PSAM 11 ESREL 2012

11th International Probabilistic Safety Assessment and Management Conference
and
The Annual European Safety and Reliability Conference

Scandic Marina Congress Center, Helsinki, Finland
25–29 June 2012

PROGRAM

Contents

Foreword

Dear colleagues,

It is our pleasure to welcome you to PSAM11 & ESREL 2012, jointly organized by the International Association of Probabilistic Safety Assessment and Management (IAPSAM) and the European Safety and Reliability Association (ESRA).

We hope the conference will provide an interesting platform for presenting and discussing developments and applications related to safety, reliability and risk assessment methods.

Following a number of successful meetings in the past, this year's conference program is a blend of ESREL – PSAM traditions and Nordic Footprints in the safety assessment field. The technical program comprises papers covering all of the major areas of reliability and risk assessment methods and applications, including nuclear, process and chemical industries, offshore and marine, space and aviation, civil engineering, financial management, information technology, medical technology, just to name a few. In addition to the typical PSAM & ESREL topics, we would like to draw your attention to several special sessions covering issues like Imprecise Probabilities, Passive Safety Systems, the Fukushima Accident and many others – no less than 25 altogether.

Originally, about 1000 abstracts were submitted. Following the review by the Technical Program Committee, approximately 750 full papers in 30 technical tracks were accepted and are included in the program. The work and effort of the peers involved in the Technical Program Committee in helping the authors to improve their papers are greatly appreciated. Special thanks go to the track leaders and organizers of the Special Sessions, for their work.

In addition to the technical sessions, each conference day includes a plenary session in the morning. The plenary talks cover topics ranging from important methodological issues in reliability and risk assessment to safety goals and major nuclear and offshore accidents.

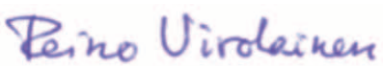
Besides the technical program, the conference also offers an exhibition where you have the opportunity to learn about commercial products and services, and meet the conference sponsors.

At Tuesday luncheon, four "early career" individuals who have been active in the field of Risk Assessment will be awarded with the George Apostolakis Fellowship. The Honorary Chairman, Commissioner USNRC, George Apostolakis, will introduce the award-winning young scientists.

We would like to acknowledge the local organizer, STUK (Radiation and Nuclear Safety Authority), VTT (Technical Research Centre of Finland), Aalto University and the Finnish Nuclear licensees, Fortum and TVO, and the conference secretariat, CONGREX / Blue & White Conferences Oy, for their careful planning of the practical arrangements.

In addition to a versatile technical program, the meeting attendees have a unique opportunity to enjoy the Nordic "nightless nights" in Helsinki, the World Design Capital 2012.

Thank you for your participation in this conference and welcome to Helsinki.



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Radiation and Nuclear Safety Authority (STUK)

Terje Aven
Technical Program Chair
University of Stavanger

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Akira Yamaguichi
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Robert Youngblood
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Organizers and Sponsors

Exhibitors

The George Apostolakis Fellowship

This Fellowship is awarded to honor the singular contribution of George Apostolakis to the Science of Risk as well as his vision, energy and guidance generously given to IAPSAM.

The George Apostolakis Fellowship is to be awarded to an "early career" individual who is active in the field of Risk Assessment. We wish to identify an individual who may be one of tomorrow's leaders in the advancement of probabilistic safety assessment and management.

A broad definition of "early career" is purposefully chosen. Candidates could be advanced undergraduates, graduate students, post graduate researchers or early career professionals. Candidates are to be nominated by a professor, a colleague or a supervisor.

The George Apostolakis Fellows will receive transportation allowance to attend the PSAM conference, complimentary participation, hotel accommodation during the conference, small stipend for incidental costs, a plaque commemorating the award and an honored place on the meeting agenda for a technical presentation.

It is intended that additional Fellows will be chosen for recognition at future PSAM meetings.

Dr. George Apostolakis
Commissioner of the U.S. Nuclear Regulatory Commission (NRC)

Reece Clothier
Senior Research Fellow
Australian Research Centre for Aerospace Automation
Science and Engineering Faculty, Queensland University of Technology, Australia

Presentations given by Reece Clothier:
21-We4-3 and 21-Th4-4

Dr. Reece Clothier completed his Bachelor of Engineering majoring in Aerospace Avionics, with first class honours and the University Medal in 2004 at the Queensland University of Technology (QUT), Brisbane, Australia.

In 2006, Reece was one of only eight postgraduate students to be awarded a Queensland State Government Smart State PhD scholarship for his PhD research in the safe design and operation of Unmanned Aircraft Systems (UAS).

Reece initiated and is an active member of a number of industry forums for the development of safety regulations for civil UAS. He has chaired the Australian Aviation Industry Forum, Sub-Committee on UAS Certification and Regulation and is a member of the Civil Aviation Safety Authority, Standards Consultative Committee, Sub-Committee for the review of Regulations and Guidance Material for UAS (Project OS 11/20).

Reece has also consulted to industry on Australian airspace management and reform, has advised the Australian Department of Defence on matters relating to UAS airworthiness, and has developed quantitative risk assessment tools for the Defence Science and Technology Organisation. Through these and other initiatives, Reece has been able to practically apply his research to ensure the risk-informed development of safety regulations for UAS.

Dr. Clothier is also a strong advocate for the civil UAS industry. He is on the Steering and Technical Committees for the UAV Outback Rescue Challenge and was a founding Board Member of the Association for Unmanned Vehicle Systems – Australia.

Katrina Groth
Senior Member of Technical Staff in Risk and Reliability Analysis
Sandia National Laboratories in Albuquerque, NM, USA

Presentations given by Katrina Groth:
16A-We3-3 and 02BS-Fr2-2

Dr. Katrina Groth is a Senior Member of Technical Staff in Risk and Reliability Analysis at Sandia National Laboratories in Albuquerque, NM, USA.

Dr. Groth received her PhD in Reliability Engineering in 2009 from the University of Maryland. She also holds an MS in Reliability Engineering (2008) and a BS in Nuclear Engineering (2004) from the University of Maryland. At UMD, Dr. Groth worked with Professor Ali Mosleh in the area of Bayesian analysis, Probabilistic Risk Assessment, and decision making under uncertainty. Dr. Groth has authored or co-authored several conference and journal papers related to risk analysis in both nuclear power and aviation applications.

While at UMD, Dr. Groth participated in the development of a methodology and software package (Trilith) that extends traditional PRA to incorporate soft causal factors (such as human, software, and organizational risks), using Bayesian Belief Networks (BBNs). The methodology allows analysts to apply familiar risk metrics (e.g., importance measures, risk indicators) to non-deterministic system elements.

Dr. Groth's dissertation focused on improving human performance models used in nuclear power plant Human Reliability Analysis. Using a combination of available human performance data and expert models, she developed a BBN that can assess human error probability based on specific aspects of the context. This BBN is the first attempt to fully integrate a causal model of human performance into traditional PRA.

She is currently researching Bayesian statistical methods for aggregating various types of data (including subjective information) to produce a more robust human performance BBN. She hopes to reduce the difficulty of quantifying Bayesian Belief Networks, so they are more accessible for decision makers without advanced statistical expertise.

Brian Johnson
PRA Analyst
TerraPower, LLC, USA

Presentations given by Brian Johnson:
16C-Th3-2

Dr. Brian Johnson is a Probabilistic Risk Assessment (PRA) Analyst at TerraPower. He is leading the effort to develop a Level-1 PRA for the traveling wave reactor as well as developing the NQA-1 procedures related to the PRA. Additionally, he provides risk information to guide design of safety systems such as the decay heat removal system. Before joining TerraPower, he studied Nuclear Science and Engineering at the Massachusetts Institute of Technology (MIT).

He wrote his thesis on the topic of applying risk information to sodium fast reactor licensing and design. His work was done as part of a multi-university Nuclear Energy Research Initiative study with MIT, The Ohio State University, and Idaho State University entitled "Risk-informed Balancing of Safety, Non-proliferation, and Economics for the Sodium-cooled Fast Reactor (SFR)." He graduated summa cum laude with a B.S. in Nuclear Engineering from Oregon State University.

Zahra Mohaghegh
Soteria Consultants, USA (www.soteriaconsultants.com)

Presentations given by Zahra Mohaghegh:
16C-Fr2-4

Dr. Zahra Mohaghegh is the founder and principal research scientist at Soteria Consultants, a startup risk management consulting enterprise which supports proactive decision making for technological systems by collaborating with a cross-disciplinary group of experts from regulatory agencies, academia, national labs, and industry. Her contribution to modeling large-scale complex systems was also recognized by the Zonta International Amelia Earhart Award.

Dr. Mohaghegh earned her M.Sc. and Ph.D. in Reliability Engineering from the University of Maryland (UMD) and worked as a post-doctoral research associate at the Center for Risk and Reliability at UMD. Her Ph.D. and post-doc gave her an opportunity to focus on the incorporation of both social and physical failure mechanisms into Probabilistic Risk Assessment (PRA). She pioneered the integration of Bayesian Belief Networks and System Dynamics with the classical PRA techniques to quantify multidisciplinary risk frameworks.

Zahra is interested in promoting research and education in risk and reliability analysis. Examples include her studies on failure phenomenology and causal modeling, the treatment of dependent failures, Probabilistic Physics-Of-Failure, risk-informed decision making, Human Reliability Analysis, and safety culture & organizational risk factors. Her research has been of interest to regulatory agencies such as the U.S. Federal Aviation Administration (FAA) and the U.S. Nuclear Regulatory Commission (NRC).

Dr. Mohaghegh is the author of the book, Socio-Technical Risk Analysis, and over twenty journal and conference papers on risk analysis. She has offered a number of courses in advanced methods of reliability and risk analysis, and taught the first risk management workshop, sponsored by the Nuclear Energy Institute (NEI), at the 2011 U.S. Women in Nuclear conference. Zahra has been on technical committees for international conferences and as a technical reviewer for journals. She is a member of the American Nuclear Society, Society for Risk Analysis, Society of Women Engineers, and American Society of Mechanical Engineers. Dr. Mohaghegh also holds a B.S. in Mechanical Engineering.

Previous PSAM Conferences

PSAM 1
Beverly Hills, CA, USA, February 1991
General and Technical Program Chair: G. E. Apostolakis

PSAM 2
San Diego, CA, USA, March 1994
General Chair: M. G. Stamatelatos
Technical Program Chair: G. E. Apostolakis

PSAM 3
(Held in conjunction with ESREL'96)
Crete, Greece, June 1996
General Chair: I. A. Papazoglou
Technical Chair: P. C. Cacciabue

PSAM 4
New York, New York, USA, September 1998
General Chair: R. A. Bari
Technical Program Chair: A. Mosleh

PSAM 5
Osaka, Japan, November 2000
Honorary Chair: H. Uchida
General Chair: S. Kondo
Technical Program Chairs: S. Kondo and K. Furuta

PSAM 6
San Juan, Puerto Rico, USA, June 2002
General Chair: E. J. Bonano
Technical Program Chair: A. L. Camp
Technical Program C-Chair: A. Ghassemi

PSAM 7
(held in conjunction with ESREL 2004)
Berlin, Germany, June 2004
General Chair: C. Spitzer
Technical Program Chair: U. Schmocker
Associate General Chair: E. Zio
Technical Program C-Chairs: S. Chakraborty, M. Faber, and S. Hirschberg

PSAM 8
New Orleans, USA, May 2006
General Co-Chairs: D. Johnson and L. J. Steinberg
Technical Program Co-Chairs: H. Blackman and M. Stamatelatos

PSAM 9
Hong Kong, China, May 2008
General Chair: V. Ho
Technical Program Chair: Tsu-Mu Kao
Associate Technical Program Chair: E. Zio

PSAM 10
Seattle, USA, June 2010
General Chair: Bruce Hallbert
Technical Program Chair: Harold S. Blackman

Previous ESREL Conferences

ESREL 2001	European Safety and Reliability Conference Torino, Italy, September 16-20, 2001
ESREL 2002	European Safety and Reliability Conference Lyon, France March 18-21, 2002
ESREL 2003	European Safety and Reliability Conference Maastricht, Netherlands June 15-18, 2003
ESREL 2004 / PSAM 7	European Safety and Reliability Conference and Int. Conf. on Probabilistic Safety Assessment and Management Berlin, Germany June 14-18, 2004
ESREL 2005	European Safety and Reliability Conference Tri City, Poland June 27-30, 2005
ESREL 2006	European Safety and Reliability Conference Estoril, Portugal September 18-22, 2006
ESREL 2007	European Safety and Reliability Conference Stavanger, Norway June 25-27, 2007
ESREL 2008 / 17th SRA-Europe Annual Conference	European Safety and Reliability Conference Valencia, Spain September 22-25, 2008
ESREL 2009	European Safety and Reliability Conference Prague, Czech Republic September 7-10, 2009
ESREL 2010	European Safety and Reliability Conference Rhodes, Greece September 5-9, 2010
ESREL 2011	European Safety and Reliability Conference Troyes, France September 18-22, 2011

General Information

Airport Transportation
Finnair provides regular bus transportation between the Helsinki-Vantaa Airport and the City Terminal near the Railway Station at a cost of approximately 6 €. Taxis between the Airport and the Helsinki city centre cost approximately 40 € (30 minutes). Group taxis are also available at the airport (Yellow Line and Airport Taxi, cost approximately 25 € per person).

Registration and Information Desk

Participants can pick up their personal conference material at the registration desk. The registration desk will be open at Scandic Grand Marina Hotel before the conference as follows:

- Sunday, 24 June 2012 at 17:00–21:00

The registration desk will be open at Marina Congress Center during the conference as follows:

- Monday, 25 June 2012 at 08:00–18:00
- Tuesday, 26 June 2012 at 08:00–18:00
- Wednesday, 27 June 2012 at 08:00–18:00
- Thursday, 28 June 2012 at 08:00–18:00
- Friday, 29 June 2012 at 08:00–16:00

The conference secretariat will be available to assist you during the entire conference at Marina Congress Center.

Language
The conference language is English. There will be no interpretation.

Name Badges
Participants and accompanying persons are obliged to wear the official conference name badges at all conference events. An additional fee will be charged for reproduction of lost name badges.

Photographing, Recording and Mobile Phones
Photographing or recording of oral presentations is not allowed. Mobile phones should be switched off in the lecture halls since they may interfere with the audio system of the halls.

Lunch and Refreshments
Lunch is not included in the participants' registration fee except for Tuesday, however, light lunches can be purchased at Marina Congress Center (15 €). Coffee and tea will be available in the lobby areas during the morning and afternoon coffee breaks. Other lunch options are available e.g. at Scandic Grand Marina Hotel.

Non-Smoking Policy
Smoking will be prohibited in the conference and exhibition areas. Smoking is allowed only outside Marina Congress Center in designated smoking areas.

Cloakroom
Cloakroom is available free of charge next to the entrance on the first (ground) floor of Marina Congress Center.

Conference Assistants
Conference assistants and in-house technical staff are assisting in practical issues in the lecture halls before and during the sessions (e.g. setting up the presentations on the computers and handing microphones for questions).

Internet Connections
Wireless internet connection is available at Marina Congress Center in the lobby areas. User id's and passwords will be available at the registration desk. In addition, two workstations are available close to the registration desk for internet access. Please limit the use to 5 minutes at a time to allow also other participants to use the computers.

Public Transportation
Helsinki has a good public transportation system. Trams operate frequently and the closest tram stop is available just one block away from the Scandic Grand Marina Hotel.

Certificate of Attendance
All participants will receive a certificate of attendance during the conference together with the conference material.

Currency and Credit Cards
The official currency in Finland is euro (€). Most major credit cards are accepted in hotels and shops. VISA, Eurocard and MasterCard are accepted at the conference registration desk.

First Aid
The general emergency phone number is 112. You can call this number free of charge from any phone, including foreign mobile phone connections, without any area code. In genuine emergencies, when someones life, health or property is in danger, just call 112.

Liability
By registering into the conference and/or by participating in the exhibition joined to the conference, participants agree that neither the organizing committee nor the conference secretariat assume any responsibility for damage or injuries to persons or property during the conference. Participants and exhibitors are adviced to organize their own health, travel and personal insurances.

Social Program

The following social events are arranged as part of the conference program:

Welcome Reception
Date: Monday, 25 June 2012
Time: 19:00 – 21:00
Venue: Scandic Marina Congress Center, Exhibition and lobby areas
Address: Katajanokanlaituri 6
Dress code: Informal

Conference Luncheon
Date: Tuesday, 26 June 2012
Time: 11:40 – 13:10
Venue: Scandic Marina Congress Center, Fennia 1 and Fennia 2
Address: Katajanokanlaituri 6
Dress code: Informal

Conference Dinner
Date: Wednesday evening, 27 June 2012
Time: 19:00 – 23:30
Venue: Hilton Helsinki Kalastajatorppa
Address: Kalastajatorpantie 1
Dress code: Smart casual
Bus transportation will be provided at 19:00. Return shuttle buses starting at 22:30.

Helsinki City Reception
Date: Thursday, 28 June 2012
Time: 19:30 – 21:00
Venue: Helsinki City Hall
Address: Pohjoisesplanadi 11-13
Dress code: Smart casual
Short walking distance from the Conference Venue, by Market Square.

Excursion

Visit to Olkiluoto Nuclear Power Plant
Date: Saturday, 30 June 2012
Time: 08:00 – 20:00
Venue: Olkiluoto NPP
Dress code: Informal
Bus transportation will be provided.

Conference Halls and Exhibition Stands

Halls on the first (ground) floor
- Europaea
- Nautica
- Press Room

Halls on the second floor
- Fennia 1
- Fennia 2
- Nordia
- Baltica
- Marine Room

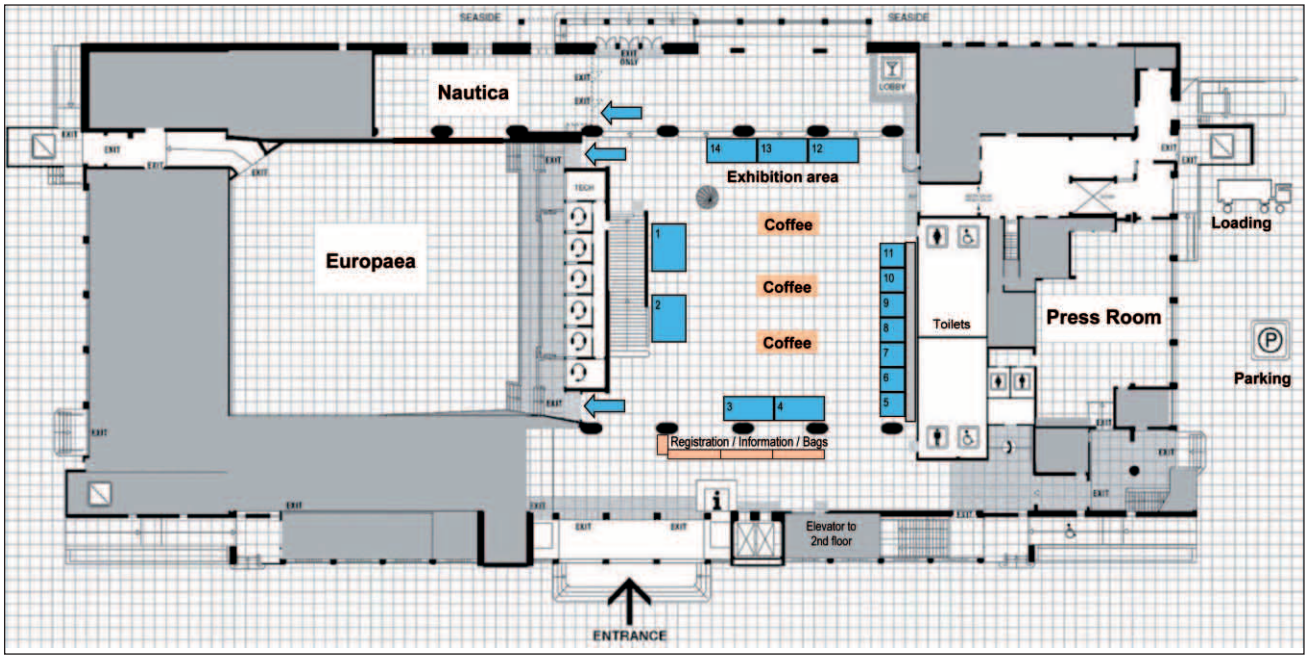
Rooms at Scandic Grand Marina Hotel
- Eliel First (ground) floor near the hotel reception
- Selim First (ground) floor near the hotel reception

Auditorium at Kino K13
- Kino K13 Auditorium First (ground) floor
  (about 100 meters from Marina Congress Center)

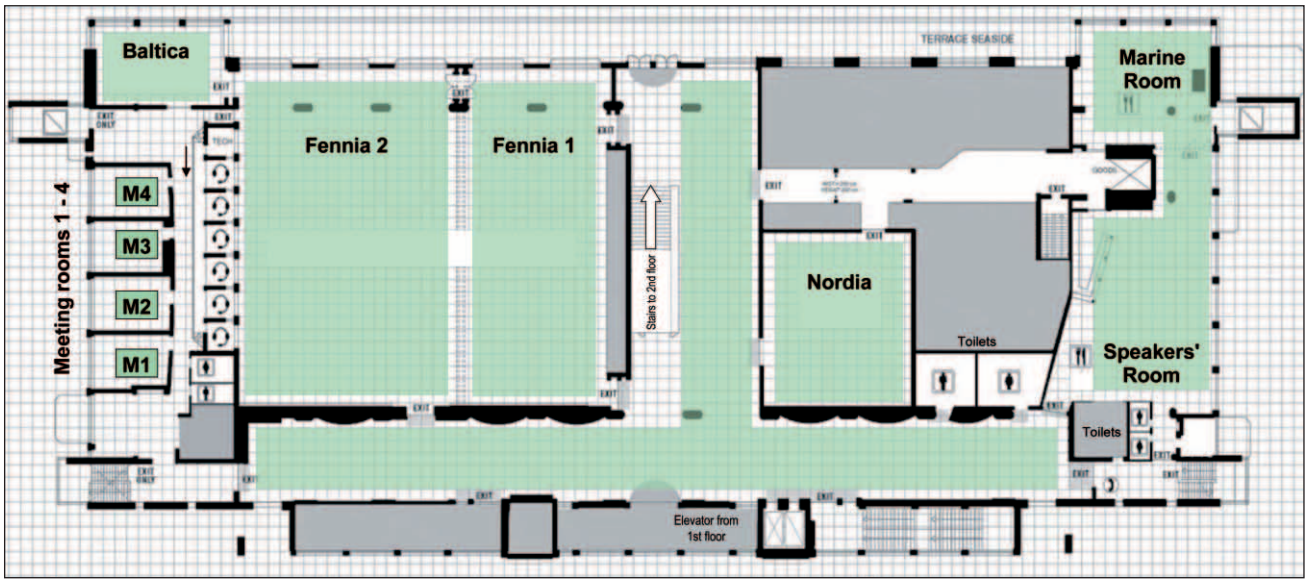
Exhibition stands
01 STUK / VTT
02 Scandpower
03 Fortum
04 TVO
05 Item Software
06 Engineering Planning and Management
07 Proactima
08 SAGE
09 Jacobsen Analytics
10 ESRA / IAPSAM
11 Safetec Nordic
12 Isograph
13 DNV
14 ReliaSoft Corporation

Floor Plans of Marina Congress Center

First (ground) floor



Second floor



Instructions for Chairs and Speakers

Session Chair Instructions

Please be present at your session room at least 15 minutes prior to the start of your session. This will allow you to greet and coordinate media arrangements with the speakers and the room assistant, as well as collect possible biographical sketches (these should be very brief). Alternatively, you can ask each presenter to introduce herself / himself shortly.

A laptop will be provided and set-up in each of the session rooms for the speakers' PowerPoint presentations. You may find it helpful to bring your own laptop and upload the speakers' presentations prior to your session.

For the sake of the meeting attendees, please keep the session synchronized as shown in the final program. You are supposed to signal the presenter when there is 3 minutes remaining in the time slot. Moderate the discussion after each presentation and restrict the discussion if necessary due to the time constraints. Before ending the session, please summarize the session briefly if you find it worthwhile.

Speaker Instructions

PowerPoint or PDF presentations of Monday morning should be delivered preferably already upon registration on Sunday evening at Scandic Grand Marina Hotel. Speaker's room is located on the 2nd floor Restaurant at Marina Congress Center starting on Monday morning. Minor modifications of PowerPoint presentations can also be done in the speaker's room. PowerPoint presentations should be delivered at the latest 3 hours before the starting time of the session or during the day before your presentation.

Only single projection using Microsoft PowerPoint or PDF files will be available in the session rooms. Apple computers, slide projectors or overhead projectors are not available.

Each oral presentation should last not more than 15 minutes following maximum 5 minutes of discussion. The time for the discussion depends on the number of presentation in the session. Speakers are asked to adhere strictly to the 15 minute limit. The chairperson will interrupt the talk if you overrun the time.

Fifteen minutes before the start of their session, all speakers are encouraged to sit in the front row of the session hall close to the speaker podium and to introduce themselves to the session chair and to the hall assistant on duty. This will allow the session chairman to introduce you properly to the audience and the assistant to familiarize you with the audiovisual equipment available in the session hall.

