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

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European Safety and Reliability Association

Newsletter

<http://www.esrahomepage.org>

September 2011

Editorial



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

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. Later in this issue you will find 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 in 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 were 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 the 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



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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 noticed 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.

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Quantifying Fire Risk A quantitative model for fire risk estimation



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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.



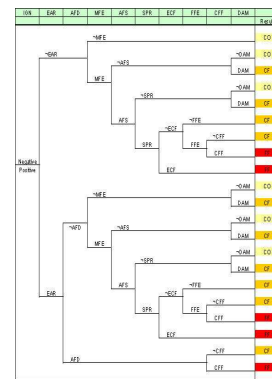
External risks provide a significant influence on the (calculated) unavailability or unreliability of an object. Fire risk is one of the external risks that has to be taken into account. Rijkswaterstaat developed a new method to quantify fire risk on the reliability / availability of infrastructural 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.

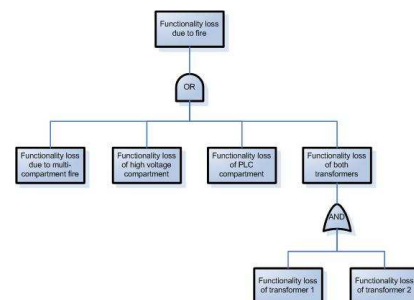


- 1) Unavailability of a single component due to fire (CO)
- 2) Unavailability of more than one component within a single fire compartment. In this case the conservative assumption is made that the functionality of all objects in the fire compartment is lost. (CF)
- 3) Unavailability of multiple compartments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

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Introduction

Research efforts are actively underway in order to understand and assess the potential environmental, health, and safety risks of engineered nanomaterials (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 “nanomaterial” 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 nanoscale or which is nanostructured” (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 nanomaterials

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 ecotoxicological 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 nanoparticles 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 nanomaterials, 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 Defense 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.

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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 scarce and

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.

To start a Project Group (PG) in ESReDA, the requirement is that at least 4 ESReDA board members should provide their support to it. For the start of Asset Management project group, following ESReDA members has confirmed their support via email: John Andrews, Luis Ferreira, Mohamed Eid, Egoitz Conde.

ESReDA General Assembly officially approved the Project Group in May 2010 during the 38th ESReDA seminar.

2. Project Plan and Schedule

2.1 Summary

- The first kick off meeting of the Project Group members was held on 21st Oct 2009 during the 37th ESReDA seminar held in Baden, Switzerland. It was presented to the BoD during the same conference.
- A meeting was held in May 2010 between some of the members regarding the status and the approach.
- In order to involve asset owners, a meeting was held in Lisbon in EDP's offices to get them on board and seek their first hand support.
- A conference call has been held in Oct 10 among the Project group members followed by a meeting along with the 40th Esreda conference in Bordeaux.

- Regular conference calls (say once in a quarter) along with project group meetings (normally a day earlier of the start of ESReDA seminars shall be held).
- The Plan is to consolidate the experience and focus on the key target and parameters along with the gap study between asset owners and providers - end of 2011.
- Secondly, the impact of parameters, drivers will be investigated by Dec 2011 along with overall focus on the optimization potential during new design phase.
- Currently (as of Sept. 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.
- In general, several aspects of the topic will be running parallel and the project is anticipated to end with a seminar anticipated in Autumn 2012, hopefully.

2.2 Duration of the Project group: 3-4 years

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 Financials

Upon presentation of the Project groups progress, the ESReDA board shall approve a budget of up to max 7000 Euros / year for support of administrative activity. The budget is allocated to the group lead and it is up to him to manage the funds and report back to ESReDA on it. The time spent on it could be considered as voluntary contribution.

Currently the status is that, close to 2000 Euros from the above-allocated budget. It is anticipated increased spending due to the ongoing asset management questionnaire work.

