techn. Research, Poland
- Technical University of Wroclaw, Poland
- Instituto Superior Técnico, Portugal
- Universidade de Coimbra, Portugal
- Universidade Nova de Lisboa, Portugal
- Universidade de Minho, Portugal
- Universidade do Porto, Portugal
- University Politechnica of Bucharest, Romania
- University of Strathclyde, Scotland
- Institute of Construction and Architecture of the Slovak Academy of Sciences, Slovakia
- University of Trencin, Slovakia
- Institute "Jozef Stefan", Slovenia
- PMM Institute for Learning, Spain
- Universidad D. Carlos III de Madrid, Spain
- Universidad de Cantabria, Spain
- Universidad de Extremadura, Spain
- Univ. de Las Palmas de Gran Canaria, Spain
- Universidad Politecnica de Madrid, Spain
- Universidad Politecnica de Valencia, Spain
- Consejo Sup.Investig.Científicas, IMAFF, Spain
- Lulea University, Sweden
- World Maritime University, Sweden
- Institut f. Energietechnik (ETH), Switzerland
- Paul Scherrer Institut, Switzerland
- City University London, UK
- Liverpool John Moores University, UK
- University of Bradford, UK
- University of Portsmouth, UK
- University of Reading, School of Construction Management & Engineering, UK
- University of Salford, UK

1.5 Associate Members

- Federal University of Pernambuco, Brazil
- Fluminense Federal University, Brazil
- Pontificia Universidade Catolica, Brazil
- Universidad Central de Venezuela, Venezuela
- European Commission - DR TREN (transport and Energy), in Luxembourg
- Chevron - Energy Technology Company, in Houston, USA

1.6 Private Members

- Dr Chen En Wu from Taiwan

2 ESRA Officers

Chairman
Enrico Zio (enrico.zio@polimi.it)
Politecnico di Milano, Italy
Ecole Centrale Paris, Supelec

Vice-Chairman
Terje Aven (terje.aven@uis.no)
University of Stavanger, Norway

General Secretary
Pieter van Gelder (p.vangelder@ct.tudelft.nl)
Delft University of Technology, The Netherlands

Treasurer
Radim Bris (radim.bris@vsb.cz)
Technical University of Ostrava, Czech Republic

Past Chairman
Ioannis Papazoglou (yannisp@ipta.demokritos.gr)
NCSR Demokritos Institute, Greece

Chairmen of the Standing Committees
K. Kolowrocki, Gdynia Maritime University, Poland
C. Guedes Soares, Instituto Superior Técnico, Portugal

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.

4 Standing Committees

4.1 Conference Standing Committee

Chairman: K. Kolowrocki, Gdynia Maritime Univ., Poland

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

Chairman: C. Guedes Soares, Instituto Sup. Técnico, Portugal

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.

5 Technical Committees

Technological Sectors

5.1 Aeronautics Aerospace

Chairman: Darren Prescott, UK
E-mail: d.r.prescott@lboro.ac.uk

5.2 Critical Infrastructures

Chairman: W. Kröger, Switzerland
E-mail: kroeger@mavt.ethz.ch

5.3 Energy
Chairman: Kurt Petersen, Sweden
E-mail: Kurt.Petersen@lucram.lu.se

5.4 Information Technology and Telecommunications
Chairman: Elena Zaitseva, Slovakia
E-mail: Elena.Zaitseva@fri.uniza.sk

5.5 Manufacturing
Chairman: Benoit Lung, France
E-mail: Benoit.Iung@cran.uhp-nancy.fr

5.6 Nuclear Industry
Chairman: S. Martorell, Univ. Poli. Valencia, Spain
E-mail: smartore@iqn.upv.es

5.7 Safety in the Chemical Industry
Chairman: M. Christou, Joint Research Centre, Italy
Email: Michalis.Christou@jrc.ec.europa.eu

5.8 Land Transportation
Chairman: Valerio Cozzani, Italy
E-mail: valerio.cozzani@unibo.it

5.9 Maritime Transportation
Chairman: Jin Wang, UK
E-mail: J.Wang@ljmu.ac.uk

5.10 Natural Hazards
Chairman: P. van Gelder, The Netherlands
Email: p.h.a.j.m.vangelder@tudelft.nl

Methodologies

5.11 Accident and Incident Modelling
Chairman: Stig O. Johnson, Norway
Email: stig.o.johnsen@sintef.no

5.12 Prognostics & System Health Management
Chairman:Piero Baraldi, Italy
E-mail: Piero.baraldi@polimi.it

5.13 Human Factors and Human Reliability
Chairman: Luca Podofillini, Switzerland
Email: Luca.podofillini@psi.ch

5.14 Maintenance Modelling and Applications
Chairman: Christophe Bérenguer, France
Email: christophe.berenguer@utt.fr

5.15 Mathematical Methods in Reliability and Safety
Chairman: John Andrews, UK
Email: John.Andrews@nottingham.ac.uk

5.16 Quantitative Risk Assessment
Chairman: Marko Cepin, Slovenia
E-mail: marko.cepin@fe.uni-lj.si

5.17 Systems Reliability
Chairman: Gregory Levitin, Israel,
E-mail: levitin@iec.co.il

5.18 Uncertainty Analysis
Chairman: Stefano Tarantola, Italy,
E-mail: stefano.tarantola@jrc.it

5.19 Safety in Civil Engineering
Chairman: Raphael Steenbergen, The Netherlands
Email: Raphael.steenbergen@tno.nl

5.20 Structural Reliability
Chairman: Jana Markova, Czech Republic
E-mail: Jana.Markova@klok.cvut.cz

5.21 Occupational Safety
Chairman: Ben Ale, The Netherlands
Email: B.J.M.Ale@tudelft.nl

ESRA is a non-profit international organization for the advance and application of safety and reliability technology in all areas of human endeavour. It is an "umbrella" organization with a membership consisting of national societies, industrial organizations and higher education institutions. The common interest is safety and reliability.
For more information about ESRA, visit our web page at http://www.esrahomepage.org.
For application for membership of ESRA, please contact the general secretary **Pieter van Gelder**, E-mail: P.van.Gelder@ct.tudelft.nl.
Please submit information to the ESRA Newsletter to any member of the Editorial Board: