European Safety and Reliability Association

Newsletter

http://www.esrahomepage.eu

December 2022

Editorial

Michael Beer
Chair

Edoardo Patelli
Vice-Chair

Maria Chiara Leva
Treasurer

Myrto Konstantinidou,
General Secretary

We wish you a Happy and Prosperous 2023!

The new year comes with a number of exciting developments in ESRA, which are calling for your active contributions on technical initiatives and their promotion within and beyond ESRA.

Most importantly, we count on your valuable contributions to ESREL 2023 https://www.esrel2023.com, strong participation and vivid discussions in the conference to attack our large-scale challenges with dedicated collaborative teams, in particular in the intersection between academia and industry to nurture not only fundamental development but also transfer into practice. Please engage in the developments driven by our Technical Committees, develop initiatives using the support of our Technical Committees and make our next ESREL a great success.

Please consider the further dissemination and promotion of results and activities from ESREL and ESRA by publishing contributions in our ESRA Newsletter, publishing extended papers in the journals related to ESRA and guest-edit Special Issues in those journals. Note that the Journal "Reliability Engineering and System Safety" is published in association with ESRA.

Further opportunities are provided by the following journals connected to ESRA through membership of the Editors in Chief:

- Proceedings of the Institution of Mechanical Engineers, Part O: Journal of Risk and Reliability
- Structural Safety
- ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part A: Civil Engineering, Part B: Mechanical Engineering

The ESRA newsletter offers the opportunity to publish news, achievements, announcements, reports on latest developments and research findings, industrial applications, open positions and exchange activities, new research centers and collaborative opportunities, call for contributions for Special Issues or ESRA-related workshops etc. This newsletter features developments by both traditional members and new members of ESRA. The membership of ESRA is currently growing, in particular through non-European expansion, which opens up new opportunities for collaborative developments. We encourage you to use this opportunity for international networking with our overseas ESRA members and joint initiatives.

ESRA has a new webpage: https://esra.website/.

The current webpage will go offline by end of February. The new web-presentation of ESRA will be enriched over the next months to facilitate targeted networking and

collaboration. Useful information for our members along with links to conferences, workshops and relevant webinars from members of ESRA community will be also included in the new webpage. Please put a reminder on your calendar to visit our new homepage soon!

Two new committees have been established, alongside our TCs, in order to facilitate the operation of ESRA in the intersection to the society and industry. We are calling for expressions of interest to help on these committees:

The Communications Committee is dedicated to dissemination, promotion, networking and outreach, within ESRA and to outside, utilizing the webpage, social media etc. and integrating the newsletter.

The Industrial Liaison Committee is dedicated to establishing and supporting networking and collaboration with industry, and to reinforcing industrial engagement in our ESREL conferences.

Please send us your expressions of interest to help on these two important committees.

We thank you very much for your valuable contributions and initiatives and wish you a great and successful year ahead.

Michael Beer, Chair
Edoardo Patelli, Vice-Chair
Maria Chiara Leva, Treasurer
Myrto Konstantinidou, General Secretary

Feature Article

More public debate can strengthen defense against hybrid threats

Marte Høiby
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Nina Bjørge
SINTEF Digital
Norway

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Norway

The contemporary security situation in Europe is affected by an increasingly hybrid threat landscape, in which covert and overt measures of threats and warfare merge. NATO defines hybrid threats as a combination of military and non-military measures, deployed to blur the lines between war and peace, and exploit the weaknesses in societies, and often particularly democracies (NATO, 2023). Elements of hybrid means can be influence campaigns, cyberattacks, economic pressure, use of irregular or regular military forces. They may be deployed in a synchronized matter to multiply effects.

Security authorities have long warned against influence operations and hybrid threats in interstate conflicts. The number of news articles in Norwegian media that dealt with hybrid threats in 2022 was fourfold from previous years. Politicians, researchers and security authorities see a need for a stronger total defense where a prepared and resistant civilian population plays an important role.

Researchers at SINTEF have studied the English-language research literature on hybrid threats and hybrid war. The study shows that the number of articles increased significantly after Russia's annexation of Crimea in 2014 and has risen in line with developments in the war. No less than 62 of the 123 articles focus on Russian hybrid warfare and are in general largely concerned with information-related means. In addition, we have analyzed 365 Norwegian news articles from 2020-2022 that mention hybrid threats. Almost a hundred of the articles refer to influence, such as influence operations, campaigns or activities. Influence is clearly on the public and scientific agenda.

The Economist's democracy index shows that democratic rule is in retreat globally. Only 6.4 percent of the world's population live in countries with full democracy in 2023. But the population's expectation of democracy and freedom of expression can be as important as the actual conditions. Europe is known for generally high levels of trust in democratic institutions such as authorities and the media. When security tension increases in Europe, countries can benefit from broad and open discussions about their role in it. If citizens feel that political decisions become facts without being included in the processes, trust in authorities and the media will weaken.

Although many Europeans can participate in free, regular elections, the basis for political participation is founded in everyday life. Vulnerability to influence operations occurs during election campaigns, but also in the periods in between. This must be considering when assessing the security threats, and when looking for solutions.

With an unpredictable worldview, we can benefit from standing united behind political decisions in Europe. But

we do not stand united without popular support for these decisions. A high defense capacity requires broad participation in the population to stand against the strategic use of information as a weapon. Deep understanding of national and international security political priorities and awareness of international development is important for total preparedness. Hybrid threats can appear as isolated and unexplained events. The ability to see them in context and interpret them in a larger picture is best achieved through broad debate, more critical questions and more discussion.

It is a paradox that freedom of expression can be portrayed as dangerous to democracy, for which it is a fundamental prerequisite.

Obituary

Stein Haugen

It was a shock and very sad for many to learn that Professor Stein Haugen, a pioneer in the subject of risk management, dear friend of many, colleague and chairman of Safetec, passed away suddenly in June 2022, aged 62.

Stein Haugen was employed by myself in Safetec in the autumn of 1984, while he completed his MSc degree at NTH/NTNU in marine technology and was associated with the Safetec company throughout his career. His work on collision risk modelling in his PhD thesis (NTNU 1991) was ground-breaking and has had great significance for risk management in the Norwegian petroleum industry. He has held several roles in the Safetec group of companies, including Chairman of Safetec UK, CEO of Safetec, Head of R&D and Chairman of the Board in Safetec.

From 2010–2021 he was a full professor at NTNU, where he managed several national R&D programmes and supervised many master students and PhD candidates. Stein taught a very popular Basic Risk Analysis course for MSc students in all faculties at NTNU for many years. He also had a part time position in Wuhan University of Technology in China for several years.

As a supervisor he was very popular with his students. In the words of one of his PhD candidates, Xue Yang: “Since 2012, you have been my mentor, and it never ends. You have a big heart, are so positive, supportive and caring all the time. You will always be remembered, respected and loved from the bottom of our hearts.”

Stein wrote many standards, policy documents and a very large number of client reports. He published a significant number of peer-reviewed research articles, and some textbooks throughout his career. His latest textbook “Maritime Transportation, Safety Management and Risk Analysis” was published by his co-author Svein Kristiansen at the end of 2022.

In 2021, Stein returned to a full position at Safetec. He justified this with his eagerness for project work with clients and his curiosity to help develop new services. Stein wanted to spend the rest of his career doing the kind of work he found most enjoyable. The more complex and difficult the projects, the more he enjoyed the challenge. Stein had an extensive national and international network, he was a popular speaker at many international conferences, and his expertise and advice were highly sought after.

Stein was active on the international research arena as well as in ESRA in several capacities, his latest function was as General Chair for the ESREL2018 conference in Trondheim with the title: “Safe Societies in a Changing World”.

One of Safetec's most important carriers of continuity has passed away far too soon. He will be remembered as a gentle, dedicated, down-to-earth and highly respected professional, supervisor, colleague and highly valued friend.

ESRA News

Survey and Special Session of the ESRA Technical Committee (TC) on Decision-Making under Uncertainty (DMU)

Chair:
Kai-Dietrich Wolf
Professor of Mechatronics
Institute for Security Systems
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Co-Chair: Enrico Zio
Professor of Safety, Security and Reliability
Politecnico di Milano and Mines ParisTech
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More than a look into the crystal ball

– experts get together at the ICSRS in Venice

The Technical Committee (TC) on Decision-Making under Uncertainty (DMU) was established two years ago with the aim of bringing together experts in the field of decision analysis. The starting point of the TC was the accelerating change that mankind is facing worldwide, e.g. increasing threats, environmental disasters, pandemics and scarcity of raw materials. Conflicting requirements in critical decision-making settings have to be balanced against each other, which is difficult in the case of novel challenges for which there is only incomplete knowledge and appropriate ways are lacking to fully account for the parameters influencing the uncertain outcomes to be evaluated.

TC DMU Survey

To help answer urgent questions related to DMU from policymakers, society and industry, the TC called for participation in an online survey. The survey also served as preparation for the special session on "Managing Uncertainty in a Volatile Interconnected World," held on Nov. 23-25, 2022 at the International Conference on System Reliability and Safety (ICSRS, http://www.icsrs.org) in Venice, Italy. The initiative aimed to capture expert knowledge on DMU through guiding questions, such as "How can we deal with uncertainty in decision making?" or "When can rational decisions be made and when not?".

The survey received contributions from experts coming from several different countries, including the United States, France, Switzerland, Italy, Belgium, Poland, and Germany. Participants to the survey were from academia as well as industry and government, and responses were in most cases encouragingly detailed. When evaluating the results, we found that people working in different fields have similar problems, under the challenges coming from the fact that systems are becoming more complex and environmental conditions more dynamic. To address these problems and challenges, quantitative tools are being developed to support DMU. In this context, for example, the application of data-driven methods and algorithms to assess events in real time is playing an increasingly important role. Scenario analysis, Bayesian networks and Monte Carlo simulation, for example, have been pointed at as promising methods to support DMU analyses. Favorable methods for multi-criteria decision analysis were also mentioned, e.g., PROMETHEE and AHP.

Participants had partly predictive ("What could happen?"), partly descriptive ("Why did it happen?"), and partly prescriptive analysis focus ("What should be done?"). To summarize the survey: decision making in the context of risk analysis is a very complex task because human, technical and environmental factors must be considered in an integrated manner. Knowledge on potential causes and effects is interdisciplinary and should be carefully evaluated. Many participants indicated that uncertainties can be measured and quantified using probability distributions and probability theory. A first step in decision making under uncertainty should be to ensure that the accepted risk value, boundaries and models are well defined during the analysis. There was clear unanimity that this is not an easy task and needs to be well thought out.

Special Session in Venice

For the special session in Venice, the TC on DMU invited Professor Ahti Salo as keynote speaker, a world-renowned and award-winning expert in decision analysis. This year, the Decision Analysis Society (DAS) of the Institute for Operations Research and the Management Sciences (INFORMS) awarded Professor Ahti Salo the most prestigious 2022 Frank P. Ramsey Medal for outstanding contributions to decision analysis.

On November 24, interested experts met at the ICSRS in Venice to discuss how they deal with uncertainty in their fields of research and application. Seven scientists presented their questions on DMU and possible answers. A Q&A session was opened after each presentation. Professor Ahti Salo opened the session with a keynote address, presenting his extensive work on the development of decision analytic methods and their application in resource allocation, risk assessment, reliability engineering, technology foresight, and efficiency analysis. He gave the audience food for thought on DMU: To deal with uncertainty, one must first understand the system and clearly define terms. No one has a complete picture, so collaboration between different disciplines is needed. Scenario analysis is a widely used tool in DMU. Not to be neglected is testing scenarios for consistency.

Lukas Halekotte, then, reported on his research project dealing with resilience at different levels of abstraction from general principles to performance. Dustin Witte continued with a presentation on modeling physical attacks. He focused in particular on the separation of epistemic and aleatory uncertainties. Danko Jerez gave a presentation on the design of cost-effective structural systems that can safely withstand dynamic environmental effects. He explained that reliability-based optimization (RBO) can be achieved through a two-stage Bayesian framework. The proposed approach converts the optimization problem into a sampling problem that ultimately leads to designs that follow an approximately uniform distribution over the optimal solution set. Chidera Amazu reported on the challenges of modern systems and the overwhelming demands on operators to cope with information overload. She presented tools for optimizing

and managing process control and showed how the dynamics of the operational tasks can be tracked, e.g., via glasses with sensors. Tim Zander showed how neural network-based models can be well calibrated in terms of their predictive uncertainty. This requires first defining a calibration criterion against which to optimize. In particular, he pointed out the pitfalls of false positive and false negative results. Ingo Schönwand's contribution aimed to broaden the view of uncertainty in resilience management of infrastructures by using a political science approach. Based on the assumption that the embeddedness of infrastructures in society leads to irreducible uncertainty, the theory of policy analysis proposes to structure decision problems and to explicate their uncertainties in order to test possible strategies against a large number of scenarios. The chair of TC DMU, Professor Kai-Dietrich Wolf, concluded the presentations with a final discussion session. The following insights could be drawn from the special session: scenario analysis is an important basis for a structured view on possible futures. Artificial intelligence (AI) can contribute significantly to optimizing decision-making processes so that wrong decisions can be reduced. One issue is testing the validity of models and their adequacy to represent reality. The formulation of concrete decision criteria was also considered important.

Participating speakers were:

•Ahti Salo (Keynote), Aalto University

•Lukas Halekotte, German Aerospace Center (DLR PI)

•Dustin Witte, University of Wuppertal (ISS)

•Danko Jerez, Hannover University (IRZ)

•Chidera Amazu, Politecnico di Torino (MSCA-ITN-CISC)

•Tim Zander, Fraunhofer IOSB

•Ingo Schönwandt, German Aerospace Center (DLR PI)

•Kai-Dietrich Wolf (Concluding Summary), University of Wuppertal (ISS)

We would like to thank all contributors and especially ESRA for their support!

Call for Participation – ESREL 2023 in Southampton

ESRA's DMU Technical Committee aims to bring together industry and research professionals around the world working to improve decision making under uncertainty, with a focus on - but not limited to - reliability, safety and security. To further expand the activities and topics of the TC, we are organizing a special session on **"Scenario Analysis for Decision Support"** at the 2023 ESREL Conference in Southampton. If you are interested in contributing, or if you have any questions, please contact us!

Kai-Dietrich Wolf wolf@iss.uni-wuppertal.de Enrico Zio enrico.zio@mines-paristech.fr, enrico.zio@polimi.it

Fundamentals of Quantitative Risk Assessment

September/October, 2022

The II edition of the professional training course: "Fundamentals of Quantitative Risk Assessment" organized by Politecnico di Milano, Italy took place in hybrid format from 16/09/2022 to 07/10/2022 (each Tuesday and Friday from 14:00 to 18:00 (Rome time)).

Its goal has been to provide the 14 participants (9 from university/research center and 5 from industry) the essential notions of probability and statistics with focus on failure time distributions, failure and repair parameters estimation (Maximum Likelihood Estimation (MLE) method, Bayesian method), methods for reliability analysis and risk assessment, including Fault Tree, Event Tree, Bow-Tie, Markov modelling, and a description of the Dependent/common cause failures models and importance measures. Finally, real applications of the concepts and methods illustrated in the course have been presented. Course participants have also been given the opportunity to discuss their experience and technical problems, related to methods and applications.

The course has been officially supported by ESRA with two scholarships covering the registration fee of two PhD students. The 2022 scholarships have been offered to two PhD students, one from Politecnico di Milano, Italy and the other from City University of Hong Kong.

In 2023, the XXV edition of the course "RAM&PHM 4.0: Advanced methods for Reliability, Availability, Maintainability, Prognostics and Health Management of industrial equipment" And the II edition of the Course "Advanced Quantitative Risk and Resilience assessment and management" will take place in take place at Politecnico di Milano, Italy on April 2023 and November 2023, respectively.

4th Eurasian Conference (RISK-2022)

"Innovations in Minimizing Natural and Technogenic Risks"

11-13 October 2022

Baku, Azerbaijan

Results of the Conference

On October 11-13, 2022, the Fourth Eurasian Conference "Innovations in Minimizing Natural and Technological Risks" (RISK-2022) was held in Baku, Azerbaijan. The conference heard 80 reports from 20 countries.

The conference was organized by the International Event Organizer AMIR Technical Services LLC, which is an associate member of World Conference Alerts. The event was co-organized by the Azerbaijan Architecture and Construction University, Georgian Technical University, Hong Kong City University, International Reliability

Group Gnedenko Forum with the support of the Eurasian SEISMO Association.

The first conference under the "RISK" trend was held on May 22-24, 2019, in Baku (Azerbai-jan); it was attended by scientists and specialists from 26 countries. The second conference on April 12-19, 2020, which took place in Tbilisi (Georgia), was attended by scientists and experts from 34 countries. The third RISK-2021 conference was also held in Tbilisi (Georgia), on De-cember 7-9, 2021. Despite all the difficulties of the COVID-19 pandemic, scientists and special-ists from 30 countries participated in the conference.