Technical Program Tracks

Number	Abbreviation	Name
01	MAINTENANCE	Maintenance – Modeling and Applications
02	MATHEMATICS	Mathematical Methods in Reliability and Safety
03	UNCERTAINTY	Uncertainty and Sensitivity Analysis
04	OCCUPATIONAL	Occupational Safety
06	DATA	Data Collection and Analysis
07	DSS	Decision Support Systems for Safety and Reliability
08	STOCHASTIC	Stochastic Modeling and Simulation Techniques
09	STRUCTURAL	Structural Reliability
10	SOFTWARE	Software Reliability
11	RISK GENERIC	Risk Assessment – Generic Applications and Methods
12	RISK PERC	Risk Perception and Communication
13	NON-PROB	Non-Probabilistic/Soft Methods in Reliability Analysis
14	ACCIDENT	Accident and Incident Modeling
15	CIVIL FIRE	Civil Engineering – Fire Safety
16	PRA NPP	Probabilistic Risk Assessment – Nuclear
17	RISK MANAG	Risk Management – Risk Informed Assessment
18	SECURITY	Security
19	ECONOMIC	Economic and Finance
20	INDUSTRIAL	Industrial Reliability and Risk Assessment
21	AVIATION	Aviation and Space Safety
22	EXTERNAL	External and Environmental Risks
23	OFFSHORE	Offshore and Marine
24	INFRA	Infrastructures
25	HEALTH	Health Care and Patient Safety
26	SIL	Safety Integrity Level
27	HUMAN ORG	Human and Organizational Factors and Safety Culture
28	TRANSPORT	Transportation
29	EPISTEMIC	Uncertainties in Risk Informed Decision Making
30	IMPORTANCE	Importance Measures
31	CRISIS	Crisis and Accident Management
XX	S	Special Sessions

01 - MAINTENANCE:	**Maintenance - Modeling and Applications**
01-Mo2	Advances in maintenance modeling 1
01S-Mo3	Maintenance of transportation systems
01S-Mo4	Covariate-driven maintenance
01S-Mo5	Asset management and maintenance
01-Tu2	Condition based maintenance
01-Tu3	Maintenance modeling and optimization of complex systems
01-Tu4	Reliability centred maintenance
01-Tu5	Preventive maintenance
01-We2	Overview, discussions and new approaches
01-We3	Modeling tools and software for maintenance analyses
01-We4	Predictive maintenance
01S-Th2	System health monitoring, fault diagnosis and prognosis
01-Th5	Advances in maintenance modeling 2
02 - MATHEMATICS:	**Mathematical Methods in Reliability and Safety**
02-Mo2	Analysis of networked systems
02-Tu5	Bayesian analysis and simulation
02-We2	Dynamic analysis
02S-We3	Bayesian network applications 1
02AS-We4	Bayesian network applications 2
02B-We4	Reliability analysis
02-Th2	Markovian models
02-Th3	Stochastic modeling in reliability
02-Th4	Risk analysis
02-Th5	Probabilistic and statistical modeling and analysis
02A-Fr2	Statistical failure analysis
02BS-Fr2	HRA and Bayesian analysis
02-Fr3	Tools for RAMS assessment
03 - UNCERTAINTY:	**Uncertainty and Sensitivity Analysis**
03-Mo2	Sensitivity analysis
03-Mo3	Uncertainty analysis 1
03S-Tu2	Uncertainty analysis 2
03-Tu4	Uncertainty and sensitivity
04 - OCCUPATIONAL:	**Occupational Safety**
04-Mo5	Occupational risk modeling
04-Tu2	Occupational risk
04-Tu3	Occupational risk assessment
06 - DATA:	**Data Collection and Analysis**
06-Mo5	Statistical data analysis (non-nuclear)
06-Tu5	Data collection and analysis (non-nuclear)
07 - DSS:	**Decision Support Systems for Safety and Reliability**
07-We2	DSS case studies
08 - STOCHASTIC:	**Stochastic Modeling and Simulation Techniques**
08-Mo2	Stochastic modeling – case studies
08-Mo3	Fire risk modeling and simulation
08-We2	Stochastic simulation for reliability and risk analysis
09 - STRUCTURAL:	**Structural Reliability**
09-Mo2 **>>> 09-Tu5**	Reliability and concrete structures
09-Mo3	Structural reliability and degradation modeling 1
09-Mo4	Structural reliability and degradation modeling 2
09-We3	Structural reliability and degradation modeling 3

10 - SOFTWARE:	**Software Reliability**
10-We3	I&C reliability models 1
10-Th2	Software reliability assessment 1
10-Th3	Software reliability assessment 2
10-Th4	Failure modes identification and classification
10-Th5	I&C reliability models 2
10S-Fr2	Safety systems for real time applications 1
10S-Fr3	Safety systems for real time applications 2
11 - RISK GENERIC:	**Risk Assessment – Generic Methods and Applications**
11-Mo4	Risk assessment 1
11-Tu2	Risk management 1
11-Tu3	Risk management 2
11-Tu4	Nuclear spent fuel safety
11-Tu5	Risk assessment 2
12 - RISK PERC:	**Risk Perception and Communication**
12-Tu3	Risk and reliability criteria
12-We4	Risk perception and communication
12-Th3	Risk assessement – fundamental issues
13 - NON-PROB:	**Non-Probabilistic/Soft Methods in Reliability Analysis**
13-Th2	Expert judgments
13-Fr2	Non-probabilistic analyses
14 - ACCIDENT:	**Accident and Incident Modeling**
14-Mo4	Risk assessment – consequence analysis
15 - CIVIL FIRE:	**Civil Engineering – Fire Safety**
15-Mo2	Fire safety
16 - PRA NPP:	**Probabilistic Risk Assessment – Nuclear**
16AS-Mo2	Deterministic-probabilistic safety assessment
16BS-Mo2	Passive systems – design
16A-Mo3	Modeling and data analysis
16BS-Mo3	NRC HRA data
16A-Mo4	PRA development – overview
16BS-Mo4	Passive systems – innovative reactor concepts
16C-Mo4	Codes and tools 1
16A-Mo5	Dynamic PRA
16BS-Mo5	Passive systems - advanced reactors
16C-Mo5	Codes and tools 2
16S-Tu2	Fukushima accident 1
16-Tu3	Fukushima – panel discussion
16A-Tu4	Data analysis
16B-Tu4	HRA based on empirical study
16C-Tu4	PRA Level 2 and 3
16A-Tu5	RI applications
16B-Tu5	New HRA methods 1
16C-Tu5	PRA Level 2 related applications
16AS-We2	Fukushima accident 2
16BS-We2	Very long term storage of radioactive waste 1
16A-We3	New HRA methods 2
16BS-We3	Very long term storage of radioactive waste 2
16A-We4	Shutdown and spent fuel analyses
16B-We4	Advances in fault tree and event tree methods
16AS-Th2	Fukushima accident 3
16B-Th2	Fire methods and applications 1
16A-Th3	Risk monitors

16B-Th3	Comparison of HRA methods
16C-Th3	Other reactor types
16D-Th3	Fire methods and applications 2
16A-Th4	RI maintenance, testing and technical specifications
16B-Th4	HRA applications 1
16C-Th4	Fire methods and applications 3
16A-Th5	PRA case studies
16B-Th5	HRA applications 2
16C-Th5	Data collection and analysis for fire PRA
16AS-Fr2	Fukushima and stress tests
16B-Fr2	HRA applications 3
16C-Fr2	CCF and dependences
16A-Fr3	Modeling power systems
16B-Fr3	HRA – panel discussion: Errors of commission – Where do we stand?
16C-Fr3	NPP reliability data

17 - RISK MANAG:	**Risk Management – Risk Informed Assessment**
17-Mo2	RI decision making in nuclear domain – applications
17-Mo3	NPP ageing issues
17-Mo4	Methodological approaches to support risk management
17-Mo5	Regulatory insights and experiences on RI approaches
17-Tu2	RI inspections
17-Tu3	PRA in risk management
17-Tu4	Safety assessment, management and goals
17S-We2	Severe accident management guidance
17-Fr2	RI approaches for regulatory oversight

18 - SECURITY:	**Security**
18-Tu2	Security methods and applications
18-Tu3	Security methods

19 - ECONOMIC:	**Economic and Finance**
19-Th3	Economic and financial issues

20 - INDUSTRIAL:	**Industrial Reliability and Risk Assessment**
20-Mo3	Safety management and safety performance
20-Mo5	Industrial analysis approaches and cases 1
20-Tu2	Reliability analysis
20-Tu4	Automotive systems
20-Tu5	Risk management
20-We2	Fires and explosions
20-We3	RAMS 1
20-Th2	Learning from incidents
20-Th3	Risk assessment applications 1
20-Th4	Risk assessment applications 2
20-Th5	Industrial analysis approaches and cases 2
20-Fr2	RAMS 2
20-Fr3	Risk assessment applications 3

21 - AVIATION:	**Aviation and Space Safety**
21S-Tu4	Managing system changes in aviation – novel issues for PRA
21-We3	Critical issues in aviation – safety performance 1
21-We4	Aviation safety management
21-Th2	Aerospace safety management
21-Th4	Critical issues in aviation – safety performance 2

22 - EXTERNAL:	**External and Environmental Risks**
22-We2	External hazards 1
22-We3	Seismic risk – applications

22-We4	Seismic risk – methodology
22-Th2	External hazards 2
22-Th5	Environmental impact assessments
22-Fr2	Environmental impact and climate change
22-Fr3	Flooding risks
23 - OFFSHORE:	**Offshore and Marine**
23S-Mo3	Risk analysis methodologies in marine safety
23-Tu2	Oil and gas risk assessment
23-Tu3	Drilling risk assessment
23-Tu4	Marine operations risks
23-Tu5	Marine transportation risk assessment
23-We2	Offshore risk management
24 - INFRA:	**Infrastructures**
24-Mo2	Critical infrastructures 1
24-Mo3	Critical infrastructures 2
24-Mo4	Water systems
24S-We4	Vulnerability of critical infrastructures 1
24S-Th5 **>>> 24S-We5**	Vulnerability of critical infrastructures 2
25 - HEALTH:	**Health Care and Patient Safety**
25-Th4	Health care 1
25-Fr3	Health care 2
26 - SIL:	**Safety Integrity Level**
26-Tu5	SIL decision support
26-We3	SIL specific issues
26-Fr2	SIL high-level considerations
27 - HUMAN ORG:	**Human and Organizational Factors and Safety Culture**
27-Mo2	Cognition, context and HRA
27-Mo3	Human factors engineering
27-Mo4	Key issues in HRA development
27-Mo5	HRA in team and organization level
27-Tu4	Organizational learning and modeling
27-We2	Risk and safety behaviour
27-We3	Safety culture in complex systems
27-We4	Safety culture and indicators
27-Th2	Organizational factors and safety
27-Th3	Safety culture
27-Th4	Key issues in safety management
28 - TRANSPORT:	**Transportation**
28-We4	Railway safety
28-Th5	Modeling and applications – transportation
28-Fr3	Railway safety and reliability modeling
29 - EPISTEMIC:	**Epistemic Uncertainty – Risk Informed Decision Making**
29-Mo4	Dana Kelly memorial: Epistemic uncertainties 1
29-Mo5	Epistemic uncertainties 2
29-Tu3	Model uncertainties and validation
30 - IMPORTANCE:	**Importance Measures**
30-Th4	Importance measures
31 - CRISIS:	**Crisis Management**
31-Th5	Vulnerability and resilience analysis

Program Outline – Monday, 25 June 2012

	Europaea	Fennia 2	Fennia 1	Nordia	Nautica	Press room
09:00-10:30 **Opening and plenary** **Mo1**	Opening PL-Mo1 Plenary					
10:30-11:00	COFFEE BREAK					
11:00-12:20 **Parallel sessions** **Mo2**	PRA NPP 16AS-Mo2 Deterministic-probabilistic safety assessment	PRA NPP 16BS-Mo2 Passive systems - design	HUMAN ORG 27-Mo2 Cognition, context and HRA	UNCERTAINTY 03-Mo2 Sensitivity analysis	MAINTENANCE 01-Mo2 Advances in maintenance modeling 1	MATHEMATICS 02-Mo2 Analysis of networked systems
12:20-13:50	LUNCH BREAK					
13:50-15:10 **Parallel sessions** **Mo3**	PRA NPP 16A-Mo3 Modeling and data analysis	PRA NPP 16BS-Mo3 NRC HRA data	HUMAN ORG 27-Mo3 Human factors engineering	UNCERTAINTY 03-Mo3 Uncertainty analysis 1	MAINTENANCE 01S-Mo3 Maintenance of transportation systems	INDUSTRIAL 20-Mo3 Safety management and safety performance
15:10-15:40	COFFEE BREAK					
15:40-17:00 **Parallel sessions** **Mo4**	PRA NPP 16A-Mo4 PRA development - overview	PRA NPP 16BS-Mo4 Passive systems - innovative reactor concepts	HUMAN ORG 27-Mo4 Key issues in HRA development	EPISTEMIC 29-Mo4 Dana Kelly memorial: Epistemic uncertainties 1	MAINTENANCE 01S-Mo4 Covariate-driven maintenance	RISK GENERIC 11-Mo4 Risk assessment 1
17:00-17:30	FRUIT BREAK					
17:30-18:30 **Parallel sessions** **Mo5**	PRA NPP 16A-Mo5 Dynamic PRA	PRA NPP 16BS-Mo5 Passive systems - advanced reactors	HUMAN ORG 27-Mo5 HRA in team and organization level	EPISTEMIC 29-Mo5 Epistemic uncertainties 2	MAINTENANCE 01S-Mo5 Asset management and maintenance	INDUSTRIAL 20-Mo5 Industrial analysis approaches and cases 1
19:00-21:00	**Welcome Reception at Marina Congress Center**					

Baltica	Marine room	Eliel (hotel)	Selim (hotel)	Kino K13	
		Session moved to 09-Tu5			09:00-10:30 Opening and plenary Mo1
COFFEE BREAK					10:30-11:00
INFRA	RISK MANAG	STRUCTURAL	STOCHASTIC	CIVIL FIRE	11:00-12:20 Parallel sessions Mo2
24-Mo2	17-Mo2	09-Mo2	08-Mo2	15-Mo2	
Critical infrastructures 1	RI decision making in nuclear domain - applications	Reliability and concrete structures	Stochastic modeling - case studies	Fire safety	
LUNCH BREAK					12:20-13:50
INFRA	RISK MANAG	STRUCTURAL	STOCHASTIC	OFFSHORE	13:50-15:10 Parallel sessions Mo3
24-Mo3	17-Mo3	09-Mo3	08-Mo3	23S-Mo3	
Critical infrastructures 2	NPP - ageing issues	Structural reliability and degradation modeling 1	Fire risk modeling and simulation	Risk analysis methodologies in marine safety	
COFFEE BREAK					15:10-15:40
INFRA	RISK MANAG	STRUCTURAL	ACCIDENT	PRA NPP	15:40-17:00 Parallel sessions Mo4
24-Mo4	17-Mo4	09-Mo4	14-Mo4	16C-Mo4	
Water systems	Methodological approaches to support risk management	Structural reliability and degradation modeling 2	Risk assessment - consequence analysis	Codes and tools 1	
FRUIT BREAK					17:00-17:30
DATA	RISK MANAG	OCCUPATIONAL		PRA NPP	17:30-18:30 Parallel sessions Mo5
06-Mo5	17-Mo5	04-Mo5		16C-Mo5	
Statistical data analysis (non-nuclear)	Regulatory insights and experiences on RI approaches	Occupational risk modeling		Codes and tools 2	
					19:00

Opening	Opening session	
Europaea		
09:00 – 10:00	Chair: Reino Virolainen (FINLAND)	Opening

Opening Remarks
Director general STUK, Prof. Tero Varjoranta (FINLAND)

Introduction of Technical Program
Program Chair, Prof. Terje Aven (NORWAY)

Introduction of IAPSAM
President IAPSAM, Dr. Bruce Hallbert (USA)

Introduction of ESRA
Chairman ESRA, Prof. Enrico Zio (ITALY)

Honorary Chair's Remarks
Commissioner USNRC, George Apostolakis (USA)

Practical Information
General Chair, Reino Virolainen (FINLAND)

10:30 – 11:00	Coffee break

PL-Mo1
Europaea
10:00 – 10:30

Opening plenary session: Enrico Zio (ITALY)

Chair: Terje Aven (NORWAY)

Plenary

Prof. Enrico Zio *(BS in nuclear engng., Politecnico di Milano, 1991; MSc in mechanical engng., UCLA, 1995; PhD, in nuclear engng., Politecnico di Milano, 1995; PhD, in nuclear engng., MIT, 1998) is Director of the Chair in Complex Systems and the Energetic Challenge of the European Foundation for New Energy of Electricite' de France (EDF) at Ecole Centrale Paris and Supelec, full professor, President and Rector's delegate of the Alumni Association and past-Director of the Graduate School at Politecnico di Milano, adjunct professor at University of Stavanger. He is the Chairman of the European Safety and Reliability Association ESRA, member of the scientific committee of the Accidental Risks Department of the French National Institute for Industrial Environment and Risks, member of the Korean Nuclear society and China Prognostics and Health Management society, and past-Chairman of the Italian Chapter of the IEEE Reliability Society. He is serving as Associate Editor of IEEE Transactions on Reliability and as editorial board member in various international scientific journals, among which Reliability Engineering and System Safety, Journal of Risk and Reliability, International Journal of Performability Engineering, Environment, Systems and Engineering, International Journal of Computational Intelligence Systems. He has functioned as Scientific Chairman of three International Conferences and as Associate General Chairman of two others. His research focuses on the characterization and modeling of the failure/repair/maintenance behavior of components, complex systems and critical infrastructures for the study of their reliability, availability, maintainability, prognostics, safety, vulnerability and security, mostly using a computational approach based on advanced Monte Carlo simulation methods, soft computing techniques and optimization heuristics. He is author or co-author of five international books and more than 170 papers on international journals.*

The uncertainty of risk, the risk of uncertainty

We can all agree that risk assessment is useful to inform decisions. We can all agree that our risk assessment models are based on our (incomplete) knowledge on the phenomena involved and that, thus, uncertainty analysis plays an important role for the confidence in the decisions. And we all know that the probabilistic framework is the one routinely adopted.
We also are all aware that accidents with catastrophic consequences can occur, and our main job is to render these events even more unlikely than they already are. These situations are located in the south-east corner of the likelihood/consequence plane, where our knowledge that goes into the model is very limited, probabilities must be interpreted as subjective and most "nightmares" arise (including "perfect storms" and "black swans"). Is the probabilistic risk assessment framework the most appropriate one in these cases? Does the information available to characterise these situations provide a sufficiently strong basis for the specific (subjective) probability assignments, which we end up using for informing decisions, in spite of the theoretical help of the beautiful Bayesian updtating framework?
In this lecture, I will try to share the above concerns and position them within some of the frameworks which have been developed as alternatives to the probabilistic one, such as probability bound analysis, imprecise probability, random sets, possibility theory. My intention is to take a critical, open engineering viewpoint (I promise not to get into the technical details of the different frameworks). The end point of the critical reflection will be really the decision making and the need to feed it with the information available, completed with the justified introduction of subjective knowledge through a process of faithful representation of information and introduction of knowledge.

16AS-Mo2 Deterministic-probabilistic safety assessment

Europaea

11:00 – 12:20 Chair: Pavel Kudinov (SWEDEN) **PRA NPP**

Development and Application of a Dynamic Level 1 and 2 Probabilistic Safety Assessment Tool
Mosleh, A. (UNITED STATES) 16AS-Mo2-1

Nuclear Power Plant Precursor Risk Assessment Using a Dynamic Probabilistic Risk Method
Coyne, Kevin (UNITED STATES) 16AS-Mo2-2

Combining PSA and DSA methods for reactor cold overpressure effect analysis
Poghosyan, Shahen (ARMENIA) 16AS-Mo2-3

The impact of dynamics on the MLOCA accident model – an application of dynamic event trees
Karanki, Durga Rao (SWITZERLAND) 16AS-Mo2-4

Development of the DPSA Methodology Based on Genetic Algorithm for Identification of Failure Domains in Nuclear Power Plant Accident Scenarios Space
Vorobyev, Yury (RUSSIAN FEDERATION) 16AS-Mo2-5

16BS-Mo2 Passive systems – design

Fennia 2

11:00 – 12:20 Chair: Francesco Di Maio (ITALY) **PRA NPP**

Passive Safety Systems for Spent Fuel Pool Severe Accidents
Duan, Chengjie (CHINA) 16BS-Mo2-1

Passive Safety Systems in Advanced Water Cooled Reactors
Choi, Jong-Ho (AUSTRIA) 16BS-Mo2-2

Incorporate Modelling Uncertainty into the Decision Making of Passive System Reliability Assessment
Wang, Tairan (CHINA) 16BS-Mo2-3

Fault tree and Monte Carlo simulation in passive system reliability analysis
Yu, Yu (CHINA) >>> Moved to session 02-Th3 16BS-Mo2-4

27-Mo2 Cognition, context and HRA

Fennia 1

11:00 – 12:20 Chair: Luca Podofillini (SWITZERLAND) **Human Org**

A New Method for Human Reliability Assessment in Railway Transport
Schwencke, Daniel (GERMANY) 27-Mo2-1

Task Complexity Measure for Emergency Operating Procedures Based on Resource Requirements in Human Information Processing
Liu, Peng (CHINA) 27-Mo2-2

A distributed cognition-based cognitive analysis tool for knowledge management
Inoue, Satoru (JAPAN) 27-Mo2-3

A tool-supported training framework for improving operators' dependability confronted with faults and errors
Barboni, Eric (FRANCE) >>> Moved to session 27-We2 27-Mo2-4

SHERPA, A Systematic, Human Error Reduction and Prediction Approach to modelling and assessing human reliability in complex tasks
Embrey, David (UNITED KINGDOM) 27-Mo2-5

12:20 – 13:50 **Lunch break**

03-Mo2 Sensitivity analysis

Nordia

11:00 – 12:20 Chair: Matthias Troffaes (UNITED KINGDOM) **Uncertainty**

Some new insights in derivative-based global sensitivity measures
Popelin, Anne-Laure (FRANCE) 03-Mo2-1

Estimating Global Sensitivity Statistics from Given Data
Plischke, Elmar (GERMANY) 03-Mo2-2

A Metamodel Approach to Sensitivity Analysis of a PA Model for a Generic HLW Repository in Clay
Spiessl, Sabine M. (GERMANY) 03-Mo2-3

Particularities in sensitivity analysis of numerical models for long-term safety of final repositories
Becker, Dirk-Alexander (GERMANY) 03-Mo2-4

Sensitivity analysis of safety factor predictions for nuclear component behaviour under accidental conditions
Marrel, Amandine (FRANCE) 03-Mo2-5

01-Mo2 Advances in maintenance modeling 1

Nautica

11:00 – 12:20 Chair: **Maintenance**

A state based model for opportunity based maintenance
Vatn, Jørn (NORWAY) 01-Mo2-1

Analysis of Block-Inspection Policy parameters from economical and availability point of view
Werbinska-Wojciechowska, Sylwia (POLAND) 01-Mo2-2

A Comparison of Asymptotic and Finite Time Solutions for the Discounted Maintenance Cost of Repairable Systems
Pandey, Mahesh (CANADA) 01-Mo2-3

Investigating deferment of maintenance actions
Ansell, Jake (UNITED KINGDOM) 01-Mo2-4

02-Mo2 Analysis of networked systems

Press Room

11:00 – 12:20 Chair: Christian Tanguy (FRANCE) **Mathematics**

Semi-Markov models for performance evaluation of telecommunication networks in the presence of failures
Postiglione, Fabio (ITALY) 02-Mo2-2

Modeling key performance indicators for the availability and quality of experience of voice over IP services
Tanguy, Christian (FRANCE) 02-Mo2-3

Influence of bus partitioning on the reliability of transmissions
Aza-Vallina, Damien (FRANCE) 02-Mo2-4

A Petri net-based approach for computing two-terminal reliability of a transportation network with multi-state nodes and arcs
Zhang, Tao (CHINA) >>> Moved from session 28-Th5 28-Th5-1

24-Mo2 Baltica — Critical infrastructures 1

11:00 – 12:20 Chair: Seth Guikema (UNITED STATES) — **Infra**

The Effects of Hurricane Surge in Power System Outage Risk Models
Guikema, Seth (UNITED STATES) — 24-Mo2-1

Some aspects of the risk evaluations for renewable energy systems
Serbanescu, Dan (ROMANIA) — 24-Mo2-2

Susceptibility and vulnerability of urban buildings and infrastructure against terroristic threat from qualitative and quantitative risk analysis
Häring, Ivo (GERMANY) — 24-Mo2-3

Network Analysis of a Real Power Transmission System
Zio, Enrico (ITALY) — 24-Mo2-4

The VNK2-project: Quantifying flood risks in the Netherlands
Jongejan, Ruben (NETHERLANDS) >>> Moved from session 22-Fr3 — 22-Fr3-1

17-Mo2 Marine Room — RI decision making in nuclear domain – applications

11:00 – 12:20 Chair: Cornelia Spitzer (GERMANY) — **Risk manag**

Evaluation of Risk Within the Framework of Preparing a Risk-Informed Decision for NPP and the Level of Decision Influence on Defence-In-Depth
Lankin, Mikhail (RUSSIAN FEDERATION) — 17-Mo2-1

Assessment of the Adequacy of Existing Risk-Informed Regulatory Guidance for New Reactors
Powell, Eric (UNITED STATES) — 17-Mo2-2

Pilot project to enhance operational safety of the Paks NPP based on risk-informed decision making
Kiss, Tibor (HUNGARY) — 17-Mo2-3

ASME/ANS Technology Neutral PRA Standard for Advanced Non-LWRs
Fleming, Karl (UNITED STATES) — 17-Mo2-4

An Integrated Risk Informed Decision Making Approach for Germany
Wielenberg, Andreas (GERMANY) — 17-Mo2-5

12:20 – 13:50 Lunch break

09-Mo2 Reliability and concrete structures

Eliel (hotel)

This session has been moved to Tuesday: 09-Tu5 (Hall Fennia 1)

11:00 – 12:20 Chair: Jana Markova (CZECH REPUBLIC) **Structural**

Evaluation of reliability of existing intermediate floor beams of reinforced concrete
Derry, Markus (FINLAND) 09-Mo2-1

Probabilistic analysis of structures in serviceability conditions
Markova, Jana (CZECH REPUBLIC) 09-Mo2-2

Influence of a new CUSUM based conformity inspection scheme for EN 206-1 on the safety level of concrete structures
Van Coile, Ruben (BELGIUM) 09-Mo2-3

Verification of Existing Reinforced Concrete Bridges using the Design Value Method
Markova, Jana (CZECH REPUBLIC) 09-Mo2-4

08-Mo2 Stochastic modeling – case studies

Selim (hotel)

11:00 – 12:20 Chair: David Valis (CZECH REPUBLIC) **Stochastic**

A New Ensemble Model for Short Term Wind Power Prediction
Albu, Razvan-Daniel (ROMANIA) 08-Mo2-1

Modeling of transport of radioactive substances from underground storage with uncertainties of geologic parameters
Chudoba, Josef (CZECH REPUBLIC) 08-Mo2-2

The Impact of Initial Operation Deterioration on Sequential System Reliability
Valis, David (CZECH REPUBLIC) 08-Mo2-4

Assessment of statistical long-term wave power availability
Leira, Bernt (NORWAY) 08-Mo2-5

15-Mo2 Fire safety

Kino K13

11:00 – 12:20 Chair: Kurt Petersen (DENMARK) **Civil Fire**

Structural protection with water mist fire fighting systems
Lior, Amit (FINLAND) 15-Mo2-1

Fire Hazards Hindering Safe Evacuation during Fires in Road Tunnels
Hugosson, Jonatan (SWEDEN) 15-Mo2-2

Does passive house mean higher fire hazard?
Fourneau, Charles (BELGIUM) 15-Mo2-3

Interpretation of Safety Margin in ASET/RSET Assessments in the Norwegian Building Industry
Njå, Ove (NORWAY) 15-Mo2-4

Evaluation of the possibility to use waterscreen for improving people evacuation from the Gran Sasso National Laboratory inside the highway tunnel.
Basti, Andrea (ITALY) 15-Mo2-5

16A-Mo3 Modeling and data analysis

Europaea

13:50 – 15:10 Chair: Vidar H. Swaling (NORWAY) **PRA NPP**

A study of the influence of updating initiating event frequencies for the Japanese NPPs
Ota, Takayuki (JAPAN) 16A-Mo3-1

Age-dependent hierarchical Bayesian modelling for long-term reliability assessment
Iesmantas, Tomas (LITHUANIA) 16A-Mo3-2

Prioritizing Component Failures in Fault Tree Analysis Using Interval-valued Probability Estimates
Toppila, Antti (FINLAND) 16A-Mo3-3

Markov Model of Severe Accident Progression and Management
Bari, Robert (UNITED STATES) 16A-Mo3-4

16BS-Mo3 NRC HRA data

Fennia 2

13:50 – 15:10 Chair: James Chang (UNITED STATES) **PRA NPP**

Human Performance/Error Data Collection for Incident Analysis Via Timeline Generation Method and Tool: A Case Study
Bley, Dennis C. (UNITED STATES) 16BS-Mo3-1

Model-based Framework for Characterizing Crew Performance and Contextual Factors for HRA Applications
Mosleh, Ali (UNITED STATES) 16BS-Mo3-2

Overview of the NRC's HRA Data Program and Recent Activities
Chang, Yung Hsien James (UNITED STATES) 16BS-Mo3-3

Methodology for Collection and Analysis of Simulator Data for HRA Applications
Kirwan, Barry (UNITED STATES) 16BS-Mo3-4

Overview of Licensed Operator Simulator Training Data and Use for HRA
Chang, James (UNITED STATES) 16BS-Mo3-5

27-Mo3 Human factors engineering

Fennia 1

13:50 – 15:10 Chair: **Human org**

How does time availability influence the execution of computerized emergency operating procedures
Dong, Xiaolu (CHINA) 27-Mo3-1

Development of a Simulated Main Control Room (MCR) Information Display System for AP1000 Nuclear Power Plant
Yuan, Xihui (CHINA) 27-Mo3-2

Evaluating FBTA-Based User Interface Design for digital Nuclear Power Plants
Wu, Xiaojun (CHINA) 27-Mo3-3

The impact of digit human-system interfaces upon operator cognition in a nuclear power plant control room
Dai, Licao (CHINA) 27-Mo3-4

Economic benefits of human factors methods deployment
Doležal, Radim (CZECH REPUBLIC) 27-Mo3-5

15:10 – 15:40 **Coffee break**

03-Mo3 Uncertainty analysis 1

Nordia

13:50 – 15:10 Chair: Ali Mosleh (USA) **Uncertainty**

Quantifying data uncertainty due to sparse and/or interval data
Mahadevan, Sankaran (UNITED STATES) 03-Mo3-1

Probabilistic modelling of variables with inequality constraints
Dutfoy, Anne (FRANCE) 03-Mo3-2

The Impact of Uncertainty Type and Representation in Performance Assessment
Esh, David (UNITED STATES) 03-Mo3-3

The Effects of Considering SOKC for Uncertainty Analyses and PSA Model Developing Strategy
Muta, Hitoshi (JAPAN) 03-Mo3-4

The treatment of uncertainty in national risk assessment methodologies
Veland, Henning (NORWAY) 03-Mo3-5

01S-Mo3 Maintenance of transportation systems

Nautica

13:50 – 15:10 Chair: Jørn Vatn (NORWAY) **Maintenance**

Bayesian updating for road maintenance optimization
Castanier, Bruno (FRANCE) 01S-Mo3-1

A Railway Track Ballast Maintenance and Inspection Model for Multiple Track Sections
Prescott, Darren (UNITED KINGDOM) 01S-Mo3-2

Study on maintainability measures of passenger transport system
Werbinska-Wojciechowska, Sylwia (POLAND) 01S-Mo3-3

A study of the efficacy of the inspection of railway rolling stock
Cavalcante, Cristiano (UNITED KINGDOM) >>> Moved from session 01-We2 01-We2-5

20-Mo3 Safety management and safety performance

Press Room

13:50 – 15:10 Chair: Veikko Rouhiainen (FINLAND) **Industrial**

Structural safety performance of Dutch and Spanish engineering companies
Terwel, Karel C. (NETHERLANDS) 20-Mo3-1

Application of HRA to Accident Risk Assessment in Urban Intersections
Furuta, Kazuo (JAPAN) 20-Mo3-2

A Behavior-Based Monitoring System for Safety Management
Nascimento, Cesar (BRAZIL) 20-Mo3-3

Improving the prediction of human reliability in manual assembly
Günnel, Benjamin (GERMANY) 20-Mo3-4

Systems-theoretic analysis of interdisciplinary control loops within the traffic system taking into account a behavioral human-machine-interface
Hosse, René (GERMANY) 20-Mo3-5

24-Mo3 **Critical infrastructures 2**

Baltica

13:50 – 15:10 Chair: Jose Ramirez-Marques (UNITED STATES) **Infra**

Network Protection Against Diverse Attacks - A Multi-objective Perspective
Ramirez-Marquez, Jose Emmanuel (UNITED STATES) 24-Mo3-1

Computer simulation for risk management: Hydrogen refueling stations and water supply of a large region
Markert, Frank (DENMARK) 24-Mo3-2

Analysis and Comparison of Risk and Load Point Indices of Power System Model HLI and HLII
Rana, Lalit Bickram (FINLAND) 24-Mo3-3

Interdependencies and economic assessment of critical infrastructures in the EU:
A combined system engineering and economic model
Dorneanu, Bogdan (ITALY) 24-Mo3-4

17-Mo3 **NPP – ageing issues**

Marine Room

13:50 – 15:10 Chair: Geza Macsuga (HUNGARY) **Risk manag**

Role of Level 1 PSA at IRSN for plants life extension
Lanore, Jeanne-Marie (FRANCE) 17-Mo3-1

Risk-informed decision making using ageing PSA model
Poghosyan, Shahen (ARMENIA) 17-Mo3-2

Incorporation of reliability attributes into the maintenance rule for the qualified life extension of nuclear power plant safety
Saldanha, Pedro (BRAZIL) 17-Mo3-3

Operational Experience Assessment on NPP Ageing Related Reportable Events
Rodionov, Andrei (FRANCE) 17-Mo3-4

15:10 – 15:40 **Coffee break**

09-Mo3 Structural reliability and degradation modeling 1

Eliel (hotel)

13:50 – 15:10 Chair: **Structural**

Modelling dependence using copulas – an implementation illustration in the field of structural reliability
Remy, Emmanuel (FRANCE) 09-Mo3-1

Compliance sampling inspection for Localized deterioration process
van der Weide, Johannes A.M. (NETHERLANDS) 09-Mo3-2

Reliability of a system from the one of its components and the REX using a strength-stress method linked with a Bayesian net
de Reffye, Jerome (FRANCE) 09-Mo3-3

Scaling Structural Loads for the Structure Seismic Fragility
Lee, Dong-Won (KOREA (REP.)) 09-Mo3-4

08-Mo3 Fire risk modeling and simulation

Selim (hotel)

13:50 – 15:10 Chair: Marina Röwekamp (GERMANY) **Stochastic**

Simulation of fire behaviour and human operations using a new stochastic operation time model
Kling, Terhi (FINLAND) 08-Mo3-1

Fire Modeling of an Emerging Fire Suppression System
Cournoyer, Michael (UNITED STATES) 08-Mo3-2

Coal Fires – Definition of thermal load on the metallic structures of Coal Conveyor Belts and Coal Covered Storage by means of Fire Dynamics Simulator
Benucci, Stefania (ITALY) 08-Mo3-3

Optimization of planning process for fire safety analysis through application of developed software
Traichel, Anke (GERMANY) 08-Mo3-4

A Monte Carlo simulation platform of housing fires in Finland forecasting life and property loss
Karhula, Teemu (FINLAND) 08-Mo3-5

23S-Mo3 Risk analysis methodologies in marine safety

Kino K13

13:50 – 15:10 Chair: Pentti Kujala (FINLAND) **Offshore**

Simulation model for evaluation of effectiveness of maritime SAR services
Goerlandt, Floris (FINLAND) 23S-Mo3-1

The effects of an enhanced navigation support information service on maritime traffic risks in the Gulf of Finland
Hänninen, Maria (FINLAND) 23S-Mo3-2

Evaluation of traffic increase in the Gulf of Finland 2007-2015 and the effect of the increase on the environment and traffic chain activities
Lehikoinen, Annukka (FINLAND) 23S-Mo3-3

Probabilistic model of minimal passing distances of vessels navigating in Polish coastal waters
Marcjan, Krzysztof (POLAND) 23S-Mo3-4

A model for risk analysis of RoPax ships - the Gulf of Finland case
Montewka, Jakub (FINLAND) 23S-Mo3-5

16A-Mo4 PRA development – overview

Europaea

15:40 – 17:00 Chair: Risto Himanen (FINLAND) **PRA NPP**

PSA use and development: an international overview by WGRISK
Lanore, Jeanne-Marie (FRANCE) 16A-Mo4-1

Application of ASME PRA Standard on Swedish PSA Studies
Bäckström, Ola (SWEDEN) 16A-Mo4-2

Status and Perspectives of PSA activities in Belgium
Gryffroy, Dries (BELGIUM) 16A-Mo4-3

Development of a Full Scope, Integrated, Modern PSA Suitable for Risk-Informed Applications at KKL
Nusbaumer, Olivier (SWITZERLAND) 16A-Mo4-4

Chasing a Moving Target: Applying Safety Goals on a Living PSA
Bengtsson, Lisa (SWEDEN) 16A-Mo4-5

16BS-Mo4 Passive systems – innovative reactor concepts

Fennia 2

15:40 – 17:00 Chair: Francesco Di Maio (ITALY) **PRA NPP**

A Reliability Assessment Method for VHTR Passive Safety Systems
Jae, Moosung (KOREA (REP.)) 16BS-Mo4-1

Integration of the functional reliability of two passive safety systems to mitigate a SBLOCA+BO in a CAREM-like reactor PSA
Mezio, Federico (ARGENTINA) 16BS-Mo4-2

Qualification of methodologies for reliability analysis of passive system against experimental data
Araneo, Dino (ITALY) 16BS-Mo4-3

Quantification of the Spent Fuel Pool Cooling System Contribution to the AP1000® Plant Core Damage Frequency and Large Release Frequency
Masset, Yves (UNITED STATES) 16BS-Mo4-4

27-Mo4 Key issues in HRA development

Fennia 1

15:40 – 17:00 Chair: **Human org**

Bridging Human Reliability Analysis and Psychology, Part 2: A Cognitive Framework to Support HRA
Whaley, April (UNITED STATES) 27-Mo4-1

Bridging Human Reliability Analysis and Psychology, Part 1: The Psychological Literature Review for the IDHEAS Method
Whaley, April M. (UNITED STATES) 27-Mo4-2

SPAR-H Step-by Step Guidance
Whaley, April M. (UNITED STATES) 27-Mo4-3

Guidance on Dependence Assessment in SPAR-H
Whaley, April M. (UNITED STATES) 27-Mo4-4

Probabilistic assessment of knowledge-based behaviour by use of cognitive-science findings and concepts by Swain
Fassmann, Werner (GERMANY) 27-Mo4-5

17:00 – 17:30 **Fruit break**

29-Mo4 Nordia 15:40 – 17:00 — Dana Kelly memorial: Epistemic uncertainties 1

Chair: | Epistemic

Effect of epistemic uncertainty modelling approach on decision-making: Example using equipment performance indicator
Youngblood, Robert (UNITED STATES) 29-Mo4-1

Imprecise Dirichlet Model for Common-Cause Failure
Troffaes, Matthias (UNITED KINGDOM) 29-Mo4-2

A bottom-up procedure to calculate the Top Event probability in presence of epistemic uncertainty
Curcurù, Giuseppe (ITALY) 29-Mo4-3

Treatment of epistemic uncertainty in environmental fate models – Consequences on chemical safety regulatory strategies
Iqbal, M. Sarfraz (SWEDEN) 29-Mo4-4

Optimizing computer representation and computer processing of epistemic uncertainty for risk-informed decision making: Finances etc.
Kreinovich, Vladik (UNITED STATES) 29-Mo4-5

01S-Mo4 Nautica 15:40 – 17:00 — Covariate-driven maintenance

Chair: Roger Flage (NORWAY) | Maintenance

Dempster-Shafer Theory of Evidence to handle maintenance models tainted with imprecision
Compare, Michele (ITALY) >>> Moved to session 13-Fr2 01S-Mo4-1

Petri-Net Simulation Model of a Nuclear Component Degradation Process
Li, Yanfu (FRANCE) 01S-Mo4-2

A maintenance model based on an estimated stress indicator of failure modes for industrial components. Application to wind turbines
Sanz-Bobi, Miguel A. (SPAIN) 01S-Mo4-3

11-Mo4 Press Room 15:40 – 17:00 — Risk assessment 1

Chair: Radim Bris (CZECH REPUBLIC) | Risk generic

Uncertainty Analysis for Large Dam Failure Frequencies based on Historical Data
Ferrante, Fernando (UNITED STATES) 11-Mo4-1

Framework for the adjustment of failure frequencies in quantitative risk assessment methodologies
Laheij, Gerald (NETHERLANDS) 11-Mo4-2

Time-dependent risk modeling of accidental events and responses in process Industries
Bris, Radim (CZECH REPUBLIC) 11-Mo4-3

Severe fatal accident risk in the oil chain – Frequency and severity analysis using a Bayesian hierarchical model
Eckle, Petrissa (SWITZERLAND) 11-Mo4-4

24-Mo4 | **Water systems**

Baltica

15:40 – 17:00 | Chair: Sarah LaRocca (UNITED STATES) | **Infra**

Method of safety analysis of water supply systems
Zimoch, Izabela (POLAND) 24-Mo4-1

Analysis of Water Distribution Networks Topology to Support Vulnerability Assessment
Hernando Gomez Castro, Camilo (UNITED STATES) 24-Mo4-2

Maps of risk in water distribution subsystem
Boryczko, Krzysztof (POLAND) 24-Mo4-3

Risk Analysis of Guaranteed Level of Waterworks Services Availability Model and Methodology
Pietrucha-Urbanik, Katarzyna (POLAND) 24-Mo4-4

The Identification of Threats to the Source of Emergency Water Supply
Bumbova, Alena (CZECH REPUBLIC) 24-Mo4-5

17-Mo4 | **Methodological approaches to support risk management**

Marine Room

15:40 – 17:00 | Chair: Garreth Parry (UNITED STATES) | **Risk manag**

On Developing Methods of Defining a List of Beyond Design Basis Accidents to Be Taken Into Account in a NPP Design
Lankin, Mikhail (RUSSIAN FEDERATION) 17-Mo4-1

Establishing a Balance between the Principles of Risk-Informed Decision-Making Related to Making Changes to the Licensing Basis
True, Doug (UNITED STATES) 17-Mo4-2

Assessing the governance of the organizations: risks, resiliencies and sustainable development
Merad, Myriam (FRANCE) 17-Mo4-3

Advanced Nuclear Fuel Cycle Decision-Making Tool
Dykes, Andrew A. (UNITED STATES) 17-Mo4-4

Computer-assisted Risk Assessment Audit on Operational Level
Mock, Ralf (SWITZERLAND) 17-Mo4-5

17:00 – 17:30 | **Fruit break**

09-Mo4 Structural reliability and degradation modeling 2

Eliel (hotel)

15:40 – 17:00 Chair: **Structural**

X-ray endoscopy for inspection of tube-to-tube sheet welds in heat exchangers
Zscherpel, Uwe (GERMANY) 09-Mo4-1

Stochastic modelling in fracture mechanics to assess failure probability
Elegbede, Charles (FRANCE) 09-Mo4-2

Risk-Based Integrity Assessment and Failure Probabilities of a Residential Single Wall Steel Aboveground Fuel Oil Storage Tank
Nazir, Muddassir (CANADA) 09-Mo4-3

Mobile X-Ray Computed Tomography for Nuclear and Aviation Industry
Redmer, Bernhard (GERMANY) 09-Mo4-4

14-Mo4 Risk assessment – consequence analysis

Selim (hotel)

15:40 – 17:00 Chair: Pieter van Gelder (NETHERLANDS) **Accident**

Model of Spray System Work in the Process of Severe Accident at Nuclear Power Plant
Aleshin, Vladimir (RUSSIAN FEDERATION) 14-Mo4-1

Explosion Risk Analysis of Large Floaters
Storch, Raphael (NORWAY) 14-Mo4-2

Explosion Risk Analysis based on experience databases from Computational Fluid Dynamics results
Huser, Asmund (NORWAY) 14-Mo4-3

Safe optimization of potentially runaway processes using topology based tools and software
Copelli, Sabrina (ITALY) 14-Mo4-4

16C-Mo4 Codes and tools 1

Kino K13

15:40 – 17:00 Chair: **PRA NPP**

Integrated versus non-integrated Level 1 – Level 2 model, sharing experience with both approaches
Kollasko, Heiko (GERMANY) 16C-Mo4-2

Fault Tree Auto-Generator: How to Cope with Highly Redundant Systems
Herb, Joachim (GERMANY) 16C-Mo4-3

Oskarshamn – Modernization of PSA documentation
Kristensson, Andreas (SWEDEN) 16C-Mo4-4

Development of Software for Low Power and Shutdown PSA Modeling
Han, Sang Hoon (KOREA (REP.)) 16C-Mo4-5

16A-Mo5 Dynamic PRA

Europaea

17:30 – 18:30 Chair: Antoine Rauzy (FRANCE) **PRA NPP**

Some Issues with Quantification of Station Blackout Sequences and Methods of Solution
Fleming, Karl (UNITED STATES) 16A-Mo5-1

Options to Consider Reliability Information in a Dynamic PSA with the MCDET Method
Peschke, Jörg (GERMANY) 16A-Mo5-2

Calculation of damage frequencies without success criteria hypothesis. Application to MBLOCA sequences
Salazar, Cesar Queral (SPAIN) >>> Moved to session 02-We2 16A-Mo5-3

Simulation of Nuclear Power Plant Operators Reasoning Process for Situation Assessment in ADS-IDAC Dynamic PRA Platform
Li, Yuandan (UNITED STATES) 16A-Mo5-4

16BS-Mo5 Passive systems – advanced reactors

Fennia 2

17:30 – 18:30 Chair: Dennis Henneke (UNITED STATES) **PRA NPP**

Probabilistic Safety Assessment for The Advanced Boiling Water Reactor KERENA
Abusharkh, Yousef (GERMANY) 16BS-Mo5-1

Passive Systems Reliability – Application of MELCOR Simulations for PCCS Case Study
Männistö, Ilkka (FINLAND) 16BS-Mo5-2

Long-term Station Blackout Risk for The Advanced Passive Boiling Water Reactor Design - ESBWR
Henneke, Dennis (UNITED STATES) 16BS-Mo5-3

27-Mo5 HRA in team and organization level

Fennia 1

17:30 – 18:30 Chair: David Embrey (UK) **Human org**

Assessment of Organizational Factors in the HRA Context
Hartung, Jürgen (GERMANY) 27-Mo5-1

The use of SNA metrics to investigate the relationship between the characteristics of crew communications with the associated crew performance
Yang, Joon-Eon (KOREA (REP.)) 27-Mo5-2

Modeling and Simulation of the Impact of Team Characteristics on Crew Performance
Azarkhil, Mandana (UNITED STATES) 27-Mo5-3

19:00 – 21:00 **Welcome reception at Marina Congress Center**

29-Mo5 Epistemic uncertainties 2

Nordia

17:30 – 18:30 Chair: Enrico Zio (ITALY) **Epistemic**

Options for the Treatment of Uncertainty in Seismic Safety Assessment of Nuclear Power Plants
Katona, Tamas Janos (HUNGARY) 29-Mo5-1

A Nested Approach to Multivariate Modelling Using Lower Previsions
Troffaes, Matthias (UNITED KINGDOM) 29-Mo5-2

Elicitation in reliability studies under epistemic uncertainty using the belief functions theory
Aguirre, Felipe (FRANCE) 29-Mo5-3

Reliability in Predictive Models under Alternative Treatments of Predictive Uncertainty – QSPRs in Chemical Safety Assessments
Sahlin, Ullrika (SWEDEN) 29-Mo5-4

01S-Mo5 Asset management and maintenance

Nautica

17:30 – 18:30 Chair: **Maintenance**

Optimal Asset Management across a Network
Ansell, Jake (UNITED KINGDOM) 01S-Mo5-1

Investments Portfolio Optimal Planning for industrial assets management: Method, Tool and Application
Fessart, Karine (FRANCE) 01S-Mo5-2

Proactive fleet monitoring and management facilities: KASEM e-maintenance platform
Monnin, Maxime (FRANCE) 01S-Mo5-3

Modelling the effect of maintenance quality on spare parts inventory
Van Horenbeek, Adriaan (UNITED KINGDOM) 01S-Mo5-4

20-Mo5 Industrial analysis approaches and cases 1

Press Room

17:30 – 18:30 Chair: Veikko Rouhiainen (FINLAND) **Industrial**

PSA-modeling of External Grid Failures Occuring Close to Nuclear Power Plants
Sparre, Erik (SWEDEN) 20-Mo5-1

Power grid safety: dynamic criticality CWW-based analysis
Brezhnev, Eugene (UKRAINE) 20-Mo5-2

An MCDM model for potential failure causes ranking from FMECA
Alencar, Marcelo (BRAZIL) 20-Mo5-3

Evaluating effective reaction rates of kinetically driven solutes in large-scale, anisotropic media: human health risk implications in CO2 leakage
Siirila, Erica (UNITED STATES) 20-Mo5-4

06-Mo5 **Statistical data analysis (non-nuclear)**

Baltica

17:30 – 18:30 Chair: Min Xie (FRANCE) **Data**

Adjustment of complex probabilistic models and estimation of confidence intervals in a discrete manner
Cabarbaye, Andre (FRANCE) 06-Mo5-1