3. Project Group members

Find below the list of persons, represented by their company, will be part of the project group on Asset Management:

- 1) Yizhak Bot (BQR, Israel),
- 2) Bob Holzworth (Scientech, US),
- 3) Pierre Ribette (ALSTOM Transport),
- 4) Anthony Munisteri (Sigma Solutions).
- 5) Pascal Decoussemaeker (ALSTOM Power).

- 6) Francois Liard (ALSTOM power)
- 7) S.Rao Palakodeti (Sigma solutions)
- 8) Cyp Van Rijn (Asset management consultancy)
- 9) Pierre Dersin (ALSTOM Transport)
- 10) H.C. Wels (KEMA)
- 11) Egoitz Conde/ Sussana, Santiago Fernandez (Tekniker)
- 12) Any operator of the asset, if any.
- 13) ETN member if any.
- 14) EFNMS members if any
- 15) Xxx (open for others)

4. Draft Proposal from the lead: M Raza

4.1 The format of the work will have the following sequence:

- 1) Introduction, What asset management mean in the current world? – Brief explanation to the buss world used in banking industry, software industry, infrastructure industry, etc relevant tools & Methods in brief and indication of the topics, which will not be covered in this work but they are ultimately connected to the physical existing assets- M Raza in collaboration with banking, software professionals and other project members.
- 2) Current status of Asset management in Industry: Lead Cyp Van Rijn supported by others. (Paper presented from Cyp in 37th ESReDA conference will be the basis, expanded to cover European Industry).
- 3) Target value and key indicators definition, International norms, identify, reassess and sort the parameters existing in RAMS domain (basically to cover the first 2 points from chapter 3). Jan –Cedric Hansen / M.Raza , Pierre Ribette in collaboration with others in the group.
- 4) Expectations from asset owners and their requirements: Pascal Decoussemaeker in lead supported by others.
- 5) Advantages of Asset Management and Optimization with a lifetime aspect: Main drivers and decision factors involved: lead by Anthony Munisteri/ S.Rao (Sigma Solutions) basis their paper in 37th ESReDA conference.
- 6) Asset optimization aspects during new design phase and rejuvenation: M Raza in lead with support from other Project group members and ETN members
- 7) Asset management tools- how does it help : Yizhak Bot / Francois Liard to lead and Yizhak's paper presented in 37th ESReDA conference will be the basis.
- 8) Conditon based monitoring for Asset Management and Optimisation: Paper from Robert Holzworth presented in 37th ESReDA

shall be the basis and this section to be lead by him supported by others.

- 9) Maintenance methodology for selecting the most cost-effective Asset management strategies: Egoitz Conde, Santiago Fernandez, Aitor Arnaiz paper presented in 37th ESReDA conference will be basis.
- 10) How to predict service affecting failures : a case study - Pierre Ribette in lead supported by Pierre Dersin and his paper presented in the 37th ESReDA conference. (As Pierre left his position, it is unsure about his participation. But Egoitz Conde, Santiago Fernandez and Sussanne will write this part and Pierre Dersin should be able to support the activity).
- 11) Asset management of power plants, typically gas turbine based: Pascal Decoussemaeker in lead supported by ETN group personnel.
- 12) Modeling forced unavailability using Markov: the paper from H. Wells presented in 37th ESReDA conference will be the basis. He will lead this part.
- 13) Future of Asset management and its importance including requirement for further development (each project group member contributes his part) will be lead by Cyp.
- 14) Conclusions—M Raza in consultation with project group members.

4.2 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 (as mentioned above) 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 Q1-2012and frozen.
- 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.

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 at improving (by a 25 %) in terms of

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 co-ordinated 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, 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 matters.

a) The main results of the working meeting can be 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 and to not lose the momentum for closed collaboration.

More information of the meeting can be 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,

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 43rd 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.

Important Dates:

Submission of full-length papers: 30 January 2012

Abstracts: 31 July 2011

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

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- Total, France
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- TNO Defence Research, The Netherlands
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- University of Mining and Geology, Bulgaria
- Czech Technical University in Prague, Czech Republic
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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.

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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>.

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