Due to the COVID-19 pandemic of conferences in 2020, 2021, the second and third conferences were held online.

The success of the world community in the fight against the COVID-19 pandemic made it possi-ble to organize the Fourth Eurasian Conference RISK-2022 in person, from October 11 to 13 in Baku (Azerbaijan). As part of the RISK-2022 conference, a Symposium was organized on the topic “Technological, environmental and economic risks in the oil and gas sector”, as well as an exhibition of monographs and books on risk assessment, analysis and management.

Articles that were presented at the conference will be available in the coming days in the journal: Reliability: Theory and Applications (Special Issue) 4(70), volume 17, November 2022, ISSN: 1932-2321.

Considering the consensus of the conference participants, we express our support for the proposal of the chairman of the conference to hold the next Eurasian conference and symposium in Baku, Azerbaijan, in 2023. The 5th Eur-asian Conference RISK-2023 will be timed to coincide with the 100th anniversary of Heydar Aliyev, the national leader of the Azerbaijani people.

PhD Thesis

Train Based Automated Inspection for Railway Fastening System

Praneeth Chandran
Luleå University of Technology, Sweden

Rail transportation is a sustainable mode of transportation and is a key enabler of the socio-economic development of modern society through passenger and freight services. Growth in overall transport demand has led to railways experiencing higher demand on operational capacity, service quality, and safety. However, an increase in traffic and load can lead to an increase in degradation of the components and thus cause a reduction in the infrastructure quality. Such degradation leads to failures of components, consequently resulting in a higher frequency of interventions for maintenance and renewal activities. The downtime arising from such maintenance and renewal of networks is a significant contributor to the delays incurred to the passengers. A plausible solution to attain higher operational capacity and quality of service with the existing infrastructure and minimize delays due to failure would be to inspect the track and its components frequently using in-service trains, operating in regular traffic. One of the crucial components in rail tracks is the rail fastening system, which acts as a means to fix the rails onto the sleeper, upholding the track stability and track gauge. Failures of fasteners can increase wheel flange wear, reduce the safety of train operations, and may lead to derailment due to gage widening or wheel climb. In Sweden, the inspection of track fasteners is mainly carried out either manually by trained inspectors or by using measurement cars. Manual inspections are slow, cost-intensive, labour-intensive, pose safety issues for maintenance personal involved, and are prone to human errors. Inspections based on measurement cars are cost intensive and requires track possession and thus cannot be utilised frequently without compromising the operational capacity.

Further, the adverse weather condition, especially in the north of Sweden for the majority of the year, limit regular fastener inspection that depends on such traditional inspection methods.

The purpose of this project was to facilitate the development of an automated method for fastener inspection that can be carried out using vehicle-mounted measuring equipment operating in regular traffic.

Figure 1 Differential eddy current measurement system (Lindometer) mounted on a freight train

Firstly, a study was carried out to determine the effectiveness of automated visual-based solutions for fastener state detection. An anomaly detection model combining image processing techniques and deep learning

algorithms was developed to detect the fastener state from rail images captured during the vision-based inspection. The model had a high capability of detecting the fastener state from the rail images. However, the model had difficulties detecting the fastener when there were instances of occlusions of fasteners due to the presence of snow and ballast stones and when the image brightness was low.

In Sweden, specifically the northern part of it, the fastening systems are covered under snow for up to six months and thus can inhibit regular fastener inspections that rely on such automated visual inspection methods. To overcome the challenges associated with automated visual inspection systems for fastener state detection, an alternative inspection method using a differential eddy current measurement system (Lindometer) was investigated. Controlled field measurements were carried out along a heavy haul railway line in the north of Sweden to determine the effectiveness of the proposed measurement system. An anomaly detection model based on a supervised machine learning algorithm was developed to detect the fastener state from the controlled eddy current measurements.