Estimating a flaw size distribution using data from both destructive tests and non-destructive in-service inspections
Keller, Merlin (FRANCE) 06-Mo5-2

Review and comparison of goodness-of-fit tests for the exponential and Weibull distributions
Krit, Meryam (FRANCE) 06-Mo5-3

17-Mo5 **Regulatory insights and experiences on RI approaches**

Marine Room

17:30 – 18:30 Chair: Henrik Kortner (NORWAY) **Risk manag**

Perspectives and Insights on Transition to Risk-Informed Performance-Based Fire Protection Programs
Nourbakhsh, Hossein (UNITED STATES) 17-Mo5-1

Robust Offshore Risk Regulation An assessment of US, UK and Norwegian Approaches
Lindoe, Preben (NORWAY) 17-Mo5-2

Risk-Informed Regulation Indicator System
Macsuga, Geza (HUNGARY) 17-Mo5-3

19:00 – 21:00 **Welcome reception at Marina Congress Center**

04-Mo5 Occupational risk modeling

Eliel (hotel)

17:30 – 18:30 Chair: Olga Aneziris (GREECE) **Occupational**

Cost-benefit analysis in occupational health and safety: A++ proposal model
Ramos, Delfina (PORTUGAL) 04-Mo5-1

What Does It Mean to Be Competent in Caring about Safety
Ferjencik, Milos (CZECH REPUBLIC) 04-Mo5-2

Integrated OHS management systems: Is it the FINAL FRONTIER regarding OHS?
Ramos, D. Gabriela (PORTUGAL) 04-Mo5-3

Occupational Risk Management for falling objects
Aneziris, Olga (GREECE) 04-Mo5-4

16C-Mo5 Codes and tools 2

Kino K13

17:30 – 18:30 Chair: Jan Holmberg (FINLAND) **PRA NPP**

An Overview of the Open-PSA platform
Rauzy, Antoine (FRANCE) 16C-Mo5-1

Variant Management in a Modular PSA
Friedlhuber, Thomas (FRANCE) 16C-Mo5-2

Studying of the Failure Tolerance with the Probabilistic Risk Assessment
Ahonen, Essi (FINLAND) 16C-Mo5-3

Program Outline – Tuesday, 26 June 2012

	Europaea	Fennia 2	Fennia 1	Nordia	Nautica	Press room
08:30-09:30 Plenary session **Tu1**	Plenary PL-Tu1 Fukushima					
09:30-10:00	COFFEE BREAK					
10:00-11:40 Parallel sessions **Tu2**	PRA NPP 16S-Tu2 Fukushima accident 1			UNCERTAINTY 03S-Tu2 Uncertainty analysis 2	MAINTENANCE 01-Tu2 Condition based maintenance	INDUSTRIAL 20-Tu2 Reliability analysis
11:40-13:10		CONFERENCE LUNCHEON				
13:10-14:30 Parallel sessions **Tu3**	PRA NPP 16-Tu3 Fukushima - panel discussion			EPISTEMIC 29-Tu3 Model uncertainties and validation	MAINTENANCE 01-Tu3 Maintenance modeling and optimization of complex systems	RISK GENERIC 11-Tu3 Risk management 2
14:30-15:00	COFFEE BREAK					
15:00-16:20 Parallel sessions **Tu4**	PRA NPP 16A-Tu4 Data analysis	PRA NPP 16B-Tu4 HRA based on empirical study	HUMAN ORG 27-Tu4 Organizational learning and modeling	UNCERTAINTY 03-Tu4 Uncertainty and sensitivity	MAINTENANCE 01-Tu4 Reliability centred maintenance	INDUSTRIAL 20-Tu4 Automotive systems
16:20-16:40	FRUIT BREAK					
16:40-18:00 Parallel sessions **Tu5**	PRA NPP 16A-Tu5 RI applications	PRA NPP 16B-Tu5 New HRA methods 1	STRUCTURAL 09-Tu5 Reliability and concrete structures	DATA 06-Tu5 Data collection and analysis (non-nuclear)	MAINTENANCE 01-Tu5 Preventive maintenance	INDUSTRIAL 20-Tu5 Risk management

09-Mo2
Session moved from

Baltica	Marine room	Eliel (hotel)	Selim (hotel)	Kino K13	
					08:30-09:30 Plenary session **Tu1**
COFFEE BREAK					09:30-10:00
OFFSHORE	RISK MANAG	OCCUPATIONAL	RISK GENERIC	SECURITY	10:00-11:40 Parallel sessions **Tu2**
23-Tu2	17-Tu2	04-Tu2	11-Tu2	18-Tu2	
Oil and gas risk assessment	RI inspection	Occupational risk	Risk management 1	Security methods and applications	
					11:40-13:10
OFFSHORE	RISK MANAG	OCCUPATIONAL	RISK PERC	SECURITY	13:10-14:30 Parallel sessions **Tu3**
23-Tu3	17-Tu3	04-Tu3	12-Tu3	18-Tu3	
Drilling risk assessment	PRA in risk management	Occupational risk assessment	Risk and reliability criteria	Security methods	
COFFEE BREAK					14:30-15:00
OFFSHORE	RISK MANAG	AVIATION	RISK GENERIC	PRA NPP	15:00-16:20 Parallel sessions **Tu4**
23-Tu4	17-Tu4	21S-Tu4	11-Tu4	16C-Tu4	
Marine operations risks	Safety assessment, management and goals	Managing system changes in aviation - novel issues for PRA	Nuclear spent fuel safety	PRA Level 2 and 3	
FRUIT BREAK					16:20-16:40
OFFSHORE	MATHEMATICS	SIL	RISK GENERIC	PRA NPP	16:40-18:00 Parallel sessions **Tu5**
23-Tu5	02-Tu5	26-Tu5	11-Tu5	16C-Tu5	
Marine transportation risk assessment	Bayesian analysis and simulation	SIL decision support	Risk assessment 2	PRA Level 2 related applications	

PL-Tu1 | **Plenary session: Jukka Laaksonen (FINLAND)**

Europaea

08:30 – 09:30 | Chair: David Johnson (UNITED STATES) | **Plenary**

Prof. Jukka Laaksonen *was Director General of Radiation and Nuclear Safety Authority (STUK) of Finland from 1st April 1997 to January 31st 2012. After retirement from STUK he works with Joint Stock Company Rusatom Overseas since April 2nd 2012.*

He worked in nuclear regulation from May 1974 to January 2012, mostly at STUK but also as a visiting expert at US NRC in 1981-82. In 1987-89, he worked as senior officer in the OSART team of the IAEA.

Since 1970's he has actively participated in international cooperation in the area of nuclear safety and safeguards. He has held several chairmanships in international groups and committees, among these are WENRA (Western Europe Nuclear Regulators Association (2009-2011), the OECD/NEA's Committee for Nuclear Regulatory Activities (1998-2007), the RAMG group coordinating EU support to regulators outside the EU (2001-2003), and Country Groups of three Review Meetings of the Convention of Nuclear Safety (1999, 2005, 2011). He has also lead IAEA teams (IRRS) that reviewed the regulation of nuclear safety in Russia (2009) and in the USA (2010), as well as a high level panel that reviewed the effectiveness and efficiency of the IAEA's safeguards activities (2003).

He has been a member of several standing international committees, among others the IAEA Expert Group on Multinational Nuclear Approaches (for elaboration and promotion of a safeguards and security initiative by IAEA Director General, 2004-2005), the IAEA's Commission on Safety Standards (2008-2011), the European (EU) High Level Group on Nuclear Safety and Waste Management (2007-2011), the MDEP (Multinational Design Evaluation Project) Policy Group, 2006-2011), the Forum of regulators of WWER type reactors (1997-2011), and the Safety Review Group serving European Bank for Reconstruction and Development (1993-2006).

Currently Prof. Laaksonen is Vice Chairman of INSAG (International Nuclear Safety Group connected with the IAEA) and a member of the International Advisory Board of United Arab Emirates.

Fukushima accident aftermath

The accident in Fukushima on March 2012 prompted in all countries using nuclear energy a re-evaluation of safety of their NPPs. The main focus was on factors that contributed to the severity of Fukushima accident.

The results of re-evaluation suggested several possibilities to improve the safety design of NPPs. New insights have been used to plan concrete measures for safety enhancements at the operating plants and some of the proposed measures have already been implemented. The lessons learned have also been considered for revising design principles of new NPP's.

In Europe the safety evaluation of all NPPs in operation or under construction were conducted using commonly agreed guidelines by operators and regulators of 16 countries: all EU Member States with NPPs and Switzerland and Ukraine. The national safety evaluations were peer reviewed among the regulators of the participating countries, and recommendations were made to each county. Russia was not participant of the peer review process but it made its national review using the same EU guidelines. The topics that were assessed in Europe and Russia were the robustness of protection against external natural hazards that go beyond the current design basis, protection from complete loss of electrical power and from loss of primary ultimate heat sink and severe accident management aiming to prevent large radioactive releases to the environment.

Japan was observing the European process, and the assessment of Japanese industry was targeted on the same topics as the European one. However, the review conducted in Japan was more systematic and it also included a thorough evaluation of the accident course at each severely damaged Fukushima unit, using fault tree models. These fault trees were built around the accident course and aimed to identify arrangements that would have been useful to turn the course of events at each unit to better direction.

The presentation summarizes and discusses the generic proposals that have been made in Europe, Russia and Japan on the basis of safety reassessment, and that aim to enhance safety of current type of NPPs.

09:30 – 10:00 | **Coffee break**

Notes

16S-Tu2 **Fukushima accident 1**

Europaea

10:00 – 11:40 Chair: Akira Yamaguchi (JAPAN) **PRA NPP**

Crossroads of severe accident and cold shutdown of nuclear power plant affected by earthquake and tsunami
Yamaguchi, Akira (JAPAN) 16S-Tu2-1

A PRA Practioner Looks at the Fukushima Daiichi Accident
Epstein, Woody (JAPAN) 16S-Tu2-2

A study of Fukushima nuclear power plant accidents by the viewpoint of PSA
Matsuoka, Takeshi (JAPAN) 16S-Tu2-3

Fukushima Nuclear Power Station Accident: How and Why
Ogino, Masao (JAPAN) 16S-Tu2-4

Evaluation of Water Temperature and Level in a Spent Fuel Pit
Murase, Michio (JAPAN) 16S-Tu2-5

Luncheon **Conference luncheon program**

Fennia 1+2

11:40 – 13:10 Chair: Reino Virolainen (FINLAND) **Luncheon**

Introduction of the George Apostolakis Fellowship Award Winners
George Apostolakis

PSAM 12, Hawaii – Announcement
Todd Paulos

ESREL 2013 Amsterdam – Announcement
Raphael Steenbergen

Scandpower / Lloyd's Remarks
Jerzy Grynblat

11:40 – 13:10 **Conference luncheon (Fennia 1 and Fennia 2, second floor)**

03S-Tu2 Uncertainty analysis 2

Nordia

10:00 – 11:40 Chair: **Uncertainty**

Propagation of aleatory and epistemic uncertainties in the model for the design of a flood protection dike
Pedroni, Nicola (ITALY) 03S-Tu2-1

Uncertainty Analysis for the U.S. NRC State-of-the-Art Consequence Analyses
Ghosh, S. Tina (UNITED STATES) 03S-Tu2-2

Bounding the Failure Probability Range of Polynomial Systems Subject to P-box Uncertainties
Crespo, Luis (UNITED STATES) 03S-Tu2-3

A structural methodology on severe accident uncertainty assessment; integration of input, model and output
Hosseini, Seyed Mohsen (IRAN (ISLAMIC REP.)) 03S-Tu2-4

Phenomena Identification and Ranking for Severe Accident Uncertainty Assessment;
a Systematic, Two-Dimensional Approach
Hosseini, Seyed Mohsen (UNITED STATES) 03S-Tu2-5

Confidence bounds on risk assessments – Application to radiological contaminations
Blatman, Géraud (FRANCE) 03S-Tu2-6

01-Tu2 Condition based maintenance

Nautica

10:00 – 11:40 Chair: Mitra Fouladirad (FRANCE) **Maintenance**

Detection of a damaged operating mode of an optronic equipment using Hidden Markov Model
Baysse, Camille (FRANCE) 01-Tu2-1

Case study for condition-based maintenance combined with on-line monitoring
Fouladirad , Mitra (FRANCE) 01-Tu2-2

Possible Inputs to Maintenance Optimisation Based on Non-direct Diagnostics
Valis, David (CZECH REPUBLIC) 01-Tu2-3

Condition-based maintenance for a deteriorating system subject to random shocks and environmental changes
Zhu, Wenjin (FRANCE) 01-Tu2-4

Incorporating Human Error in Reliability Assessment of Condition Based Maintenance System –
A Systemic Framework
Asadzadeh, Seyed Mohammad (IRAN (ISLAMIC REP.)) 01-Tu2-5

Spare parts optimisation subject to condition monitoring
Ferreira, Rodrigo J. P. (BRAZIL) 01-Tu2-6

20-Tu2 Reliability analysis

Press Room

10:00 – 11:40 Chair: John Andrews (UNITED KINGDOM) **Industrial**

Reliability based model that supports decision making about recovery options in the area of reverse logistics
Plewa, Marcin (POLAND) 20-Tu2-1

Towards Advanced Visualization and Interaction Techniques for Fault Tree Analyses
Comparing existing methods and tools
Al-Zokari, Yasmin (GERMANY) 20-Tu2-2

Treating Complex Dynamics in Probabilistic Safety Assessment: a Case Study from the Process Industry
Podofillini, Luca (SWITZERLAND) 20-Tu2-3

Reliability analysis of complex systems with the monte carlo simulation for system structures
Plinke, Fabian (GERMANY) 20-Tu2-4

Application of phased-mission model to analyze reliability of combined rail-water transport system
Nowakowski, Tomasz (POLAND) 20-Tu2-5

Reliability Model for Influencing Individuals in the Social Network Setting
Ramirez-Marquez, Jose Emmanuel (UNITED STATES) 20-Tu2-6

23-Tu2 | **Oil and gas risk assessment**
Baltica
10:00 – 11:40 | Chair: Jan Erik Vinnem (NORWAY) | **Offshore**

Risk and Reliability Analyses of Dynamic Positioning for Deepwater Pipelaying Operations
Zheng, Hao (CHINA) 23-Tu2-1

Application of Probabilistic Uncertainty Analysis for Modeling of Gas Pipeline Explosion
Alzbutas, Robertas (LITHUANIA) 23-Tu2-2

Visualisation of risk for hydrocarbon leakages in the planning of maintenance and modification activities on offshore petroleum installations
Sarshar, Sizarta (NORWAY) 23-Tu2-3

Use of RSCM in the Offshore QRA
He, Xuhong (SWEDEN) 23-Tu2-4

On the analysis of hydrocarbon leaks on offshore installations in a work process context
Vinnem, Jan-Erik (NORWAY) 23-Tu2-5

Validation and testing of a multi layer risk model for hydrocarbon leaks in the offshore petroleum industry
Johansen, Trond Stillaug (NORWAY) 23-Tu2-6

17-Tu2 | **RI inspection**
Marine Room
10:00 – 11:40 | Chair: Henrik Kortner (NORWAY) | **Risk manag**

A Risk Based Inspection Analysis for Corroding Oil and Gas with Extended Uncertainty Analysis
Berner, Christine Louise (NORWAY) 17-Tu2-1

Risk Informed Scheduling of Regulatory Inspections - A Deterministic approach to regulating operational risks of Elevating Devices
Mangalam, Srikanth (CANADA) 17-Tu2-2

Inspection based on reliability growth: Defining the time of inspection periods based on Power Law reliability growth method
Calixto, Eduardo (BRAZIL) 17-Tu2-3

Multi-Objective Optimization of Risk and Cost for Risk-Based Inspection Plans
Lins, Isis Didier (BRAZIL) 17-Tu2-4

Luncheon | **Conference luncheon program**
Fennia 1+2
11:40 – 13:10 | Chair: Reino Virolainen (FINLAND) | **Luncheon**

Introduction of the George Apostolakis Fellowship Award Winners
George Apostolakis

PSAM 12, Hawaii – Announcement
Todd Paulos

ESREL 2013 Amsterdam – Announcement
Raphael Steenbergen

Scandpower / Lloyd's Remarks
Jerzy Grynblat

11:40 – 13:10 **Conference luncheon (Fennia 1 and Fennia 2, second floor)**

04-Tu2 Occupational risk

Eliel (hotel)

10:00 – 11:40 Chair: Chris Winder (AUSTRALIA) **Occupational**

Emissions of hazardous compounds during PVC manufacturing processes
Derudi, Marco (ITALY) 04-Tu2-1

The contribution of case law to compliance management in Occupational Health and Safety (OHS) in France
Audiffren, Thomas (FRANCE) 04-Tu2-2

The use of video technology as an enabling tool for risk assessment and management in a manufacturing context
Cocca, Paola (ITALY) 04-Tu2-3

Clients and professionals: same places, same perception about accident risk?
Loureiro, I.F. (PORTUGAL) 04-Tu2-4

Applications of Dynamic Risk Assessment
Winder, Chris (AUSTRALIA) 04-Tu2-5

11-Tu2 Risk management 1

Selim (hotel)

10:00 – 11:40 Chair: Jake Ansell (UNITED STATES) **Risk generic**

Plant lifetime management for the onshore process industry
Candreva, Frank (BELGIUM) 11-Tu2-1

Nuclear Waste Facility Siting in Federal Systems:
Understanding the Structure of Public Preferences in the US
Jenkins-Smith, Hank (UNITED STATES) 11-Tu2-2

A systems dynamics framework for risk management of multiple autonomous underwater vehicles
Brito, Mario (UNITED KINGDOM) 11-Tu2-3

18-Tu2 Security methods and applications

Kino K13

10:00 – 11:40 Chair: **Security**

Human factors in the layers of defense in airport security
Andriessen, Hinke (NETHERLANDS) 18-Tu2-1

The Relation between Terrorism Risk Discourses and Aviation Security
Jore, Sissel Haugdal (NORWAY) 18-Tu2-2

Protection of Multiple Assets to Intentional Attacks: A Methodological Framework
Cojazzi, Giacomo G.M. (ITALY) 18-Tu2-3

A framework for selection of strategy for management of security measures
Abrahamsen, Eirik Bjorheim (NORWAY) 18-Tu2-4

Higher Education in Informatics – Concepts and Lessons Learnt
Mock, Ralf (SWITZERLAND) 18-Tu2-5

LNG regasification terminals: assessment of accidents due to external acts of interference
Cozzani, Valerio (ITALY) 18-Tu2-6

16-Tu3 | **Europaea** | **13:10 – 14:30**

Fukushima – panel discussion

Chair: Woody Epstein, Scandpower (Japan)

Co-chair: Akira Yamaguchi, University of Osaka (JAPAN)

PRA NPP

Jukka Laaksonen	STUK
Bob Geller	Tokyo University
Roger Cooke	Resources for the Future
Elisabeth Pate-Cornell	Stanford University
Masaharu Kitamura	Tohoku University
Irina Kuzmina	IAEA
Dave Tappin	British Geological Survey
Pierre Le Bot	EDF R & D and HRA Society

Panel Discussion Not losing to the rain: the impact of the 3/11 earthquake and tsunami, risk assessment, and risk management.	
From the risk point of view	**From the safety point of view**
What went wrong?	What went right?
Was it bad luck?	Was it good luck?
Were the consequences caused by the lack of requisite imagination?	Were the consequences avoided by resilient responses?
What changes are needed in risk/safety assessment? How can we talk in plain words to the public?	

It has been 15 months since the unprecedented earthquake and tsunami struck the Tōhoku area of Japan, not only causing station black out and subsequent core damage and radioactive releases at Fukushima Daiichi, but almost 20,000 deaths, massive relocation of people, economic loss, closure of all 50 nuclear power stations in Japan, projected electric power shortages, and mistrust in government and the regulatory process. The effect has impacted not only Japan, but other countries as well.

What has 3/11 taught the practioners of risk assessment and risk management? What lessons from the disaster can we bring to policy makers and governments? How can we better explain to the public about risk and safety? Most importantly, what changes should we make in risk assessment and risk management to help navigate extreme events in the future?

This Panel Discussion will bring together experts in several different fields who will briefly describe what they have learned and engage in open discussions with each other and members of the audience. We hope that this will be a thought provoking and highly interactive session.

not losing to the rain
not losing to the wind ...

... in everything
count yourself last and put others
before you
watching, listening, understanding
and not forgetting ...

... such a person
I want to become.

From Not losing to the rain by the poet laureate of Tohoku, Miyazawa Kenji.

14:30 – 15:00 **Coffee break**

29-Tu3 Nordia 13:10 – 14:30 — Model uncertainties and validation

Chair: Ali Mosleh (USA) — Epistemic

The Concept of validation of numerical models in consequence analysis
Borg, Audun (NORWAY) 29-Tu3-1

Uncertainty modelling on coupled models using minimum information methods
Bedford, Tim (UNITED KINGDOM) 29-Tu3-2

The Importance of Modelling Assumptions
Andersson, Cilla (SWEDEN) 29-Tu3-3

An application of a new framework for model (output) uncertainty analysis in risk assessment.
Bjerga, Torbjoern (NORWAY) 29-Tu3-4

Verification and Validation Process of a Fire Model
McGrattan, Kevin (UNITED STATES) 29-Tu3-5

01-Tu3 Nautica 13:10 – 14:30 — Maintenance modeling and optimization of complex systems

Chair: Radim Bris (CZECH REPUBLIC) — Maintenance

The interplay between deployment and optimal maintenance intervals for a navy frigate
Tinga, Tiedo (NETHERLANDS) 01-Tu3-1

Maintenance activities planning and grouping for complex structure systems
Vu, Hai Canh (FRANCE) 01-Tu3-2

Maintenance Management Models – a deciding tool for achieving a world-class maintenance function?
Harald, Rødseth (NORWAY) 01-Tu3-3

A modelling language for maintenance task scheduling
Reed, Sean (UNITED KINGDOM) 01-Tu3-4

Reliability-dependent choice of spare part provision and maintenance strategies at optimal cost as an offered service
Appel, Dominic (GERMANY) 01-Tu3-5

11-Tu3 Press Room 13:10 – 14:30 — Risk management 2

Chair: Jake Ansell (UNITED KINGDOM) — Risk generic

Semi-formal safety requirement specification using SysML state machine diagrams
Häring, Ivo (GERMANY) 11-Tu3-1

The environmental integration of safety aspects into the urban development design.
Suddle, Shahid (NETHERLANDS) 11-Tu3-2

Systems engineering approach for the Construction risks of building spanning an underpass
Suddle, Shahid (NETHERLANDS) 11-Tu3-3

Development of a Tool to Present the External Emergency Planning Zones in Belgium
Nourry, Joachim (BELGIUM) 11-Tu3-4

23-Tu3 | **Drilling risk assessment**

Baltica

13:10 – 14:30 | Chair: Jan Erik Vinnem (NORWAY) | **Offshore**

Reliability performance of technical systems: A case study in relation to drilling operations
Håbrekke, Solfrid (NORWAY) 23-Tu3-1

BOP risk and reliability model to give critical decision support for offshore drilling operations
Alme, Inge A. (NORWAY) 23-Tu3-2

In the aftermath of the Deepwater Horizon accident: Inadequate risk management as a common feature of major offshore well operation accidents
Okstad, Eivind (NORWAY) 23-Tu3-3

Investigation of oil-well drilling problems in an Iranian central field using computational fluid dynamics
Owrangi, Mojtaba (IRAN (ISLAMIC REP.)) 23-Tu3-4

17-Tu3 | **PRA in risk management**

Marine Room

13:10 – 14:30 | Chair: Ari Julin (FINLAND) | **Risk manag**

A Technical Overview and Future Plans of Development of AESJ Standards for PRA
Narumiya, Yoshiyuki (JAPAN) 17-Tu3-1

Unforeseen Events, PRA, and Resilience
Epstein, Woody (JAPAN) 17-Tu3-2

Interaction between Industry and Regulator to Improve Quality of the PSA
Lankin, Mikhail (RUSSIAN FEDERATION) 17-Tu3-3

Probabilistic Investigations to Support Risk-Informed Decision-making: Experiences and Perspective
Spitzer, Cornelia (GERMANY) 17-Tu3-4

14:30 – 15:00 | **Coffee break**

04-Tu3 Occupational risk assessment

Eliel (hotel)

13:10 – 14:30 Chair: Olga Anezeris (GREECE) **Occupational**

Models and tools supporting the development and the evaluation of occupational safety and health interventions
Masi, Donato (ITALY) 04-Tu3-1

Developing, Implementing and Evaluating OSH Interventions in SMEs: an Exploratory Study
Masi, Donato (ITALY) 04-Tu3-2

Risk decision in occupational environments: The Portuguese reality
Rodrigues, Matilde (PORTUGAL) 04-Tu3-3

Major accidents in industrial enterprises and occupational safety
Suchardova, Petra (CZECH REPUBLIC) 04-Tu3-4

12-Tu3 Risk and reliability criteria

Selim (hotel)

13:10 – 14:30 Chair: Kevin Coyne (UNITED STATES) **Risk perc**

Reliability test qualification requirements for mechanical systems; setting the standards
Pourgol-Mohammad, Mohammad (IRAN (ISLAMIC REP.)) 12-Tu3-1

The contribution of knowledge bases to compliance assessment:
a case study of industrial maintenance in the gas sector.
Bourreau, Lea (FRANCE) 12-Tu3-2

Environmental risk acceptance criteria in the Norwegian offshore petroleum industry – shortcomings and possible improvements
Kråkenes, Tony (NORWAY) 12-Tu3-3

Criteria for the Acceptance of Risks Related To Human Interactions within the Railway System
Antova, Maria (FRANCE) 12-Tu3-4

18-Tu3 Security methods

Kino K13

13:10 – 14:30 Chair: Stefan Hirschberg (SWITZERLAND) **Security**

Implementation of quantum cryptography
Nowakowski, Tomasz (POLAND) 18-Tu3-1

A framework for integrating economic evaluation and risk assessment to support policymakers' security-related decisions
Räikkönen, Minna (FINLAND) 18-Tu3-2

On prediction of QoS of SCADA accounting cyber attacks
Minichino, Michele (ITALY) 18-Tu3-3

Applying a Hybrid Decision Analysis Approach to Prioritize Cybersecurity Risk
Katsumata, Peter (UNITED STATES) 18-Tu3-4

Vulnerability analysis using tree diagrams
Valis, David (CZECH REPUBLIC) 18-Tu3-5

16A-Tu4 Data analysis

Europaea

15:00 – 16:20 Chair: Antti Toppila (FINLAND) **PRA NPP**

An Approach to Estimating the Reliability of Degraded Piping for Nuclear Power Plant Risk Assessments
Coyne, Kevin (UNITED STATES) 16A-Tu4-1

A study of the introduction of PFM analysis for the LOCA initiating event frequency at Japanese NPPs
Mamizuka, Yutaka (JAPAN) 16A-Tu4-2

Pros & cons of using a multi-parametric model for assessing reliability parameters in nuclear PSA
Swaling, Vidar H. (SWEDEN) 16A-Tu4-3

On applications concerning OECD pipe failure database OPDE
Cronvall, Otso (FINLAND) 16A-Tu4-4

16B-Tu4 HRA based on empirical study

Fennia 2

15:00 – 16:20 Chair: Anthony Spurgin (UNITED STATES) **PRA NPP**

Results and insights derived from the intra-method comparisons of the US empirical HRA benchmarking study
Dang, Vinh (UNITED STATES) 16B-Tu4-1

Conclusions on Human Reliability Analysis (HRA) Methods from the International HRA Empirical Study
Bye, Andreas (UNITED STATES) 16B-Tu4-2

Overview and Preliminary Results of the US Empirical HRA Study
Bye, Andreas (NORWAY) 16B-Tu4-3

Multi Methods Approach to Human Performance Modeling and HRA: A Field Assessment
Boring, Ronald (UNITED STATES) 16B-Tu4-4

Insights from Development and Application of EPRI/NRC Fire HRA Guidance
Chapman, Jim (UNITED STATES) 16B-Tu4-5

27-Tu4 Organisational learning and modeling

Fennia 1

15:00 – 16:20 Chair: Ben Ale (NETHERLANDS) **Human org**

Risk management of resupplying power to railways from the Parisian Metro Centralized Command Center
Jubert, Fabrice (FRANCE) 27-Tu4-1

Organizational learning as a vehicle for providing organizational health and safety culture
Tkatsova, Laura (ESTONIA) 27-Tu4-2

Nuclear Industry Organizations: Shaped by Accidents
Spurgin, Anthony (UNITED STATES) 27-Tu4-3

Modelling risk in high hazard operations: integrating technical, organisational and cultural factors
Ale, Ben J.M. (NETHERLANDS) 27-Tu4-4

16:20 – 16:40 **Fruit break**

03-Tu4 Nordia 15:00 – 16:20 — Uncertainty and sensitivity

Chair: Martina Kloos (GERMANY) — Uncertainty

Sensitivity analysis for the tolerancing of gear profiles with stochastic errors
Rajabalinejad, Mohammad (NETHERLANDS) 03-Tu4-1

Probabilistic modelling and uncertainty analysis of extreme weight of snow
Cesnulyte, Vaida (FINLAND) 03-Tu4-2

Development of a surrogate model and sensitivity analysis for an atmospheric dispersion computer code
Marrel, Amandine (FRANCE) 03-Tu4-3

Sensitivity analyses supplemented to epistemic uncertainty analyses for PSA results
Kloos, Martina (GERMANY) 03-Tu4-4

01-Tu4 Nautica 15:00 – 16:20 — Reliability centred maintenance

Chair: Christophe Berenguer (FRANCE) — Maintenance

Framework to assess RCM software tools
Barberá, Luis (SPAIN) 01-Tu4-1

Options of effectiveness improvement of the RCM process
Kamenicky, Jan (CZECH REPUBLIC) 01-Tu4-2

RCM outputs utilization in optimizing production process
Zajicek, Jaroslav (CZECH REPUBLIC) 01-Tu4-3

20-Tu4 Press Room 15:00 – 16:20 — Automotive systems

Chair: — Industrial

Reliability allocation of a vehicle with regard to warranty costs
Vintr, Tomas (CZECH REPUBLIC) 20-Tu4-1

Handling Product Variants in the Safety Engineering Lifecycle
Ciocanescu, Ioana (GERMANY) 20-Tu4-2

GOBI and OASIS - A concept and its realization for model-based situation descriptions compliant to ISO 26262
Kemmann, Sören (GERMANY) 20-Tu4-3

ARID - A model-based risk analysis approach
Kemmann, Sören (GERMANY) 20-Tu4-4

23-Tu4 | **Marine operations risks**

Baltica

15:00 – 16:20 | Chair: Stein Haugen (NORWAY) | **Offshore**

Collision between offshore supply vessels and offshore installations
Haugen, Stein (NORWAY) 23-Tu4-1

Integration of Operation Management and Risk Assessment Using Hierarchical Task Analysis
Batalden, Bjørn-Morten (NORWAY) 23-Tu4-2

The Use of the TSAR to Investigate the Aging Effects on Selected Elements of Ship Propulsion System
Mitomo, Nobuo (JAPAN) 23-Tu4-3

Oil tanker transportation risk: driving factors and consequence assessment
Burgherr, Peter (SWITZERLAND) 23-Tu4-4

17-Tu4 | **Safety assessment, management and goals**

Marine Room

15:00 – 16:20 | Chair: Anders Olsson (SWEDEN) | **Risk manag**

Model-based development of a safety concept
Kemmann, Sören (GERMANY) 17-Tu4-1

Synergy between DyPASI and well-known safety indicator methodologies in the prevention of atypical accident scenarios
Paltrinieri, Nicola (ITALY) 17-Tu4-2

Safety Goals in Application to Nuclear Installations
Kuzmina, Irina (SWEDEN) 17-Tu4-3

OECD/NEA Project on Methods for Safety Assessment for Geological Disposal Facilities for Radioactive Waste (MeSA): Results and Conclusions
Röhlig, Klaus-Jürgen (GERMANY) 17-Tu4-4

16:20 – 16:40 | **Fruit break**

21S-Tu4 Managing system changes in aviation – novel issues for PRA

Eliel (hotel)

15:00 – 16:20 Chair: Carlo Cacciabue (ITALY) **Aviation**

Managing risk in real contexts with scarcity of data and high potential hazards: the case of flights in airspace contaminated by volcanic ash
Cacciabue, Pietro Carlo (ITALY) 21S-Tu4-1

A methodology for managing system change – An airline case study developing a safety performance management system
McDonald, Nicholas (SWEDEN) 21S-Tu4-2

Integrated Data Management for handling hazard of change situations: a sample case of operational implementation
Cassani, Mirella (ITALY) 21S-Tu4-3

A Learning, Training & Mentoring Framework (LTM) & the Role of Serious Games to Facilitate Sustainable Change in the Aviation Industry
Zon, Rolf (NETHERLANDS) 21S-Tu4-4

Performance Management in a Small Regional Airport, from Day to Day Data Collection to Resilience
Leva, Maria Chiara (IRELAND) 21S-Tu4-5

11-Tu4 Nuclear spent fuel safety

Selim (hotel)

15:00 – 16:20 Chair: Kevin McMahon (UNITED STATES) **Risk generic**

Sensitivity Analysis of Seals Permeability and Performance Assessment of Deep Borehole Disposal of Radioactive Waste
Hadgu, Teklu (UNITED STATES) 11-Tu4-1

Performance of neutron radiation shielding material (U)HMW-PE influenced by gamma radiation
Wolff, Dietmar (GERMANY) 11-Tu4-2

Experience with the loading of storage casks and particular with respect of the drying prior long term storage
Hueggenberg, Roland (GERMANY) 11-Tu4-3

16C-Tu4 PRA Level 2 and 3

Kino K13

15:00 – 16:20 Chair: Eva-Maria Pauli (GERMANY) **PRA NPP**

A Study on the measure of Large Early Release Frequency in PSA
Jae, Moosung (KOREA (REP.)) 16C-Tu4-1

Level 2 PRA modelling at OL1 and OL2 nuclear power plants
Tarkiainen, Antti (FINLAND) 16C-Tu4-2

Level 2 PSA studies of WWER440 type reactors in Slovakia
Kovacs, Zoltan (SLOVAKIA) 16C-Tu4-3

Level 2 Probabilistic Safety Assessment for the NPP Kruemmel
Schubert, Bernd (GERMANY) 16C-Tu4-4

16A-Tu5 RI applications

Europaea

16:40 – 18:00 Chair: Ari Julin (FINLAND) **PRA NPP**

Current Status and Development of Risk Informed Event Analysis in Finland
Laitonen, Janne (FINLAND) 16A-Tu5-1

Understanding plant fire risk and visualizing a safe shutdown strategy using PRISM – A case study focusing on plant modifications and risk reduction
Theisen, Mitchell (UNITED STATES) 16A-Tu5-2

Application of Risk-informed Operational Event Analysis in China
Huang, Qian (CHINA) 16A-Tu5-3

Risk-informed classification and treatment of structures, systems and components – A 10CFR50.69 pilot study
O'Regan, Patrick (UNITED STATES) 16A-Tu5-4

Risk-Informed Safety Margin Characterization Methods
Smith, Curtis (UNITED STATES) 16A-Tu5-5

16B-Tu5 New HRA methods 1

Fennia 2

16:40 – 18:00 Chair: **PRA NPP**

Towards an Improved HRA Model for Estimation of HEPs
Lois, Erasmia (UNITED STATES) 16B-Tu5-1

Suggestions for improvement in emergency operating procedure through operator behavior analysis of simulated emergency
Choi, Sun Yeong (KOREA (REP.)) 16B-Tu5-2

MERMOS catalogue: use of generic analyses to improve the HRA method
Le Bot, Pierre (FRANCE) 16B-Tu5-3

Migration from HCR to TRC model in the context of the human reliability analysis in the PRA of Vandellós II NPP
Nos, Vicente (SPAIN) 16B-Tu5-4

Microworlds, Simulators, and Simulation: Framework for a Benchmark of Human Reliability Data Sources
Boring, Ronald (UNITED STATES) 16B-Tu5-5

09-Mo2 Reliability and concrete structures

Fennia 1

This session has been moved from Monday: 09-Mo2

16:40 – 18:00 Chair: Jana Markova (CZECH REPUBLIC) **Structural**

Evaluation of reliability of existing intermediate floor beams of reinforced concrete
Derry, Markus (FINLAND) 09-Mo2-1

Probabilistic analysis of structures in serviceability conditions
Markova, Jana (CZECH REPUBLIC) 09-Mo2-2

Influence of a new CUSUM based conformity inspection scheme for EN 206-1 on the safety level of concrete structures
Van Coile, Ruben (BELGIUM) 09-Mo2-3

Verification of Existing Reinforced Concrete Bridges using the Design Value Method
Markova, Jana (CZECH REPUBLIC) 09-Mo2-4

06-Tu5 Data collection and analysis (non-nuclear)

Nordia | **16:40 – 18:00** | Chair: Kevin Wilson (UNITED KINGDOM) | **Data**

Field data analysis with reduced sample sizes: A case study using the optimised multi-stage sampling procedures (OMSP) concept
Haller, Stephan (GERMANY) 06-Tu5-1

Failure data analysis of an oil refinery centrifugal pumps
Gaspar, Daniel (PORTUGAL) 06-Tu5-2

Failure frequency assessment for high pressure and large diameter pipelines
Tallone, Fabrizio (ITALY) 06-Tu5-3

Benchmarking Accident and Reporting Rates Across Locations and Supervisors: An Application of Detection Controlled Estimation
Jablonowski, Christopher (UNITED STATES) 06-Tu5-4

Failure causes for pipelines transporting hazardous substances
Hansler, Rikkert (NETHERLANDS) 06-Tu5-5

Collection and analysis of input data for probabilistic assessment of hygro-thermal performance of building
Sadovsky, Zoltan (SLOVAKIA) 06-Tu5-6

01-Tu5 Preventive maintenance

Nautica | **16:40 – 18:00** | Chair: Roger Flage (NORWAY) | **Maintenance**

Optimal replacement policy under time-varying minial repair costs and a random time horizon
Khatab, Abdelhakim (FRANCE) 01-Tu5-1

Sensitivity analysis of the optimal parameter of block-replacement policy for a gamma degradation process
Paroissin, Christian (FRANCE) 01-Tu5-2

A virtual age model for components with initial degradation
Pérez Ramírez, Pedro A. (NORWAY) 01-Tu5-3

A preventive maintenance policy for a bivariate wear indicator with continuous monitoring
Pham, Hai Ha (FRANCE) 01-Tu5-4

On the inescapability of aging in an imperfect preventive maintenance model
Segovia, MCarmen (BELGIUM) 01-Tu5-5

20-Tu5 Risk management

Press Room | **16:40 – 18:00** | Chair: Bernt Leira (NORWAY) | **Industrial**

Key Risk Measures for the Risk-Informed Prioritization of Engineering Projects
Jyrkama, Mikko (CANADA) 20-Tu5-1

Integrated risk management system based on IPL concept for chemical processes
Shimada, Yukiyasu (JAPAN) 20-Tu5-2

Risk based approaches for indicators identification: Insights from the field.
Mazri, Chabane (FRANCE) 20-Tu5-3

Major Industrial Accident Prevention in Slovak Republic and project MOPORI
Zánická Hollá, Katarína (SLOVAKIA) 20-Tu5-4

23-Tu5 Marine transportation risk assessment

Baltica

16:40 – 18:00 Chair: Pentti Kujala (FINLAND) **Offshore**

Development of a Method for Maritime Accident Analysis with ET
Mitomo, Nobuo (JAPAN) 23-Tu5-1

A method for assessment of target overlook in navigation watch
Yoshimura, Kenji (JAPAN) 23-Tu5-2

Artificial Force Fields for Multi-agent Simulations of Maritime Traffic and Risk Estimation
Xiao, Fangliang (NETHERLANDS) 23-Tu5-3

Ballast Water Risk Estimation Incorporating Fuzzy-Infection Mode and Effect Analysis
Wang, Jin (UNITED KINGDOM) 23-Tu5-4

02-Tu5 Bayesian analysis and simulation

Marine Room

16:40 – 18:00 Chair: **Mathematics**

Assessment of Bayesian estimation methods for technical reliability data
Bauer, Oliver (GERMANY) 02-Tu5-1

Generic Form of Bayesian Monte Carlo For Models With Partial Monotonicity
Rajabalinejad, Mohammad (NETHERLANDS) 02-Tu5-2

Bayesian Subset Simulation : a kriging-based subset simulation algorithm for the estimation of small probabilities of failure
Bect, Julien (FRANCE) 02-Tu5-3

Bayesian calibration of the Pasture Simulation Model (PaSim) to simulate European grasslands under climate extremes: case study at Stubai (Austria)
Ben Touhami, Haythem (FRANCE) 02-Tu5-4

A Bayesian Framework for Life Cycle Reliability Estimation of New Product
Xie, Min (HONG KONG, CHINA PR) 02-Tu5-5

26-Tu5 SIL decision support

Eliel (hotel)

16:40 – 18:00 Chair: Jan Holmberg (FINLAND) **SIL**

Optimal prooftests for Safety Instrumented Systems based on maintenance models
Machleidt, Konstantin (GERMANY) 26-Tu5-1

Joint using the deterministic and probabilistic approaches to improve the safety analysis of a system
de Reffye, Jerome (FRANCE) 26-Tu5-2

Functional safety assessment within the risk informed decision making process
Kosmowski, Kazimierz, Tadeusz (POLAND) 26-Tu5-3

Computer aided functional safety management using ProSIL system
Kosmowski, Kazimierz (POLAND) 26-Tu5-4

11-Tu5 Risk assessment 2

Selim (hotel)

16:40 – 18:00 Chair: **Risk generic**

Managing Risk Through Safety Barrier Analysis
Sobral, Jose (PORTUGAL) 11-Tu5-1

Infrastructure Security and All Hazards Risk Assessment Approach for the Water Sector
Rees, Daniel (UNITED STATES) 11-Tu5-2

Positively Influencing Safety through a Tailored Probabilistic Assessment of Refuelling Operations
Loudoun, James (UNITED KINGDOM) 11-Tu5-3

Contribution to a concept of robustness for risk management for critical infrastructure
Krauss, Matias (GERMANY) 11-Tu5-4

16C-Tu5 PRA Level 2 related applications

Kino K13

16:40 – 18:00 Chair: Antti Tarkiainen (FINLAND) **PRA NPP**

Evaluation of source term distributions in Level 2 PSA with a fast running Monte Carlo transport code
Pauli, Eva-Maria (GERMANY) 16C-Tu5-1

The Analysis of Severe Accident Induced Steam Generator Tube Rupture and Mitigation Measure
Peng, Chang-Hong (CHINA) 16C-Tu5-2

Very fast running codes for the characterization of severe accident radiological consequences and the results presentation in level 2 PSA
Durin, Thomas (FRANCE) 16C-Tu5-3

Human Reliability Analysis for the updated Level 2 PSA in Belgium
Oury, Laurence (BELGIUM) 16C-Tu5-4

Program Outline – Wednesday, 27 June 2012

	Europaea	Fennia 2	Fennia 1	Nordia	Nautica	Press room
08:30-09:30 Plenary session **We1**	Plenary PL-We1 1					
09:30-10:00	COFFEE BREAK					
10:00-11:40 Parallel sessions **We2**	PRA NPP 16AS-We2 Fukushima accident 2	PRA NPP 16BS-We2 Very long term storage of radioactive waste 1	HUMAN ORG 27-We2 Risk and safety behavior	OFFSHORE 23-We2 Offshore risk management	MAINTENANCE 01-We2 Overview, discussions and new approaches	MATHEMATICS 02-We2 Dynamic analysis
11:40-13:10	LUNCH BREAK					
13:10-14:30 Parallel sessions **We3**	PRA NPP 16A-We3 New HRA methods 2	PRA NPP 16BS-We3 Very long term storage of radioactive waste 2	HUMAN ORG 27-We3 Safety culture in complex systems	MATHEMATICS 02S-We3 Bayesian network applications 1	MAINTENANCE 01-We3 Modeling tools and software for maintenance analyses	INDUSTRIAL 20-We3 RAMS 1
14:30-15:00	COFFEE BREAK					
15:00-16:40 Parallel sessions **We4**	PRA NPP 16A-We4 Shutdown and spent fuel analyses	PRA NPP 16B-We4 Advances in fault tree and event tree methods	HUMAN ORG 27-We4 Safety culture and indicators	MATHEMATICS 02AS-We4 Bayesian network applications 2	MAINTENANCE 01-We4 Predictive maintenance	MATHEMATICS 02B-We4 Reliability analysis

19:00	**Bus transfers for the Conference Dinner**

Baltica	Marine room	Eliel (hotel)	Selim (hotel)	Kino K13	
					08:30-09:30 Plenary session **We1**
COFFEE BREAK					09:30-10:00
EXTERNAL	RISK MGMT	STOCHASTIC	DSS	INDUSTRIAL	10:00-11:40 Parallel sessions **We2**
22-We2	17S-We2	08-We2	07-We2	20-We2	
External hazards 1	Severe accident management guidance	Stochastic and numerical simulation for reliability and risk analysis	DSS case studies	Fires and explosions	
LUNCH BREAK					11:40-13:10
EXTERNAL	SIL	SOFTWARE	AVIATION	STRUCTURAL	13:10-14:30 Parallel sessions **We3**
22-We3	26-We3	10-We3	21-We3	09-We3	
Seismic risk - applications	SIL specific issues	I&C reliability models 1	Critical issues in aviation - safety performance 1	Structural reliability and degradation modeling 3	
COFFEE BREAK					14:30-15:00
EXTERNAL	RISK PERC	TRANSPORT	AVIATION	INFRA	15:00-16:40 Parallel sessions **We4**
22-We4	12-We4	28-We4	21-We4	24S-We4	
Seismic risk - methodology	Risk perception and communication	Railway safety	Aviation safety management	Vulnerability of critical infrastructures 1	

Session moved from **24S-Th5** → **INFRA** / **24S-We5** / Vulnerability of critical infrastructures 2

19:00

PL-We1 | **Plenary session: Ashok Thadani (USA)**

Europaea

08:30 – 09:30 | Chair: Cornelia Spitzer (GERMANY) | **Plenary**

Mr. Ashok Thadani *has been a consultant to domestic and international organizations on nuclear safety matters since July 2006. Currently, he is Chairman of the Nuclear Safety Committee reporting to the Nuclear Safety Authority Commission of France.*
From 1974 to his retirement in 2006, he worked at the Nuclear Regulatory Commission. Mr. Thadani held progressively responsible management positions including Associate Director of the Office of Nuclear Reactor Regulation, Director of the Office of Nuclear Regulatory Research, and Deputy Executive Director of NRC.
He was at the forefront of activities directed toward investigating and resolving major nuclear safety issues as well as assessing new and innovative nuclear power plant designs and technologies. He was extensively and personally engaged in developing safety requirements and directing NRC's technical reviews of advanced light water reactor designs (ABWR, AP-600 which was uprated to AP-1000, and Systems 80+). Throughout his career he has been tasked to lead response to some of the most significant challenges that have won him recognition for technical and management excellence. He has been a recipient of many awards including two Presidential Rank awards and the NRC's highest award of Distinguished Service.
During his tenure as the director of the Office of Nuclear Regulatory Research, he managed about 200 scientific and engineering staff as well as a budget of about 100 million dollars. Recognizing the importance of international cooperation and the importance of effective use of resources, he expanded bilateral and multilateral nuclear safety cooperation agreements with twenty seven countries.
Mr. Thadani was a member of the International Nuclear Safety Advisory Group tasked to give advice to the Director General of the International Atomic Energy Agency, member of the OECD Committees on Nuclear Regulatory Activities and Safety of Nuclear Installations, and he was chairman of the Committee on Safety of Nuclear Installations for five years. He also served on the Nuclear Energy Research Advisory Committee tasked to advise the Secretary of Energy.

International harmonization of nuclear power safety… Role of safety goals

Civilian use of nuclear power requires a long term (100 years or more) commitment. This commitment must reflect an attitude of continuous close attention to world wide experience and results from nuclear safety research. Further, the nuclear map is changing as new countries access nuclear power and many new designs of power plants have been developed and yet others are under development. In recent years increased international partnerships have been developed to address issues of significant safety in designs and operation. However, there is a need for greater clarity in the expectations of the overall level of safety of designs. IAEA has made strides in proposing requirements for design of nuclear power plants but some gaps remain regarding high level safety goals (integration of deterministic and probabilistic elements) and agreement on such goals would lead to much harmonized safety requirements.