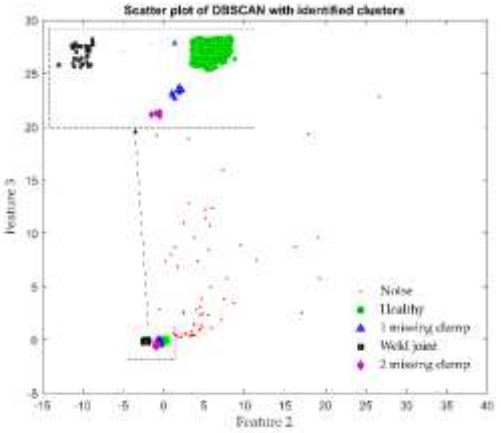

Figure 3 Clusters Identified with the detection mode

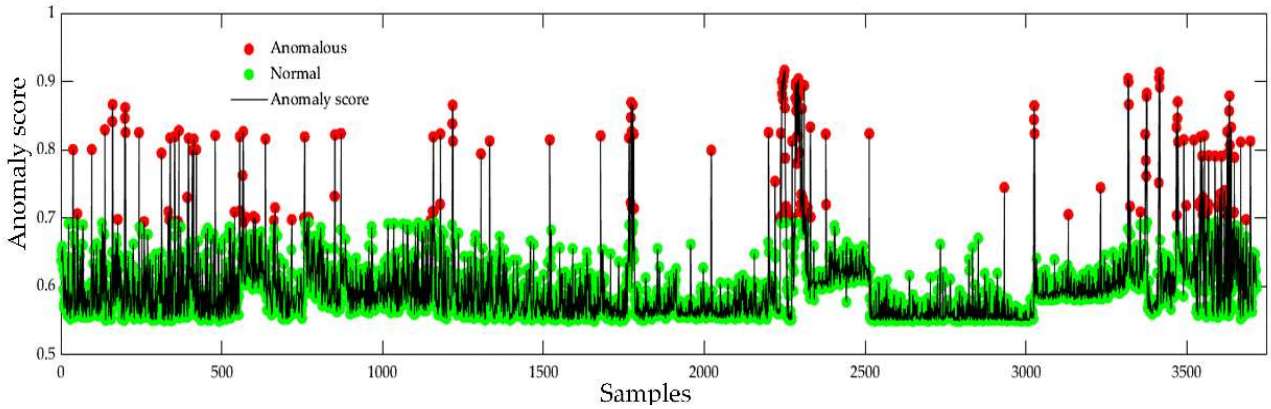

Figure 2 Anomaly score of the detection model. Anomalous points are marked with red indicators and normal/ healthy fasteners with green indicators

The thesis was successfully defended by Praneeth Chandran on 7th April 2022 at the division of Operation and Maintenance Engineering, Luleå University of Technology. The grading committee for the dissertation included Prof. Rolf Dollevoet (Delft University of Technology, Netherlands), Prof Gopika Vinod (Homi Bhabha National Institute, India), Dr. Krister Wolff (Chalmers, Sweden), Prof. Kalevi Juhani Huhtala (Tampere University of Technology, Finland) and Prof. Uday Kumar (LTU, Sweden.

Calendar of Safety and Reliability Events

5th ISO Seminar on International Standardization in the Reliability Technology and Cost Area

ISO/TC67 Vision: International Standards Used Locally Worldwide
1 December 2022
La Défense, Paris France

The ISO/Technical Committee 67/Working Group 4 (ISO TC67/WG4) - "Reliability engineering and technology" which is responsible for reliability and cost related ISO standards in the field of oil & gas industry, including petrochemical and lower carbon energy activities invites to this seminar. This event organized in collaboration with IOGP and TotalEnergies as host will offer a unique opportunity for these industries and others to learn how existing and new multi-disciplinary international ISO standards are enablers for cost-efficiency, risk reduction, and minimizing carbon footprint. Similar seminars have previously been held in USA (2018), Netherlands (2017), Norway (2016), and Brazil (2014).

The objective will be to provide an overview and status of standards developed and demonstration of industry applications. During the seminar, focus will be given to the following:

- ISO 14224 - Collection and exchange of reliability and maintenance data for equipment
- ISO 20815 - Production assurance and reliability management
- ISO/TR 12489 - Reliability modelling and calculation of safety systems
- ISO 19008 - Standard cost coding system for oil and gas production and processing facilities

Target Group: The seminar is aimed for petroleum, petrochemical and natural gas industries, and also lower carbon energy arena (e.g., offshore wind, CCS and hydrogen), and personnel amongst Operators, Contractors and Vendors working across various life cycle phases.

The attendees can be within engineering/technical, safety, operational/maintenance, cost estimation and information technology areas in such companies, also including drilling contractors, engineering and construction firms, equipment manufacturers, safety and reliability consultancies, certification bodies, regulatory and safety authorities, research and development. The multi-disciplinarity of the ISO standards being presented are also relevant to other industry sectors to exchange industry learning and challenges.

Registration: Advance registration is required. Please RSVP by Tuesday, November 15, 2022 to Seminar Host Nicolas Clavé (TotalEnergies S.E., France) by email nicolas.clave@totalenergies.com, with your name, company affiliation, job title, country, and your telephone number. Please also indicate if you will be joining the lunch. Final confirmation and further practical details (e.g., location details and personal ID needs) will be informed to you by Friday, November 18, 2022.

Location:
COMET - COEUR DÉFENSE, 100 Esplanade du Général de Gaulle, Courbevoie 92240, France (close to Total Energies offices at La Défense, Paris)

Date and Time:
Thursday, December 1, 2022, 12:00-18:00 hours CET (advance registration required).

Seminar series on
System Reliability, Risk and Resilience
19 January
Politecnico di Milano, Italy

Prof. Gyunyoung Heo from the Department of Nuclear Engineering, Kyung Hee University, South Korea delivered the seminar on "Global risk and the development of risk assessment".

As the digital, physical and human worlds continue to integrate, we experience a deep transformation in industry, which far-reaches into our lives. The 4th industrial revolution, the internet of things and big data, the industrial internet, are changing the way we design, manufacture, provide products and services. This is creating a complex network of things and people that are seamlessly connected and communicating. It is providing opportunities to make productions systems more efficient and faster, and more flexible and resilient the complex supply chains and distribution networks that tie the global economy. In this fast-pace changing environment, the attributes related to the reliability of components and systems continue to play a fundamental role for industry and those related to safety and security continue to be increasingly of concern, as a right to freedom. The innovations that are being developed have high potential of increased wellbeing and benefits, but also generate new and unknown failure mechanisms, hazards and risks, partly due also to new and unknown functional and structural dependencies. On the other hand, the advancements in knowledge, methods and techniques, the increase in information sharing, data availability and computational capabilities, and the advancements in knowledge that these can bring, offer new opportunities of development for the analysis and assessment of risks. Risk assessment must evolve for addressing these challenges. Development directions are presented, including the use of simulation for accident scenario identification and exploration, the extension of risk assessment into the framework of resilience and business continuity, the reliance on data for dynamic and condition monitoring-based risk assessment.

42nd International Conference on Ocean, Offshore and Arctic Engineering (OMAE 2023)
Structures, Safety and Reliability Symposium
11-16 June
Melbourne Convention and Exhibition Centre, Melbourne, Australia

Join your colleagues from industry, academia, and government at the 42nd International Conference on Ocean, Offshore and Arctic Engineering (OMAE 2023) in Melbourne, Australia from June 11 - 16, 2023.

This is the first time the OMAE conference will be held in Australia. OMAE 2023 will consist of the 11 standard symposia plus 3 special symposia.

Among the standard symposia, there will be one on structures, safety and reliability that will deal with the probabilistic formulations related to the assessment of the reliability of offshore structures.

OMAE 2023 is the ideal forum for researchers, engineers, managers, technicians, and students from the scientific and industrial communities from around the world to meet and present advances in ocean, offshore and arctic engineering.

Be sure to include OMAE 2023 in your plans by submitting an abstract by October 24, 2022 and adding the conference dates of June 11 to 16, 2023 to your calendar/planner. The full publication schedule for OMAE 2023 is available on the conference website (https://event.asme.org/OMAE).

Important Dates:
Abstract Submission: 24 October 2022
Abstract Acceptance: 31 October 2022

Safety and Reliability Symposium Coordinator
Carlos Guedes Soares
(c.guedes.soares@centec.tecnico.ulisboa.pt)

7th International Conference on Transportation Information and Safety (ICTIS 2023)

Connected and Resilient Transportation Systems
4-6 August
Xi'an, China

The 7th International Conference on Transportation Information and Safety (ICTIS 2023), sponsored by China Communications & Transportation Association (CCTA), Canadian Society for Civil Engineering (CSCE), IEEE Intelligent Transportation Systems Society (IEEE-ITSS) and European Safety and Reliability Association, co-organized by Chang'an University, Wuhan University of Technology, University of Granada and Liverpool John Moores University will be held in Xi'an, China on 4-6 August, 2023.