09:30 – 10:00 | **Coffee break**

Notes

16AS-We2 Fukushima accident 2

Europaea

10:00 – 11:40 Chair: Steve Epstein (UNITED STATES) **PRA NPP**

Consequences of the Fukushima accident
Cazzoli, Ericco (SLOVAKIA) 16AS-We2-1

Fundamental considerations of evacuation behavior of Fukushima residents in nuclear emergency event based on questionnaire surveys
Nishino, Tomoaki (JAPAN) 16AS-We2-2

Tsunami PRA Standard Development by Atomic Energy Society Japan (AESJ) (1) Outline of Tsunami PRA and Plant Systems Analysis
Kirimoto, Yukihiro (JAPAN) 16AS-We2-3

An Impact-based Approach in Selecting External Events for PRA at a NPP
Narumiya, Yoshiyuki (JAPAN) 16AS-We2-4

16BS-We2 Very long term storage of radioactive waste 1

Fennia 2

10:00 – 11:40 Chair: Tito Bonano (UNITED STATES) **PRA NPP**

Long-term Containment Performance Test of Metal Cask for Spent Nuclear Fuel Storage
Wataru, Masumi (JAPAN) 16BS-We2-1

Seal and Closure Performance in Long Term Storage
Völzke, Holger (GERMANY) 16BS-We2-2

SCC Evaluation Method of Multi-Purpose Canister in Long Term Storage
Shirai, Koji (JAPAN) 16BS-We2-3

Studies on nuclear fuel evolution during storage and testing of used fuel response to impact loadings
Rondinella, Vincenzo (GERMANY) 16BS-We2-4

27-We2 Risk and safety behavior

Fennia 1

10:00 – 11:40 Chair: Teemu Reiman (FINLAND) **Human org**

Skills and traits as contributors to senior managerial safety commitment
Fruhen, Laura (UNITED KINGDOM) 27-We2-1

A Behavior-Based Observation Program's Contribution to a Nuclear Facility Operational Safety
Cournoyer, Michael (UNITED STATES) 27-We2-2

Risk acceptance: Perspectives of a challenging
Matilde, Rodrigues (PORTUGAL) 27-We2-3

Behavioral Safety: a way to decrease injuries at work (with science)
Sala Cattaneo, Carlo (ITALY) 27-We2-4

Designing the training: Leadership in Everyday Activities that hold Major Incident Risk
von Hirsch Eriksen, Helen (NORWAY) 27-We2-5

A tool-supported training framework for improving operators' dependability confronted with faults and errors
Barboni, Eric (FRANCE) >>> Moved from session 27-Mo2 27-Mo2-4

11:40 – 13:10 **Lunch break**

23-We2 Offshore risk management

Nordia

10:00 – 11:40 Chair: Jan Erik Vinnem (NORWAY) **Offshore**

A Review and Discussion of the Norwegian Offshore Safety Regulation Regime for Risk Assessments
Khorsandi, Jahon (NORWAY) 23-We2-1

A generic method for identifying major accident risk indicators
Haugen, Stein (NORWAY) 23-We2-2

Incident data from decommissioning and removal of offshore installations
Haugen, Stein (NORWAY) 23-We2-3

On the use of Vision Zero for production loss in the oil and gas industry
Selvik, Jon Tømmerås (NORWAY) 23-We2-4

01-We2 Overview, discussions and new approaches

Nautica

10:00 – 11:40 Chair: Mitra Fouladirad (FRANCE) **Maintenance**

Maintenance Optimisation and the ALARP Principle – Review and Discussion
Flage, Roger (NORWAY) 01-We2-1

Maintenance Performance Indicators for TSOs
Matahri, Naoelle (FRANCE) 01-We2-2

Economical effectiveness of Delay Time approach using in Time-Based maintenance modelling
Werbinska-Wojciechowska, Sylwia (POLAND) 01-We2-3

Integration of root cause analysis and theory of inventive problem solving
Viveros, Pablo (CHILE) 01-We2-4

A study of the efficacy of the inspection of railway rolling stock
Cavalcante, Cristiano (UNITED KINGDOM) >>> Moved to session 01S-Mo3 01-We2-5

02-We2 Dynamic analysis

Press Room

10:00 – 11:40 Chair: Pierre-Etienne Labeau (BELGIUM) **Mathematics**

Dynamic Probabilistic Risk Analysis of the Fast Cascade Phase of Large Disturbances in Power System
Faghihi, Farshid (BELGIUM) 02-We2-1

Implementing dynamic flowgraph methodology models with logic programs
Karanta, Ilkka (FINLAND) 02-We2-2

Applications of the Dynamic Flowgraph Methodology to Dynamic Modeling and Analysis
Guarro, Sergio (UNITED STATES) 02-We2-3

Dynamic aspects and behaviors in performance and reliability assessment
Distefano, Salvatore (ITALY) 02-We2-4

Building Dynamic Resilience Estimation Metrics for Interdependent Infrastructures
Barker, Kash (UNITED STATES) 02-We2-5

Sequential optimization of oil production from multiple reservoirs under uncertainty
Huseby, Arne (NORWAY) 02-We2-6

Calculation of damage frequencies without success criteria hypothesis. Application to MBLOCA sequences
Salazar, Cesar Queral (SPAIN) >>> Moved from session 16A-Mo5 16A-Mo5-3

22-We2 External hazards 1

Baltica

10:00 – 11:40 Chair: Elisabeth Pate-Cornel (UNITED STATES) **External**

Reassessment of external events in view of the Fukushima accident
Olofsson, Frida (SWEDEN) 22-We2-1

Effect of severe space weather on cascading power grid failure: An illustrative model and policy implications
Paté-Cornell , M. Elisabeth (UNITED STATES) 22-We2-2

Probabilistic hurricane rain model for the evaluation of mid/high-rise buildings damage due to water penetration
Pinelli, Jean-Paul (UNITED STATES) 22-We2-3

Reliability analysis of a fish diversion structure at the cooling water intake of a power generating station
Jyrkama, Mikko (CANADA) 22-We2-4

A risk framework for offshore wind farms in hazard-prone areas
Staid, Andrea (UNITED STATES) 22-We2-5

17S-We2 Severe accident management guidance

Marine Room

10:00 – 11:40 Chair: Cornelia Spitzer (GERMANY) **Risk manag**

Designing societal safety – A study of the Swedish crisis management system
Tehler, Henrik (SWEDEN) 17S-We2-1

Development of severe accident management for Paks NPP
Techy, Zsolt (HUNGARY) 17S-We2-2

Accident management programs in the nuclear domain: Status and perspective in Germany
Spitzer, Cornelia (GERMANY) 17S-We2-3

Considerations for Future Development of SAMG at Multiple-Unit Sites
Dinnie, Keith (CANADA) 17S-We2-4

SAMG Development for German NPPs: Concept and Utilities Point of View
Schubert, Bernd (GERMANY) 17S-We2-5

11:40 – 13:10 **Lunch break**

08-We2 Eliel (hotel) 10:00 – 11:40

Stochastic and numerical simulation for reliability and risk analysis

Chair: Nicolo Pedroni (ITALY)

Stochastic

Graphic representation alternative to conditional cobweb plots
Cormenzana, José Luis (SPAIN) 08-We2-1

Simulation of autonomous energy supply systems considering data and model uncertainties
Gabel, Dieter (GERMANY) 08-We2-2

All-Terminal Reliability Evaluation through a Monte Carlo simulation based on an MPI implementation
Pascual, Silvia (SPAIN) 08-We2-3

Numerical simulation of non-Gaussian stochastic processes by amplitude modulation and phase reconstruction
Jiang, Yu (CHINA) 08-We2-4

07-We2 Selim (hotel) 10:00 – 11:40

DSS case studies

Chair:

DSS

A multicriteria decision model to support building maintenance planning
Cavalcante, Cristiano (BRAZIL) 07-We2-1

A DSS to support maintenance planning for an electrical power distribution company
Almeida-Filho, Adiel (BRAZIL) 07-We2-2

Using SySML language for maintenance decision-making model development to support complex maintenance program quantification
Ruin, Thomas (FRANCE) 07-We2-3

A DSS for multiple dimension risk evaluation of a gas pipeline
Almeida, Adiel (BRAZIL) 07-We2-4

20-We2 Kino K13 10:00 – 11:40

Fires and explosions

Chair: Valerio Cozzani (ITALY)

Industrial

A preliminary analysis of the 1996 channel tunnel fire by applying a TFSMS model
Santos-Reyes, Jaime (MEXICO) 20-We2-1

Specificities in the explosion risk assessment of gas/dust hybrid mixtures
Dufaud, Olivier (FRANCE) 20-We2-2

Physical hazards comparison based on flammable gas release for two kinds of polystyrene foams
Nakarai, Toyoaki (JAPAN) 20-We2-3

Passive fire protection materials for process equipment: testing the properties and modeling the behavior for advanced performance analysis
Cozzani, Valerio (ITALY) 20-We2-4

Risk assessment in pressure tests: a case study
Borgia, Orlando (ITALY) 20-We2-5

16A-We3 New HRA methods 2

Europaea

13:10 – 14:30 Chair: Gareth Parry (UNITED STATES) **PRA NPP**

A Model-Based Human Reliability Analysis Methodology
Mosleh, Ali (UNITED STATES) 16A-We3-1

A Model-Based Approach to HRA: Qualitative Analysis Methodology
Oxstrand, Johanna (UNITED STATES) 16A-We3-2

George Apostolakis Fellowship Award Winner

A Model-Based Approach to HRA: Example Application and Quantitative Analysis
Groth, Katrina M. (UNITED STATES) **16A-We3-3**

Towards an Improved HRA Method
Dang, Vinh (UNITED STATES) 16A-We3-4

MERMOS-A: A new method to analyze pre-initiator for specific HRA
Serdet, Emmanuel (FRANCE) 16A-We3-5

16BS-We3 Very long term storage of radioactive waste 2

Fennia 2

13:10 – 14:30 Chair: Ken Sorensen (UNITED STATES) **PRA NPP**

Mechanical Behaviour of High Burn-Up SNF under Normal and Accident Transport Conditions – Present Approaches and Perspectives
Wille, Frank (GERMANY) 16BS-We3-1

U.S. Gap Analysis to Support Extended Storage of Used Nuclear Fuel
Hanson, Brady (UNITED STATES) 16BS-We3-2

International Perspectives on Technical Data Gaps Associated with Long Term Storage and Transportation of Used Nuclear Fuel
Sorenson, Ken (UNITED STATES) 16BS-We3-3

Impact of Fuel Failure on Criticality Safety of Used Nuclear Fuel
Wagner, John (UNITED STATES) 16BS-We3-4

27-We3 Safety culture in complex systems

Fennia 1

13:10 – 14:30 Chair: Barry Kirwan (UNITED KINGDOM) **Human org**

The EUROCONTROL safety culture questionnaire: Lessons from Application
Kirwan, Barry (UNITED KINGDOM) 27-We3-1

HSE Implications of Industrial Networks
Hansson, Lisbeth (NORWAY) 27-We3-2

Enhancing Network Safety through Network Governance, Shared Understanding and Interfirm Heedfulness
Gotcheva, Nadezhda (FINLAND) 27-We3-3

14:30 – 15:00 **Coffee break**

02S-We3 Bayesian network applications 1

Nordia

13:10 – 14:30 Chair: Ali Mosleh (USA) **Mathematics**

A Bayesian Belief Network Method of Sensor Placement Optimization for System Reliability Monitoring
Pourali, Masoud (UNITED STATES) 02S-We3-1

Assessment of causes of a bridge downfall using Bayesian network
Holicky, Milan (CZECH REPUBLIC) 02S-We3-2

Developing a tool for rapid source term prediction (RASTEP)
Swaling, Vidar H. (SWEDEN) 02S-We3-3

Root Cause Analysis to Identify Physical Causes
Ruin, Thomas (FRANCE) 02S-We3-4

Bayesian Belief Networks for Predicting Drinking Water Distribution System Pipe Breaks
Francis, Royce (UNITED STATES) 02S-We3-5

01-We3 Modeling tools and software for maintenance analyses

Nautica

13:10 – 14:30 Chair: Darren Prescott (UNITED KINGDOM) **Maintenance**

Finding the optimal power plant maintenance strategy with fuzzy input data
Aha, Ulrich (GERMANY) 01-We3-1

A probabilistic approach to introduce risk measurement indicators to an offshore wind project evaluation – improvement to an existing tool ECUME
Douard, Fanny (FRANCE) 01-We3-3

Simulation Tool Development to Support Customer-Supplier Relationship for CBM Services
Salokangas, Riku (ITALY) 01-We3-4

20-We3 RAMS 1

Press Room

13:10 – 14:30 Chair: Jørn Vatn (NORWAY) **Industrial**

Experiences of using RAMS principles in rail transport, oil & gas, nuclear power and process industries – Conformities and differences
Olsson, Anders (SWEDEN) 20-We3-1

Modelling the Availability of Offshore Wind Farm Sub-Assemblies
Zitrou, Athena (UNITED KINGDOM) 20-We3-2

Availability analysis of chemical process plants with storage units applying Semi-Markov processes with semi-regenerative states
Fink, Olga (SWITZERLAND) 20-We3-3

A model for the estimation of the impacts of system availability on cumulative oil production and economic return
de Carvalho, Marcos Henrique (BRAZIL) 20-We3-5

Production availability analysis for oil and gas facilities: Concepts and procedure
Brissaud, Florent (FRANCE) 20-We3-4

22-We3	Seismic risk – applications	
Baltica		
13:10 – 14:30	Chair:	External

Issues in Quantitative Seismic Risk Analysis of Petrochemical and Chemical Facilities
Lin, James (UNITED STATES) 22-We3-1

Impact Evaluation of Updated Canadian Seismic Hazards on Point Lepreau G.S. PSA-Based Seismic Margin Assessment and Design Basis
Mullin, Derek (CANADA) 22-We3-2

Estimation of seismic risk for Point Lepreau generating station utilizing simplified hybrid model
Mullin, Derek (CANADA) 22-We3-4

The update of seismic probabilistic risk analysis for Loviisa nuclear power plant
Helander, Juho (FINLAND) 22-We3-5

26-We3	SIL specific issues	
Marine Room		
13:10 – 14:30	Chair: Henrik Kortner (NORWAY)	SIL

Average probability of a dangerous failure on demand: Different modelling methods, similar results
Brissaud, Florent (FRANCE) 26-We3-3

The application of Scrum to IEC 61508 certifiable software
Stålhane, Tor (NORWAY) 26-We3-1

Impact of Wireless Signal Transmission on Analysis of SIL Compliance
Dahl-Olsen, Håkon (NORWAY) 26-We3-2

14:30 – 15:00	Coffee break

10-We3 I&C reliability models 1

Eliel (hotel)

13:10 – 14:30 Chair: Celine Martinie (FRANCE) **Software**

Digital I&C Replacement Integration Method and Critical Digital Review Procedure
Huang, Hui-Wen (TAIWAN) 10-We3-1

Modular fault tree modeling for digital I&C systems implemented with TXS, using the example of the NVNPP-2 reactor protection system
Otto, Peter (GERMANY) 10-We3-2

A Diversity Model for Multi-Version Safety-Critical I&C Systems
Vilkomir, Sergiy (UNITED STATES) 10-We3-3

Isolation of I&C model from PRA fault tree model
Niemelä, Ilkka (FINLAND) 10-We3-4

21-We3 Critical issues in aviation – safety performance 1

Selim (hotel)

13:10 – 14:30 Chair: Carlo Cacciabue (ITALY) **Aviation**

Risk management in the course of aircraft flight test planning and the flight test programme optimization
Wójcik, Joanna (POLAND) 21-We3-1

The challenges in defining aviation safety performance indicators
Klompstra, Margriet (NETHERLANDS) 21-We3-2

Software contributions to aircraft accidents and incidents: Recent case studies, analysis, and recommendations
Jackson, David (UNITED STATES) 21-We3-3

A scenario based model for assessing runway conditions using weather data
Huseby, Arne Bang (NORWAY) 21-We3-4

Integrating fatigue risk management into an airline's safety management system
Koornneef, Floor (NETHERLANDS) 21-We3-5

09-We3 Structural reliability and degradation modeling 3

Kino K13

13:10 – 14:30 Chair: Kaisa Simola (FINLAND) **Structural**

Probabilistic corrosion hazard assessment for partially surveyed pipelines
Vaccaro, Filippo (ITALY) 09-We3-1

The Reliability Estimation Of Structural Components With Some Selected Failure Model
Zieja, Mariusz (POLAND) 09-We3-2

A Probabilistic-Mechanistic Approach to Modeling Stress Corrosion Cracking Propagation in Alloy 600 Components with Applications
Wu, Gary (UNITED STATES) 09-We3-3

Physics-based multi-state models of passive component degradation for the R7 reactor simulation environment
Unwin, Stephen (UNITED STATES) 09-We3-4

16A-We4 Shut down and spent fuel analyses

Europaea

15:00 – 16:40 Chair: Risto Himanen (FINLAND) **PRA NPP**

Development of a spent fuel pool level 1 PSA model for the French EPR reactor (FA3)
Leloutre, Helene (FRANCE) 16A-We4-1

The probability based risk analysis of a planned shutdown and start-up for OL1 and OL2 nuclear power plants
Tuulensuu, Hannu (FINLAND) 16A-We4-2

Deterministic Analyses of Severe Accidents inside Spent Fuel Pools for Support of PSA Level 2 Studies
Steinrötter, Thomas (GERMANY) 16A-We4-3

Experience from PSA evaluations of a specific cold shutdown period
Cederhorn, Erik (SWEDEN) 16A-We4-4

An Optimum Structure for Shut-Down PSA
Becker, Günter (GERMANY) 16A-We4-5

Assessment of the Likelihood of Shipping a Spent Fuel Cask Susceptible to Criticality
Dykes, Andrew A. (UNITED STATES) 16A-We4-6

16B-We4 Advances in fault tree and event tree methods

Fennia 2

15:00 – 16:40 Chair: Jari Pesonen (FINLAND) **PRA NPP**

A Treatment of Not Logic in Fault Tree and Event Tree Analysis
Krcal, Pavel (SWEDEN) 16B-We4-1

Anatomy of an Efficient Fault Tree Assessment Engine
Rauzy, Antoine (FRANCE) 16B-We4-2

Systematic extraction of Minimal Cut Sequences from a BDMP model
Chaux, Pierre-Yves (FRANCE) 16B-We4-3

Accurate quantification of event tree/fault tree systems using minimal cut sets
Niemelä, Ilkka (FINLAND) 16B-We4-4

Fault Tree Linking versus Event Tree Linking Approaches: A Mathematical and Algorithmic Reconciliation
Nusbaumer, Olivier (SWITZERLAND) 16B-We4-5

27-We4 Safety culture and indicators

Fennia 1

15:00 – 16:40 Chair: Teemu Reiman (FINLAND) **Human org**

Hard data on soft subjects: The relationship between safety culture and nuclear power plant performance
Koves, G. Kenneth (UNITED STATES) 27-We4-1

Toward universal process safety management attributes/categories for activities and outcomes observations
Gerbec, Marko (SLOVENIA) 27-We4-2

Reliability Diagnostic Assessment (RDA) by using adapted International Sustainability Rating System – ISRSTM
Alvarenga, Tobias Vieira (BRAZIL) 27-We4-3

Safety performance indicators as a tool for monitoring the industrial risk on conventional power plants
Maia, Paulo (PORTUGAL) 27-We4-4

19:00 **Bus transfers to Hilton Kalastajatorppa for the conference dinner**

02AS-We4 Bayesian network applications 2

Nordia

15:00 – 16:40 Chair: Ben Ale (NETHERLANDS) **Mathematics**

Using Dynamic Bayesian Networks to Implement Feedback in a Management Risk Model for the Oil Industry
Hanea, Daniela (NETHERLANDS) 02AS-We4-1

Hybrid Bayesian Networks for Weigh-in-Motion Systems Data
Morales-Napoles, Oswaldo (NETHERLANDS) 02AS-We4-2

Representing Advanced Aspects of Fault Trees into Bayesian Networks – Modelling Safety in Complex Railway Systems
Mahboob, Qamar (GERMANY) 02AS-We4-3

Integrating organisational factors into a BBN model of risk
Lin, Pei-Hui (NETHERLANDS) 02AS-We4-4

Dynamic Bayesian Networks as a Possible Alternative to the Ensemble Kalman Filter for Parameter Estimation in Reservoir Engineering
Hanea, Anca (NETHERLANDS) 02AS-We4-5

01-We4 Predictive maintenance

Nautica

15:00 – 16:40 Chair: Antoine Grall (FRANCE) **Maintenance**

A predictive maintenance strategy based on mean residual life for systems subject to competing failures due to degradation and shocks
Castro, Inma T. (SPAIN) 01-We4-1

A Cost Model for the Selection of a Predictive Maintenance Activity in a Series System
Curcurù, Giuseppe (ITALY) 01-We4-2

Predictive maintenance for the heated hold-up tank
de Saporta, Benoîte (FRANCE) 01-We4-3

Analysis of the residual lifetimes of a system under deferred maintenance policy
Sidibe, Ibrahima dit Bouran (FRANCE) 01-We4-4

Residual useful lifetime prognosis and design of control systems
Langeron, Yves (FRANCE) 01-We4-5

02B-We4 Reliability analysis

Press Room

15:00 – 16:40 Chair: John Andrews (UNITED KINGDOM) **Mathematics**

Reliability assessment of safe egress in case of a fire incident using Adaptive Importance Sampling
Siemon, Matthias (GERMANY) 02B-We4-1

α–Decomposition Method: A New Approach to the Analysis of Common Cause Failure
Zheng, Xiaoyu (JAPAN) 02B-We4-2

Qualitative Analysis of Power Transformer Reliability by Fault Tree
Sihite, Josep Franklin (JAPAN) 02B-We4-3

On the Usage of Reliability Methods in Early Design Phases
Johansson, Cristina (SWEDEN) 02B-We4-4

Towards safe and reliable allocation of functions in modular process plants
Krause, Annett (GERMANY) 02B-We4-5

22-We4	Seismic risk – methodology	
Baltica		
15:00 – 16:40	Chair: Stephan Kranz (GERMANY)	External

Development of Simplified Probabilistic Risk Assessment Model for Seismic Initiating Event
Khericha, Soli (UNITED STATES) 22-We4-1

A system-of-systems framework of Nuclear Power Plant Probabilistic Seismic Hazard Analysis by Fault Tree analysis and Monte Carlo simulation
Ferrario, Elisa (FRANCE) 22-We4-2

Development of importance measures for system fragility for the evaluation of seismic safety of NPP.
Zentner, Irmela (FRANCE) 22-We4-3

Seismic Analysis using RiskSpectrum
Bäckström, Ola (SWEDEN) 22-We4-4

Performance of Seismic PSA according to the German PSA Guideline
Sewell, Robert T. (GERMANY) 22-We4-5

12-We4	Risk perception and communication	
Marine Room		
15:00 – 16:40	Chair: Joan Harvey (UNITED KINGDOM)	Risk perc

Risk Communication Within a Risk-Informed Regulatory Decision-Making Environment
Coyne, Kevin (UNITED STATES) 12-We4-1

When might deception be acceptable, and what are the consequences for risk communication of deception being discovered?
Harvey, Joan (UNITED KINGDOM) 12-We4-2

Participant Observation in Risk Problems
Kluin, Marieke (NETHERLANDS) 12-We4-3

The role of feedback devices in changing driver behaviour and reducing insurance premia
Harvey, Joan (UNITED KINGDOM) 12-We4-4

Low probability high cost: the example of the impact of nuclear accident on tourism
Pascucci-Cahen, Ludivine (FRANCE) 12-We4-5

19:00	Bus transfers to Hilton Kalastajatorppa for the conference dinner

28-We4 Railway safety

Eliel (hotel)

15:00 – 16:40 Chair: Valerio Cozzani (ITALY) **Transport**

Certification plan for development of safety products
Myklebust, Thor (NORWAY) 28-We4-1

Measuring Safety Performance, the trialling of new guidance in Great Britain's rail industry
Heavisides, Jay (UNITED KINGDOM) 28-We4-2

Holistic long-term optimization of maintenance strategies on ballasted railway track
Quiroga, Lisandro Mariano (GERMANY) 28-We4-3

Conceptual Design of a Simulation System for Analyzing RAM of Railway Systems
Kim, Jong-Woon (KOREA (REP.)) 28-We4-4

Ballasted track – slab track: complementarity instead of opposition
Antoni, Marc (FRANCE) 28-We4-5

Planning on Track – Introduction of a Planning Device in the Railway Domain
Marcus, Arenius (GERMANY) 28-We4-6

21-We4 Aviation safety management

Selim (hotel)

15:00 – 16:40 Chair: Carlo Cacciabue (ITALY) **Aviation**

Measuring team quality as a means for improving productivity in Air Traffic Management (ATM)
Hansson, Lisbeth (NORWAY) 21-We4-1

Safety Scanning – An approach to manage safety in the Single European Sky
Straeter, Oliver (GERMANY) 21-We4-2

George Apostolakis Fellowship Award Winner

A Review of System Safety Failure Probability Objectives for Unmanned Aircraft Systems
Clothier, Reece (AUSTRALIA) **21-We4-3**

24S-We4 Vulnerability of critical infrastructures 1

Kino K13

15:00 – 16:00 Chair: Wolfgang Kröger **Infra**

An adaptive simulation technique for efficient seismic risk assessment of critical infrastructures.
Rasulo, Alessandro (ITALY) 24S-We4-1

Development of indicators to monitor vulnerabilities in power systems
Hofmann, Matthias (NORWAY) 24S-We4-2

A Multi-Objective Memetic Optimization Method for Power Network Cascading Failures Protection
Li, Yanfu (FRANCE) 24S-We4-3

24S-Th5 Vulnerability of critical infrastructures 2

Selim (hotel)

This session has been moved from Thursday: 24-Th5

16:00 – 17:00 Chair: Wolfgang Kröger **Infra**

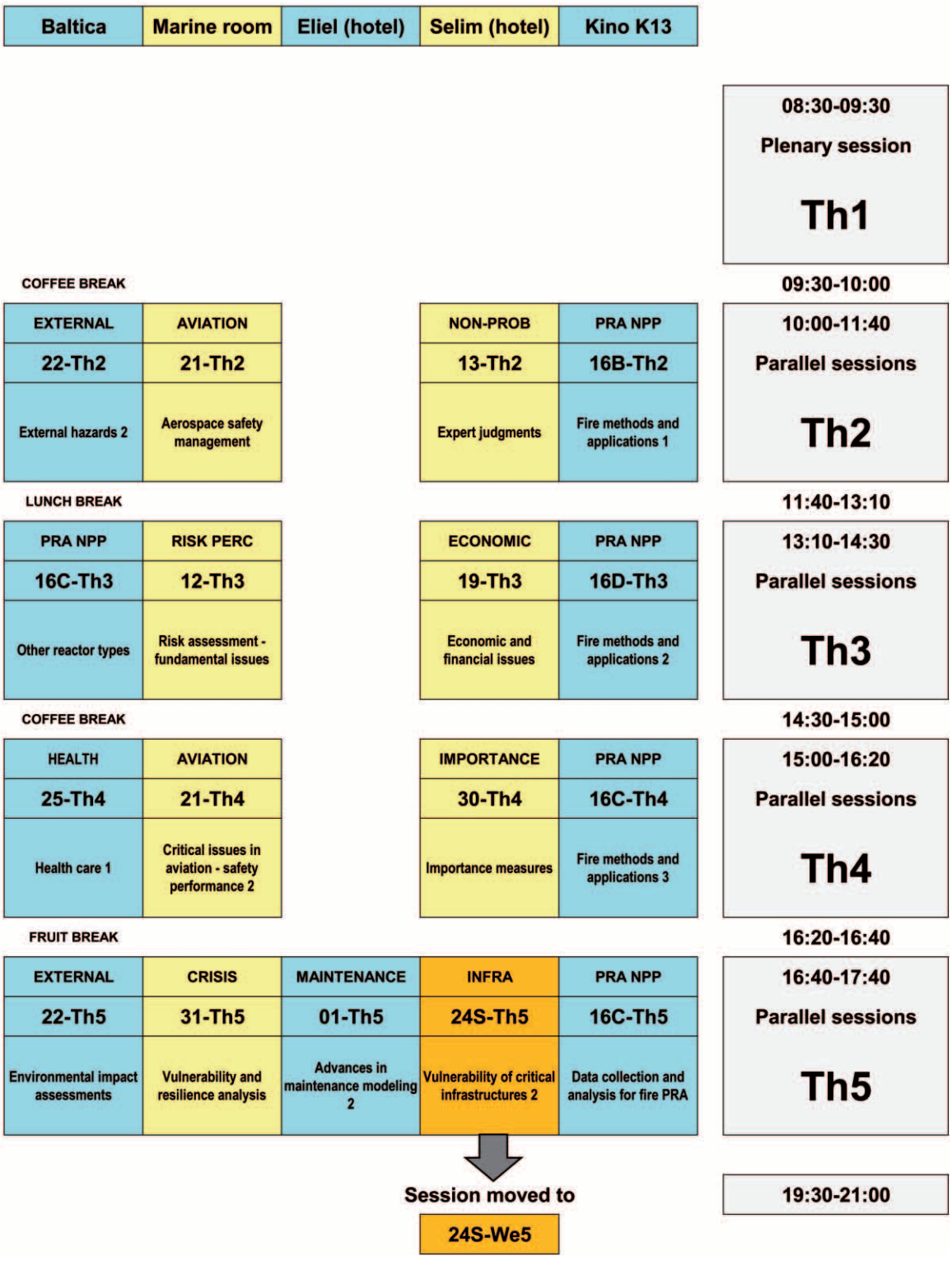
Intervention strategies for interdependent fragility control on urban lifelines systems
Gomez, Camilo (UNITED STATES) 24-Th5-1

Resilience analysis of networked systems-of-systems based on structural and dynamic interdependencies
Filippini, Roberto (ITALY) 24-Th5-2

Assessing CI interdependency issues using an HLA-compliant simulation platform
Nan, Cen (SWITZERLAND) 24-Th5-3

Program Outline – Thursday, 28 June 2012

	Europaea	Fennia 2	Fennia 1	Nordia	Nautica	Press room
08:30-09:30 Plenary session **Th1**	Plenary PL-Th1					
09:30-10:00	COFFEE BREAK					
10:00-11:40 Parallel sessions **Th2**	PRA NPP 16AS-Th2 Fukushima accident 3	MAINTENANCE 01S-Th2 System health monitoring, fault diagnosis and prognosis	HUMAN ORG 27-Th2 Organizational factors and safety	MATHEMATICS 02-Th2 Markovian models	INDUSTRIAL 20-Th2 Learning from incidents	SOFTWARE 10-Th2 Software reliability assessment 1
11:40-13:10	LUNCH BREAK					
13:10-14:30 Parallel sessions **Th3**	PRA NPP 16A-Th3 Risk monitors	PRA NPP 16B-Th3 Comparison of HRA methods	HUMAN ORG 27-Th3 Safety culture	MATHEMATICS 02-Th3 Stochastic modeling in reliability	INDUSTRIAL 20-Th3 Risk assessment applications 1	SOFTWARE 10-Th3 Software reliability assessment 2
14:30-15:00	COFFEE BREAK					
15:00-16:20 Parallel sessions **Th4**	PRA NPP 16A-Th4 RI maintenance, testing and technical specifications	PRA NPP 16B-Th4 HRA applications 1	HUMAN ORG 27-Th4 Key issues in safety management	MATHEMATICS 02-Th4 Risk analysis	INDUSTRIAL 20-Th4 Risk assessment applications 2	SOFTWARE 10-Th4 Failure modes identification and classification
16:20-16:40	FRUIT BREAK					
16:40-17:40 Parallel sessions **Th5**	PRA NPP 16A-Th5 PRA case studies	PRA NPP 16B-Th5 HRA applications 2	TRANSPORT 28-Th5 Modeling and applications - transportation	MATHEMATICS 02-Th5 Probabilistic and statistical modeling and analysis	INDUSTRIAL 20-Th5 Industrial analysis approaches and cases 2	SOFTWARE 10-Th5 I&C reliability models 2
19:30-21:00	Helsinki City Reception at Helsinki City Hall					


Baltica
Marine room
Eliel (hotel)
Selim (hotel)
Kino K13
08:30-09:30
Plenary session
Th1
COFFEE BREAK
09:30-10:00
EXTERNAL
AVIATION
NON-PROB
PRA NPP
10:00-11:40
22-Th2
21-Th2
13-Th2
16B-Th2
Parallel sessions
External hazards 2
Aerospace safety management
Expert judgments
Fire methods and applications 1
Th2
LUNCH BREAK
11:40-13:10
PRA NPP
RISK PERC
ECONOMIC
PRA NPP
13:10-14:30
16C-Th3
12-Th3
19-Th3
16D-Th3
Parallel sessions
Other reactor types
Risk assessment - fundamental issues
Economic and financial issues
Fire methods and applications 2
Th3
COFFEE BREAK
14:30-15:00
HEALTH
AVIATION
IMPORTANCE
PRA NPP
15:00-16:20
25-Th4
21-Th4
30-Th4
16C-Th4
Parallel sessions
Health care 1
Critical issues in aviation - safety performance 2
Importance measures
Fire methods and applications 3
Th4
FRUIT BREAK
16:20-16:40
EXTERNAL
CRISIS
MAINTENANCE
INFRA
PRA NPP
16:40-17:40
22-Th5
31-Th5
01-Th5
24S-Th5
16C-Th5
Parallel sessions
Environmental impact assessments
Vulnerability and resilience analysis
Advances in maintenance modeling 2
Vulnerability of critical infrastructures 2
Data collection and analysis for fire PRA
Th5
Session moved to
24S-We5
19:30-21:00

PL-Th1
Europaea
08:30 – 09:30

Plenary session: Jan Erik Vinnem (NORWAY)

Chair: Michael Knochenhauer (SWEDEN)

Plenary

***Jan Erik Vinnem**, adjunct professor of risk management at the University of Stavanger. He has played a central role regarding the use of risk analysis in the Norwegian offshore industry since the late 1970ties, and has also written the book Offshore Risk Assessment. In 1984 he started the consulting firm Safetec Nordic AS, where he recently was Chairman of the board in the period 2006-08. Vinnem has also been an adjunct professor of marine safety at NTNU, and has had a number of positions both nationally and internationally, including vice chairmanship in ESRA International some fifteen years ago. Vinnem has also founded and currently runs the consultancy Preventor AS.*

Reflections on the Gulf of Mexico disaster and other serious events in the offshore oil and gas sector from a risk assessment and risk management perspective

A brief historical overview is presented of the development of risk assessment and risk management in the offshore oil and gas industry for more than 35 years. From a modest start as a research activity inspired by the nuclear sector, Quantified Risk Assessment has today become one of the focal points of oil and gas management in all countries around the North Sea, and also in many other areas. This has mainly been initiated by authority regulations and requirements, but has now for some time been driven by the industry itself, as it sees the risk assessment techniques as a vehicle to gain extended flexibility with respect to optimization of offshore safety standards. The main efforts are made with respect to prevention and mitigation of major hazards, which also is the main topic of the presentation. Despite these efforts there have been more major accidents worldwide in the last 10–15 years than in any previous period. Following the recent accidents, it has been suggested by some that more countries should adopt a risk based (or better; risk informed) approach to management of major hazard risk in their regulations.

The paper discusses how QRAs are used in the offshore oil and gas sector in UK and Norway, and makes a brief comparison with the use of corresponding approaches in the nuclear power industry. Although the origin is the same, the applications have developed in virtually opposite directions. The main weakness with current applications is the inability of the QRA studies for the offshore oil and gas sector to address aspects that are essential in an operational context. This implies that there are extensive decision-making activities in the operational phase, including management of the drilling operations of new wells that are made without systematic and detailed consideration of major hazard aspects. This is discussed in detail, and the implications for risk management in relation to the Macondo accident in the Gulf of Mexico and others are reflected upon. Possibilities for improvement are outlined, with a side glance to approaches adopted in the nuclear power industry.

09:30 – 10:00 **Coffee break**

Notes

16AS-Th2 Fukushima accident 3

Europaea

10:00 – 11:40 Chair: **PRA NPP**

Risk Targets in View of Fukushima
Vitazkova, Jirina (SLOVAKIA) 16AS-Th2-1

Post-Fukushima PSA Development for New Reactors in Russia
Tokmachev, Gennady (RUSSIAN FEDERATION) 16AS-Th2-2

Accident Progression of Severe Accident in Various Nuclear Reactor Types
Park, Sooyong (KOREA (REP.)) 16AS-Th2-3

Tsunami PRA Standard Development by Atomic Energy Society Japan (AESJ) Line break (3) Tsunami Fragility Analysis
Mihara, Yoshinori (JAPAN) 16AS-Th2-4

Tsunami PRA Standard Development by Atomic Energy Society Japan (AESJ) (4) Unresolved Issues and Future Works
Yamaguchi, Akira (JAPAN) 16AS-Th2-5

01S-Th2 System health monitoring, fault diagnosis and prognosis

Fennia 2

10:00 – 11:40 Chair: Piero Baraldi (ITALY) **Maintenance**

Health Assessment of Choke Valves undergoing Erosion with a Hybrid Ensemble Approach
Gola, Giulio (NORWAY) 01S-Th2-1

Diagnosis of Transient States Using Pattern Matching Techniques for Improved Operability
Heo, Gyunyoung (KOREA (REP.)) 01S-Th2-2

A Maturation Procedure For Prognosis And Health Monitoring Algorithms
Hmad, Ouadie (FRANCE) 01S-Th2-3

Prognostic maintenance policy based on remaining useful life estimation
Le Son, Khanh (FRANCE) 01S-Th2-4

A Wavelet-Based Approach for Condition Monitoring of a Gas Turbine During Start-Up Transients
Di Maio, Francesco (ITALY) 01S-Th2-5

Ensemble of Neural Networks for Predicting Scale Deposition in Oil Well Plant Equipments
Di Maio, Francesco (ITALY) 01S-Th2-6

27-Th2 Organisational factors and safety

Fennia 1

10:00 – 11:40 Chair: **Human org**

Modelling human and organizational behaviour in a high-risk operation
Sillem, Simone (NETHERLANDS) 27-Th2-1

A comparison between the nuclear and the maritime domains on challenges related to technological advances
Ferkingstad, John (NORWAY) 27-Th2-2

Ship-platform collisions in the North Sea
Oltedal, Helle (NORWAY) 27-Th2-3

Alienation and seamanship: A field study on an offshore service vessel
Sydnes, Tone (NORWAY) 27-Th2-4

A qualitative study of organizational factors influencing compliance with procedures.
Skaugrud, Ida (NORWAY) 27-Th2-5

11:40 – 13:10 **Lunch break**

02-Th2 Markovian models

Nordia

10:00 – 11:40 Chair: **Mathematics**

Statistical inference of a discrete-time Markovian degradation model with time-dependent covariates
Paroissin, Christian (FRANCE) 02-Th2-1

Reliability assessment of safety-instrumented systems: The influence of demand rates and demand durations
Liu, Yiliu (NORWAY) 02-Th2-2

Dynamic reliability upper bounds on customer-centered performance measures for multi-state systems with multi-state components
Solorio Magaña, Carlos (MEXICO) 02-Th2-3

Critical comparison of two user friendly tools to study Piecewise Deterministic Markov Processes (PDMP)
Bouissou, Marc (FRANCE) 02-Th2-4

Analysis of the reliability discrepancy in container transshipment system
Zajac, Mateusz (POLAND) 02-Th2-5

20-Th2 Learning from incidents

Nautica

10:00 – 11:40 Chair: Stig O. Johnsen (NORWAY) **Industrial**

From factor to vector, a systems engineering design perspective on safety
Stoop, John (NETHERLANDS) 20-Th2-1

Managing the risks associated with a simple operation in a complex system
Jubert, Fabrice (FRANCE) 20-Th2-2

Accident Precursors: Critical Review, Conceptual Framework, and Failure Mechanisms
Saltmarsh , Elizabeth A. (UNITED STATES) 20-Th2-3

Safety and security challenges of integration of process control systems and information and communication technology
Johnsen , Stig Ole (NORWAY) 20-Th2-4

The use of a root cause analysis method for industrial plant reliability improvement and engineering design feedback
Nascimento, Cesar (BRAZIL) 20-Th2-5

BP Texas City Refinery Explosion: Case study in breakdown of defense-in-depth and violation of the safety-diagnosability principle in design
Haga, Rachel A. (UNITED STATES) 20-Th2-6

10-Th2 Software reliability assessment 1

Press Room

10:00 – 11:40 Chair: Jan-Erik Holmberg (FINLAND) **Software**

An Integrated Quantification Method for Safety-Critical Software Failure Probability
Kang, Hyun Gook (KOREA (REP.)) 10-Th2-1

Safety case framework to provide justifiable reliability numbers for software systems
Holmberg, Jan-Erik (FINLAND) 10-Th2-2

A component-based approach for assessing reliability of compound software
Kristiansen, Monica Lind (NORWAY) 10-Th2-3

Use of IEC 61508 in Nuclear Applications Regarding Software Reliability
Bäckström, Ola (SWEDEN) 10-Th2-4

Context-based Software Risk Modeling: A recommended approach to assessment of software related risk in NASA missions
Guarro, Sergio (UNITED STATES) 10-Th2-5

22-Th2	External hazards 2	
Baltica		
10:00 – 11:40	Chair: Roshi Nateghi (UNITED STATES)	External

Risk assessment of accidents induced by lightning strike on storage tanks 22-Th2-1
Cozzani, Valerio (ITALY)

Potential damage to filtration systems due to volcanic ash fallout 22-Th2-2
Milazzo, Maria Francesca (ITALY)

Vulnerability maps for industrial facilities in areas with the potential volcanic ash fallout 22-Th2-3
Milazzo, Maria Francesca (ITALY)

Frequency of damage by external explosion hazards based on geographical information 22-Th2-4
Becker, Günter (GERMANY)

Individual and social risk assessment for toxic gas outflow by road transport 22-Th2-5
Saska, Tomas (CZECH REPUBLIC)

21-Th2	Aerospace safety management	
Marine Room		
10:00 – 11:40	Chair: Joseph Fragola (UNITED STATES)	Aviation

Fault detection and fault tolerant control scheme for aerospace launcher 21-Th2-1
Zbiri, Nabila (FRANCE)

Risk assessment of new space launch and supply vehicles 21-Th2-2
Guarro, Sergio (UNITED STATES)

A "Systems/Case-based" approach to system safety 21-Th2-3
Dezfuli, Homayoon (UNITED STATES)

Evolution of continuous risk management at NASA 21-Th2-4
Benjamin, Allan (UNITED STATES)

Application of PRA to developmental systems 21-Th2-5
Fragola, Joseph (UNITED STATES)

11:40 – 13:10 Lunch break

13-Th2	Expert judgments	
Selim (hotel)		
10:00 – 11:40	Chair:	Non-prob

Evaluating the effect of confidence in assessment in a predictive process relying on expert judgement
Tamparopoulos, Alexios E. (AUSTRIA) 13-Th2-1

The moment method for combining quantitative expert judgements
Bedford, Tim (UNITED KINGDOM) 13-Th2-2

16B-Th2	Fire methods and applications 1	
Kino K13		
10:00 – 11:40	Chair: Lasse Tunturivuori (FINLAND)	PRA NPP

Fire PSA for French 1300 MWe PWR
Nicoleau, Fabienne (FRANCE) 16B-Th2-1

Specific fire safety issues for first generation VVER-440 reactors
Poghosyan, Shahen (ARMENIA) 16B-Th2-2

Modelling of the fire scenarios to the PSA
Vidal, Serge (FRANCE) 16B-Th2-3

Probabilistic Fire Analyses for Spanish NPPs
Carretero Fernandino, Jose Antonio (SPAIN) 16B-Th2-4

Treatment of Level 1 Fire Risk Evaluation in a US Nuclear Power Plant
Wang, Jinkai (UNITED STATES) 16B-Th2-5

16A-Th3 Risk monitors

Europaea

13:10 – 14:30 Chair: Dennis Henneke (UNITED STATES) **PRA NPP**

Development and Validation of Instantaneous Risk Model in Nuclear Power Plant's Risk Monitor
Wang, Jin (CHINA) 16A-Th3-1

Full scope risk monitor for the Slovak electrical power system
Kovacs, Zoltan (SLOVAKIA) 16A-Th3-2

Development and Application of Risk Monitor in Dukovany NPP
Hustak, Stanislav (CZECH REPUBLIC) 16A-Th3-3

Risk Monitor Development for the Paks NPP
Karsa, Zoltan (HUNGARY) 16A-Th3-4

Development and Application of Third Qinshan Nuclear Power Plant Risk Monitor
Wang, Fang (CHINA) 16A-Th3-5

16B-Th3 Comparison of HRA methods

Fennia 2

13:10 – 14:30 Chair: Helene Pesme (FRANCE) **PRA NPP**

Comparing Various HRA Methods to Evaluate their Impact on the results of a Shutdown Risk Analysis during PWR Reduced Inventory
Zoulis, Antonios (UNITED STATES) 16B-Th3-1

EXAM-HRA – Evaluation of Existing Applications and Guidance on Methods for HRA
Fritzson, Lisa (SWEDEN) 16B-Th3-2

HRA Method Analysis Criteria
Dang, Vinh (UNITED STATES) 16B-Th3-3

Spectrum Human Reliability Analysis
Petkov, Gueorgui (BULGARIA) 16B-Th3-4

Fifty Years of THERP and Human Reliability Analysis
Boring, Ronald (UNITED STATES) 16B-Th3-5

27-Th3 Safety culture

Fennia 1

13:10 – 14:30 Chair: Barry Kirwan (UNITED KINGDOM) **Human org**

Formal Safety versus Real Safety: Quantitative and Qualitative Approaches to Safety Culture
Meliá, José L. (SPAIN) 27-Th3-1

Learning across Europe - Insights from a Pan-European safety culture programme
Kirwan, Barry (FRANCE) 27-Th3-2

Does the management of regulatory compliance and occupational risk have an impact on safety culture?
Lefranc, Guénolé (FRANCE) 27-Th3-3

Detailed analysis of four categories of culture-driven organizational factors in the light of incident analysis
Thunem, Atoosa P-J (NORWAY) 27-Th3-4

14:30 – 15:00 Coffee break

02-Th3 Stochastic modeling in reliability

Nordia

13:10 – 14:30 Chair: Uwe Jensen (NORWAY) **Mathematics**

Reliability of the multi-state systems modeled by the finite states semi-Markov processes
Grabski, Franciszek (POLAND) 02-Th3-1

Extended geometric processes for application to reliability
Mercier, Sophie (FRANCE) 02-Th3-2

Generalized method for solving logical loops in reliability analysis
Matsuoka, Takeshi (JAPAN) 02-Th3-3

A shock and wear model standing a fixed number of shocks
Pérez-Ocón, Rafael (SPAIN) 02-Th3-4

Fault tree and Monte Carlo simulation in passive system reliability analysis
Yu, Yu (CHINA) >>> Moved from session 16BS-Mo2 16BS-Mo2-4

20-Th3 Risk assessment applications 1

Nautica

13:10 – 14:30 Chair: Kurt Petersen (DENMARK) **Industrial**

Analysis and modeling of risk associated with the transport of hazardous materials in Walloon Region (Belgium)
Beaudoint, Damien (BELGIUM) 20-Th3-1

Risk analysis of incident-accident transformation in air traffic
Skorupski, Jacek (POLAND) 20-Th3-2

The weighted risk analysis applied for the Delft Tunnel in the Netherlands
Suddle, Shahid (NETHERLANDS) 20-Th3-3

Route based risk estimation across the GB rail network using empirical Bayes methods
Griffin, David (UNITED KINGDOM) 20-Th3-4

10-Th3 Software reliability assessment 2

Press Room

13:10 – 14:30 Chair: Celine Martinie (FRANCE) **Software**

Comparing safety requirement sources of machinery software
Malm, Timo (FINLAND) 10-Th3-1

Performance Estimation of a System under Minimal, Perfect and Failed Rejuvenation
Koutras, Vasilis (GREECE) 10-Th3-2

Assessment of bit error detecting and correcting codes for safety-critical embedded fuzing systems
Häring, Ivo (GERMANY) 10-Th3-3

Optimal Reliability Allocation for Large Software Projects through Soft Computing Techniques
Albu, Razvan-Daniel (ROMANIA) 10-Th3-4

16C-Th3 Other reactor types

Baltica

13:10 – 14:30 Chair: Kaisa Simola (FINLAND) **PRA NPP**

Outlines of RAMI Guidelines for DEMO Systems
Pinna, Tonio (ITALY) 16C-Th3-1

George Apostolakis Fellowship Award Winner

Preliminary Results of the TerraPower – 1 Probabilistic Risk Assessment
Johnson, Brian (UNITED STATES) **16C-Th3-2**

12-Th3 Risk assessment – fundamental issues

Marine Room

13:10 – 14:30 Chair: Enrico Zio (ITALY) **Risk perc**

Complexity in risk assessment of sociotechnical systems
Johansen, Inger Lise (NORWAY) 12-Th3-1

Development of training to improve PSA awareness of decision-makers in order to support the growing use of PSA
Vasseur, Dominique (FRANCE) 12-Th3-2

The Science and Superstition of Quantitative Risk Assessment
Rae, Andrew (UNITED KINGDOM) 12-Th3-3

A practical guide on how to present and visualize the result of risk and vulnerability analyses in a societal safety and security context
Amundrud, Øystein (NORWAY) 12-Th3-4

14:30 – 15:00 Coffee break

19-Th3 Economic and financial issues

Selim (hotel)

13:10 – 14:30 Chair: Ahti Salo (FINLAND) **Economic**

Bankruptcy by catastrophes for major multi-nationals: stock exchange sensitivity for three catastrophes
van Gulijk, Coen (NETHERLANDS) 19-Th3-1

On the use of Quality Function Deployment (QFD) for the identification of risks associated to warranty programs
Costantino, Francesco (ITALY) 19-Th3-2

A "Triple Bottom Line" approach to QRA
Cavanagh, Nicholas (UNITED KINGDOM) 19-Th3-3

Are too many safety measures crowding each other out?
Moharamzadeh, Alireza (NORWAY) 19-Th3-4

The Customer Relationship in the Warranty Management of Distribution Network Service Providers
Crespo, Adolfo (SPAIN) 19-Th3-5

16D-Th3 Fire methods and applications 2

Kino K13

13:10 – 14:30 Chair: Heinz-Peter Berg (GERMANY) **PRA NPP**

Updating of the fire PRA of the Olkiluoto NPP units 1 and 2
Tunturivuori, Lasse (FINLAND) 16D-Th3-1

Analysis of Fire and Flooding at OKG: Method, Background and Application
Bäckström, Ola (SWEDEN) 16D-Th3-2

Application of OECD FIRE Data for Plant Specific Fire Event Trees
Roewekamp, Marina (GERMANY) 16D-Th3-3

Using NUREG/CR-6850 in a Full Scope Fire PSA: Implementation Strategies and Insights Gained
Nusbaumer, Olivier (SWITZERLAND) 16D-Th3-4

Advanced Fire PRA Methods for Cabinet Fires and DC Ciruit Hot Shorts
Henneke, Dennis (UNITED STATES) 16D-Th3-5

16A-Th4 RI maintenance, testing and technical specifications

Europaea

15:00 – 16:20 Chair: Risto Himanen (FINLAND) **PRA NPP**

Multi-objective optimization of safety equipment test interval using a new time-dependent unavailability model incorporating component ageing
Kancev, Dusko (SLOVENIA) 16A-Th4-1