We would like to invite you to submit contributing papers with the research topics regarding transportation information and safety to the ICTIS 2023, especially on the spotlight theme for the 2023 conference: The accepted

papers will be published by the Proceedings of Institute of Electrical and Electronics Engineers (IEEE) and would be indexed by EI (Compendex).

Important Dates
· Abstract Submission Deadline January 15, 2023
· Notification of Abstract Acceptance February 15, 2023
· Submission of Full-Length Paper for Review April 30, 2023
· Paper Acceptance Notification May 15, 2023
· Submission of Revised Paper for Review (if required) June 15, 2023
· Author Notification of Acceptance of Revised Papers June 25, 2023
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Conference Chair
Xinping YAN (Honorary Chair), Academician, Chinese Academy of Engineering, Wuhan and University of University, China.
Xiangmo ZHAO, Professor, President, Xi'an Technological University, China.
Chaozhong WU, Professor, Vice President, Wuhan University of Technology, China.

Conference Secretary
Dr. Zhanwen LIU, Dr. Siyuan GONG, Dr. Lan YANG, Dr. Haigen MIN, Dr. Yi HE, Dr. Naikan DING, Dr. Da WU, Ms. Yu LU
Conference E-mail: ictis@whut.edu.cn

32nd European Safety and Reliability Conference (ESREL 2023)

3-8 September
Southampton, UK

The topic of ESREL 2023 is "The Future of Safety in a Reconnected World".

This reflects our ambition to explore how risk, reliability and safety methodologies can help society address the new challenges of the post COVID< era and as new technologies proliferate. The conference will present technical and scientific papers covering methods and applications in the fields of risk, safety and reliability.

The city of Southampton has long been at the centre of global connectivity, with its rich maritime history. Both the Mayflower and centuries later the Titanic left Southampton dock, to meet very different fates, with the former signifying the irrepressible spirit of hope and the latter signifying hubris and disaster. Both of these voyages offer lessons in the interplay of human and technological factors, both in optimising safety and reliability and in determining what risks should be taken in the first place.

We look forward to welcoming you to Southampton to discuss the latest developments in safety and reliability in a rapidly reconnecting world.

You will find full details of the topic areas and further information about submitting an abstract for the event at the website, www.esrel2023.com .

Important Submission Dates

Special session proposal deadline: 15 December 2022

Abstract submission deadline: 15 January 2023

Full paper/extended abstract submission: 30 March 2023

Full paper/extended abstract acceptance: 30 April 2023

Final Revised Papers: 20 May 2023

Japan Conference on Structural Safety and Reliability (JCOSSAR)

25-27 October
Tokyo, Japan

Japan Conference on Structural Safety and Reliability (JCOSSAR) is held every four years by the Science Council of Japan to enhance the safety and reliability of structures, transcending the disciplinary boundaries.

The structures targeted in this Conference include but not limited to mechanical, bridge, building, geotechnical, offshore, and aerospace structures, industrial and energy plants, ships, automobiles and rail vehicles. The common issues related to the structural safety and reliability are component and system reliability; load measurement and evaluation; design, manufacturing, maintenance, and management; natural and human-caused disasters; risk assessment, insurance, and warranties.

JCOSSAR 2023 invites all stakeholders to share their research, case studies, ideas, and best practices to ensure the safety and reliability of structures. Interim reports on ongoing projects are also highly recommended. We look forward to hearing from academia, practitioners, owners, and governmental and local agencies. The conference is organized by the JCOSSAR 2023 steering committee (the executive society is the Japan Society of Civil Engineering) and supported by the European Safety and Reliability Association (ESRA).

Full paper submission deadline: April 12, 2023
Papers should be submitted via:
https://www.jcossar2023.jp/en/submission-en.html

Other key dates
•June 31, 2023 – Notification of acceptance
•August 21, 2023 – Final revised paper submission
•October 25-27, 2023 – JCOSSAR 2023 at Roppongi, Minato-ku, Tokyo, Japan

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- ESReDA, France
- IDA Risk – Technical Network for Risk Assessment under the Danish Society of Engineers, Denmark
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