Risk-informed Periodic Surveillance Testing Interval of Digital Safety Systems with Self-diagnosis Capacity
Shi, Jian Ming (CHINA) 16A-Th4-2

Evaluation of Allowed Outage Time (AOT) in Technical Specifications at Ringhals 1
Wallgren, Erik (SWEDEN) 16A-Th4-3

Risk-informed classification of equipment for maintenance
Jänkälä, Kalle (FINLAND) 16A-Th4-4

16B-Th4 HRA applications 1

Fennia 2

15:00 – 16:20 Chair: Harold Blackman (UNITED STATES) **PRA NPP**

ATHEANA analysis in support of the U.S. HRA empirical study
Bley, Dennis (UNITED STATES) 16B-Th4-1

Towards guidance for assessment of "training" as a performance-shaping factor in human reliability analysis
Bye, Andreas (NORWAY) 16B-Th4-2

Current human reliability analysis methods applied to computerized procedures
Boring, Ronald (UNITED STATES) 16B-Th4-3

Haven't a cue? The CUE Map as an HRA aid in modeling hybrid and advanced HSI
Gertman, David (UNITED STATES) 16B-Th4-4

A comparison of published human computer interaction reliability data with established HRA methods
Hickling, Ned (UNITED KINGDOM) 16B-Th4-5

27-Th4 Key issues in safety management

Fennia 1

15:00 – 16:20 Chair: Björn Wahlström (FINLAND) **Human org**

Professionals' beliefs about nuclear safety – An interview study in the Nordic nuclear branch
Reiman, Teemu (FINLAND) 27-Th4-1

Identification and management of risks of system of systems
Prochazkova, Dana (CZECH REPUBLIC) 27-Th4-2

Safety management – a multi-level control problem
Wahlström, Björn (FINLAND) 27-Th4-3

Reconceptualization of the competing values framework tailored for management of nuclear power plants
Reiman, Teemu (FINLAND) 27-Th4-4

Safety management for operational controllability: developing an organized theoretical perspective
Moorkamp, Matthijs (NETHERLANDS) 27-Th4-5

16:20 – 16:40 **Fruit break**

02-Th4 Risk analysis

Nordia

15:00 – 16:20 Chair: Willy Røed (NORWAY) **Mathematics**

Quantifying impact of project risk decisions and dependencies within an integrated methodology
Smith, Clayton (UNITED STATES) 02-Th4-1

A reflection on some practices In the use of risk matrices
Røed, Willy (NORWAY) 02-Th4-2

The use of field experience to assess the probabilities of major accidents
Flauw, Yann (FRANCE) 02-Th4-3

The quantitative risk assessment of domino effect on industrial plants using colored stochastic Petri nets
Kadri, Farid (FRANCE) 02-Th4-4

20-Th4 Risk assessment applications 2

Nautica

15:00 – 16:20 Chair: Marco Cepin (SLOVENIA) **Industrial**

Integrating time determination with qualitative risk assessment method – Case study for road construction project in Malaysia
Ting, Sim Nee (MALAYSIA) 20-Th4-1

Risk and hazard analyses of the industrial furnaces – Safety of electroheat equipment
Kotek, Lubos (CZECH REPUBLIC) 20-Th4-2

Multidimensional risk assessment of manhole explosions in an underground electrical distribution system
Garcez, Thalles Vitelli (BRAZIL) 20-Th4-3

Applications of a comprehensive semi-quantitative risk assessment method for various industries
Berg, Heinz Peter (GERMANY) 20-Th4-4

10-Th4 Failure modes identification and classification

Press Room

15:00 – 16:20 Chair: Jan-Erik Holmberg (FINLAND) **Software**

Development of best practice guidelines on failure modes taxonomy for reliability assessment of digital I&C systems for PSA
Holmberg, Jan-Erik (FINLAND) 10-Th4-1

Identification of failure modes of software in safety-critical digital I&C systems in nuclear power plants
Smidts, Carol (KOREA (REP.)) 10-Th4-2

Proposal for the taxonomy of failure modes of digital system hardware for PSA
Piljugin, Ewgenij (GERMANY) 10-Th4-3

A comparison of taxonomies of digital system failure modes
Chu, Tsong-Lun (UNITED STATES) 10-Th4-4

25-Th4 Health care 1

Baltica

15:00 – 16:20 Chair: Henning Boje Andersen (DENMARK) **Health**

Root cause analysis in healthcare as a solution to patient safety – Reality or illusion?
Wreathall, John (UNITED STATES) 25-Th4-1

The challenge of improving safety culture in hospitals: A longitudinal study using hospital survey on patient safety culture
Olsen, Espen (NORWAY) 25-Th4-2

Nonparametric approach applied on medical survival data:
Uncertainty analysis and comparison of two operative techniques
Janurová, Kateøina (CZECH REPUBLIC) 25-Th4-3

A questionnaire-based survey on nurse perceptions of patient handoffs in Japanese hospitals
Gu, Xiuzhu (JAPAN) 25-Th4-4

Studying quality and safety in hospitals by using different theoretical frameworks – does it matter?
Wiig, Siri (NORWAY) 25-Th4-5

21-Th4 Critical issues in aviation – safety performance 2

Marine Room

15:00 – 16:20 Chair: Carlo Cacciabue (ITALY) **Aviation**

Condition based maintenance: A methodology for the economical feasibility evaluation of prognostic health management integration
Vallone, Giorgio (ITALY) 21-Th4-1

Comparing aircraft maintenance approaches based on structural health monitoring
Gogu, Christian (FRANCE) 21-Th4-2

On helicopter transport risk for offshore petroleum personnel
Heide, Bjornar (NORWAY) 21-Th4-3

George Apostolakis Fellowship Award Winner

The development of ground impact models for the analysis of the risks associated with unmanned aircraft operations over inhabited areas
Clothier, Reece (AUSTRALIA) **21-Th4-4**

Model-based design and evaluation of fault-tolerant fibre-optical networks for avionics
Schulze, Karin (GERMANY) 21-Th4-5

16:20 – 16:40 **Fruit break**

30-Th4 Importance measures

Selim (hotel)

15:00 – 16:20 Chair: Emanuele Borgonovo (ITALY) **Importance**

Modelling common cause failures and computing risk importance measures in the Dynamic Flowgraph Methodology
Tyrväinen, Tero (FINLAND) 30-Th4-1

Expected value of perfect information: estimation from given data and an application to a precursor event
Borgonovo, Emanuele (ITALY) 30-Th4-2

Examination of the application of risk importance measures for the maintenance management at the Rokkasho Reprocessing Plant
Tamauchi, Yoshikazu (JAPAN) 30-Th4-3

Reliability evaluation for compound systems with importance measures
Si, Shubin (CHINA) 30-Th4-4

16C-Th4 Fire methods and applications 3

Kino K13

15:00 – 16:20 Chair: Marina Röwekamp (GERMANY) **PRA NPP**

Lessons learned from risk-informed, performance-based fire protection (NFPA 805) regulatory reviews
Harrison, Donald (UNITED STATES) 16C-Th4-1

NFPA-805 and fire PRA insights
Chapman, James (UNITED STATES) 16C-Th4-2

Development of empirical fire behavior models for estimation of target damage in a fire PRA
Ladd, Robert (UNITED STATES) 16C-Th4-3

16A-Th5 **PRA case studies**
Europaea
16:40 – 17:40 Chair: Kaisa Simola (FINLAND) **PRA NPP**

A new perspective in nuclear power plant safety considering pumped-storage hydro plant
Gjorgiev, Blaze (SLOVENIA) 16A-Th5-1

Safety and risk analysis of liquid radioactive waste transfer from Angra 1 to Angra 2 through a container tank
Passos, Erivaldo P. (BRAZIL) 16A-Th5-2

Diesel generators common cause failures in precursor analysis.
Methodological issues and application for the Generic Incident and 2 case studies.
Rodionova, Natalia (FRANCE) 16A-Th5-3

Development of location dependent loss of coolant Accident frequencies to address debris-induced failures of core cooling systems
Fleming, Karl (UNITED STATES) 16A-Th5-4

16B-Th5 **HRA applications 2**
Fennia 2
16:40 – 17:40 Chair: Dennis Bley (UNITED STATES) **PRA NPP**

Progress on Errors of Commission: an outlook based on plant-specific results
Podofillini, Luca (SWITZERLAND) 16B-Th5-1

Abandonment times evaluation of main control room at Daya Bay Nuclear Plant
Huang, Qian (CHINA) 16B-Th5-2

Human reliability analyses performed in support of PSA studies in Czech Republic
Holy, Jaroslav (CZECH REPUBLIC) 16B-Th5-3

28-Th5 **Modeling and applications – transportation**
Fennia 1
16:40 – 17:40 Chair: Valerio Cozzani (ITALY) **Transport**

A Petri net-based approach for computing two-terminal reliability of a transportation network with multi-state nodes and arcs
Zhang, Tao (CHINA) >>> Moved to session 02-Mo2 28-Th5-1

Maintenance process optimization for low-cost airlines
Kowalski, Marcin (POLAND) 28-Th5-2

Risk management in a transport system – Identification of precursors of danger
Cointet, Alain (FRANCE) 28-Th5-3

Simulation and multi-objective optimization of an open-pit mine truck-shovel system by the cross-entropy method
Mena, Rodrigo (FRANCE) 28-Th5-4

Security of supply, case Finnish ports
Yliskylä-Peuralahti, Johanna (FINLAND) 28-Th5-5

19:30 – 21:00 **Helsinki City Reception at Helsinki City Hall**

02-Th5 Nordia
16:40 – 17:40
Probabilistic and statistical modeling and analysis

Chair: Kevin Wilson (UNITED KINGDOM)

Mathematics

Uncertainty sssessment through bootstrapped support vector regression
Lins, Isis (BRAZIL) 02-Th5-1

Assessment of national reference values for railway safety – A statistical treatment
Schaebe, Hendrik (GERMANY) 02-Th5-2

Assessment of accident probability for the local areas: Copula – based model
Krymsky, Victor (RUSSIAN FEDERATION) 02-Th5-3

Traffic load model based on weigh in motion measurements
Steenbergen, Raphaël (NETHERLANDS) 02-Th5-4

Universal generating function based recursive algorithms for reliability evaluation of multi-state weighted k-out-of-n systems
Ding, Yi (DENMARK) 02-Th5-5

20-Th5 Nautica
16:40 – 17:40
Industrial analysis approaches and cases 2

Chair: John Andrews (UNITED KINGDOM)

Industrial

Use-case of an agent-oriented framework for supervision, diagnosis and prognosis applications
Thunem, Harald P.-J. (NORWAY) 20-Th5-1

A Petri net approach to fault verification in phased mission systems using the standard deviation technique
Lloyd, Michael (UNITED KINGDOM) 20-Th5-2

The development of a fatigue and drowsiness predictor
Shiomi, Kakuichi (JAPAN) 20-Th5-3

10-Th5 Press Room
16:40 – 17:40
I&C reliability models 2

Chair: Michael Knochenhauer (SWEDEN)

Software

A method for the assessment of common cause failures of digital I&C hardware
Deleuze, Gilles (FRANCE) 10-Th5-1

Reliability analysis of digital I&C system in nuclear power plant using dynamic flowgraph methodology
Zhao, Jun (CHINA) 10-Th5-2

Finding the best approach for I&C modeling in the PSA in the different design phases
Brunelière, Hervé (FRANCE) 10-Th5-3

22-Th5	Environmental impact assessments	
Baltica		
16:40 – 17:40	Chair: Seth Guikema (UNITED STATES)	External

Expert system for environmental impact assessment
Hamzi, Rachida (ALGERIA) 22-Th5-1

Discussion of environmental risk assessment models for reactive systems (BLEVE)
Galante, Erick (BRAZIL) 22-Th5-2

31-Th5	Vulnerability and resilience analysis	
Marine Room		
16:40 – 17:40	Chair:	Crisis

Comparing topological performance measures and physical flow models for vulnerability analysis of power systems
Johansson, Jonas (SWEDEN) 31-Th5-1

Modelling and simulation of service system resilience
Kanno, Taro (JAPAN) 31-Th5-2

Propelling beyond the Bow Tie: An emergent dynamic risk – resilience model
Van Trijp, John (NETHERLANDS) 31-Th5-3

19:30 – 21:00 **Helsinki City Reception at Helsinki City Hall**

01-Th5 Advances in maintenance modeling 2

Eliel (hotel)

16:40 – 17:40 Chair: **Maintenance**

Development of an overall maintenance optimization framework for offshore wind turbine
Hameed, Zafar (NORWAY) 01-Th5-1

Optimal routing, design and maintenance of main pipelines considering internal corrosion
Marcoulaki, Eftychia (GREECE) 01-Th5-2

Tailored maintenance optimization within Maintenance on Demand project
Lesobre, Romain (FRANCE) 01-Th5-3

24-Th5 Vulnerability of critical infrastructures 2

Selim (hotel)

This session has been moved to Wednesday: 24-We5 (Hall Kino K13)

16:40 – 17:40 Chair: Wolfgang Kröger (GERMANY) **Infra**

Intervention strategies for interdependent fragility control on urban lifelines systems
Gomez, Camilo (UNITED STATES) 24-Th5-1

Resilience analysis of networked systems-of-systems based on structural and dynamic interdependencies
Filippini, Roberto (ITALY) 24-Th5-2

Assessing CI interdependency issues using an HLA-compliant simulation platform
Nan, Cen (SWITZERLAND) 24-Th5-3

16C-Th5 Data collection and analysis for fire PRA

Kino K13

16:40 – 17:40 Chair: Albert Kreuser (GERMANY) **PRA NPP**

Development of a fire PRA database system
Dong Kyu, Kim (KOREA (REP.)) 16C-Th5-1

Use of Excel VBA macros in FRANX input database creation
McNeely, William (UNITED STATES) 16C-Th5-2

Updated technical reliability data for fire protection systems and components at a German nuclear power plant
Roewekamp, Marina (GERMANY) 16C-Th5-3

Program Outline – Friday, 29 June 2012

	Europaea	Fennia 2	Fennia 1	Nordia	Nautica	Press room
08:30-09:30 Plenary session **Fr1**	Plenary PL-Fr1					
09:30-10:00	COFFEE BREAK					
10:00-11:40 Parallel sessions **Fr2**	PRA NPP 16AS-Fr2 Fukushima and stress tests	PRA NPP 16B-Fr2 HRA applications 3	PRA NPP 16C-Fr2 CCF and dependences	MATHEMATICS 02A-Fr2 Statistical failure analysis	NON-PROB 13-Fr2 Non-probabilistic analyses	SOFTWARE 10S-Fr2 Safety systems for real time applications 1
11:40-13:10	LUNCH BREAK					
13:10-14:30 Parallel sessions **Fr3**	PRA NPP 16A-Fr3 Modeling power systems	PRA NPP 16B-Fr3 HRA - panel discussion	PRA NPP 16C-Fr3 NPP reliability data	MATHEMATICS 02-Fr3 Tools for RAMS assessment		SOFTWARE 10S-Fr3 Safety systems for real time applications 2
14:30-14:40	BREAK					
14:40-15:30 Closing session **Fr4**	Closing CL-Fr4 Closing					
15:30-16:00	STRAWBERRIES					
16:00	Closing of the conference					

Baltica	Marine room	Eliel (hotel)	Selim (hotel)	Kino K13	
					08:30-09:30 Plenary session **Fr1**
COFFEE BREAK					09:30-10:00
EXTERNAL	RISK MANAG	SIL	INDUSTRIAL	MATHEMATICS	10:00-11:40 Parallel sessions **Fr2**
22-Fr2	17-Fr2	26-Fr2	20-Fr2	02BS-Fr2	
Environmental impact and climate change	RI approaches for regulatory oversight	SIL - high-level considerations	RAMS 2	HRA and Bayesian analysis	
LUNCH BREAK					11:40-13:10
EXTERNAL	TRANSPORT	HEALTH	INDUSTRIAL		13:10-14:30 Parallel sessions **Fr3**
22-Fr3	28-Fr3	25-Fr3	20-Fr3		
Flooding risks	Railway safety and reliability modeling	Health care 2	Risk assessment applications 3		
BREAK					14:30-14:40
					14:40-15:30 Closing session **Fr4**
					15:30-16:00
					16:00

PL-Fr1
Europaea
08:30 – 09:30

Plenary session: Pierre-Etienne Labeau (BELGIUM), Antoine Rauzy (FRANCE), Luca Podofillini (SWITZERLAND)

Chair: Enrico Zio (ITALY)

Plenary

Pierre-Etienne Labeau
Professor of reliability engineering and nuclear engineering at the Université Libre de Bruxelles (ULB), Belgium, Master in engineering physics (ULB 1992), PhD in Applied Sciences (ULB 1996)
Research fields: probabilistic safety analysis methodology for nuclear power plants and transmission power systems, dynamic reliability, maintenance modeling, risk perception
Chairman of the Belgian Nuclear higher Education Network (BNEN), invited professor at the Helsinki University of Technology (Finland) and the Ecole Nationale de l'Industrie Minérale de Rabat (Maroc), Belgium delegate in the ESFRI Energy Strategic Working Group, Member of various scientific and technical committees in Europe, Belgium and France, ESRA member.

Towards R&D breakthroughs in imperfect maintenance modeling

A large amount of maintenance models are available in the literature. Most of them usually assume that the effect of maintenance interventions is as good as new. This amounts to assuming the maintenance action undergone by a system, be it preventive or corrective, is equivalent to its replacement. This hypothesis is of course questionable in many cases. Maintenance without replacement can lead to a significant level of rejuvenation of a system, either preventively or after repair. However, the restoration of the performances of the system is most of the time not complete. The effect of such an imperfect maintenance has been described in different ways.
Effective age models rest on the assumption that a (preventive or corrective) maintenance action does not affect the probabilistic law describing the equipment lifetime, but results in a shift in time within its intrinsic lifetime distribution, where the effective age replaces the calendar age. The most frequently used approaches assume that the rejuvenation obtained is proportional either to the last maintenance period or to the effective age before maintenance, introducing a unique parameter associated to the maintenance efficiency. Though the latter concepts are quite easy to interpret and apply, they were subject these last years to some critics on their inability to embody the intuitive behavior of maintained equipment, a.o. on a long time span.
This talk aims to summarize the discussions and conclusions of a dedicated, ESRA-funded workshop on imperfect maintenance modeling, hold in Chatou (France) on May 11, 2012.

09:30 – 10:00 **Coffee break**

Antoine Rauzy
Professor at Ecole Polytechnique (Paris, France), Senior Researcher at CNRS, Former Director of R&D System Engineering Department at Dassault System, Former Creator and CEO of ARBoost Technologies

Antoine Rauzy *got a PhD in computer science in 1989 and "Habilitation à Diriger des Recherches" (the french equivalent to tenure) in 1996.*
He works in the field of Reliability Engineering for more than 20 years. He made significant contributions on mathematical and algorithmic foundations of Probabilistic Safety Assessment.
He is the creator of AltaRica, a the high level language dedicated to Safety Analyses. He designed several state of the art software tools. He published more than 100 articles in International Conferences and Scientific Journals and has been the advisor of a dozen of PhD thesis.
Antoine Rauzy is now the leader of a research group at Ecole Polytechnique. He is also in charge of a Master Cursus on System Architecture. His current topics of interest are safety analyses and system engineering with a focus on languages and assessment algorithms.

Mathematical methods in reliability and safety

Due to economical and environmental pressure and increasing complexity of systems, Safety Analysists face a double challenge: first, Safety analyses must be better integrated with other engineering disciplines through the whole life cycle of systems. Second, they must be performed faster, to a larger scale and integrating many environmental configurations. This challenge cannot be faced without changing modeling formalisms and methodologies, assessment algorithms and best practices.
In a word, we need a paradigm shift. The aim of this talk is to open the discussion on problems at stake and potential solutions.

Dr. Luca Podofillini *is a scientist in the Risk and Human Reliability Group of the Paul Scherrer Institute (Switzerland). He has a Nuclear Engineering degree and Ph.D. in Nuclear Engineering from the Polytechnic of Milan (2004).*
His current activities include Human Reliability Analysis (HRA) research and regulatory support tasks for the Swiss Federal Nuclear Safety Inspectorate.
His research addresses the development of quantitative models of human performance in industrial systems, with focus on errors in decision-making, dynamic safety assessment, and collection of data in simulated emergencies.
He is Chair of the ESRA (European Safety and Reliability Association) Technical Committee for Human Factors and Human Reliability and member of the Board of the HRA Society (www.hrasociety.org).

ESRA TC on Human Factors and Human Reliability

The analysis of human performance is crucial to the effective risk management of industrial systems. The ESRA Technical Committee (TC) on Human Factors and Human Reliability promotes topical discussions and experience-sharing for the methodological and practical advancement of the field. This TC combines Human Factors and HRA: the idea is to help both disciplines to work better together, profiting from their complementary perspectives.
An important activity of the TC has been the organization of special technical sessions and panel discussions at the ESREL conferences. These moments of technical exchange create the opportunity for key issues to be raised and discussed. Indeed, the "word cloud" below highlights some key challenges of the field: the need for assessing HRA methods, a new role for simulator data and the development of context-based HRA approaches – an overview will be given in this talk.

16AS-Fr2 Fukushima and stress tests

Europaea

10:00 – 11:40 Chair: Attila Bareith (HUNGARY) **PRA NPP**

Beyond standards and stress tests
Momal, Patrick (FRANCE) 16AS-Fr2-1

L2 PSA application by IRSN in the context of the French additional safety assessments ("stress-tests") performed in France after the Fukushima event.
Raimond, Emmanuel (FRANCE) 16AS-Fr2-2

Use of PSA Information in the Stress Test for the Paks NPP in Hungary
Bareith, Attila (HUNGARY) 16AS-Fr2-3

The European Stress Test for NPPs - Lessons Learned for PSA with special focus on external events - Experiences from Germany and Sweden
Andernacht, Martin (GERMANY) 16AS-Fr2-4

16B-Fr2 HRA applications 3

Fennia 2

10:00 – 11:40 Chair: Ilkka Männistö (FINLAND) **PRA NPP**

Re-Writing Fire Response Procedures to Reduce Fire Response Human Failure Event Probabilities
Asmus, Thomas (UNITED STATES) 16B-Fr2-1

HRA for new reactors : methodological insights and first applications at EDF R&D
Pesme, Helene (FRANCE) 16B-Fr2-2

Human Reliability Analysis for Small Modular Reactors
Boring, Ronald (UNITED STATES) 16B-Fr2-3

16C-Fr2 CCF and dependences

Fennia 1

10:00 – 11:40 Chair: Marco Cepin (SLOVENIA) **PRA NPP**

Dependency Analysis Guidance - Procedure and applications for CCF analysis
Johanson, Gunnar (SWEDEN) 16C-Fr2-1

Common Cause Failures in critical Common Cause Component Groups for Swedish NPP Forsmark 1
Larsson, Josefin (SWEDEN) 16C-Fr2-2

General insights from the the international common cause data exchange (ICDE) project
Johanson, Gunnar (SWEDEN) 16C-Fr2-3

George Apostolakis Fellowship Award Winner

Hybrid Incorporation of Physical & Social Failure Mechanisms into Probabilistic Risk Assessment
Mohaghegh, Zahra (UNITED STATES) **16C-Fr2-4**

Modelling of Operator Action Dependencies in Small-Event-Tree-Large-Fault-Tree (SELF) Models
Ramezanian, Annette (SWITZERLAND) 16C-Fr2-5

Extension of Common Cause Analysis
Bricman, Ziva (SLOVENIA) 16C-Fr2-6

11:40 – 13:10 Lunch break

02A-Fr2 Statistical failure analysis

Nordia

10:00 – 11:40 Chair: Uwe Jensen (GERMANY) **Mathematics**

Reliability Analysis of Lifetime Data of Electric Motors
Jensen, Uwe (GERMANY) 02A-Fr2-1

A New Estimation Algorithm for Interval Censored Data from Repairable Systems
Postiglione, Fabio (ITALY) 02A-Fr2-2

Gamma Process Classification According to Covariates
Wang, Xuan Zhou (FRANCE) 02A-Fr2-3

Damage case prediction during the product´s development process and life cycle: Evaluation of prediction methods within case studies
Pospiech, Michael (GERMANY) 02A-Fr2-4

Bayes Linear Adjustments to Improve Empirical Bayes Inference for Correlated Event Rates
Wilson, Kevin (UNITED KINGDOM) 02A-Fr2-5

13-Fr2 Non-probabilistic analyses

Nautica

10:00 – 11:40 Chair: Piero Baraldi (ITALY) **Non-prob**

The cost-effective approach to selection of diverse NPP RTS under uncertainty
Brezhnev, Eugene (UKRAINE) 13-Fr2-1

A New Fuzzy Failure Mode and Effect Analysis Methodology with a Monotonicity-Preserving Similarity Reasoning Scheme
Tay, Kai Meng (MALAYSIA) 13-Fr2-2

A Subjective Approach for Evaluating Navigational Risk of Yangtze River
Zhang, Di (CHINA) 13-Fr2-3

Dempster-Shafer Theory of Evidence to handle maintenance models tainted with imprecision
Compare, Michele (ITALY) >>> Moved from session 01S-Mo4 01S-Mo4-1

10S-Fr2 Safety systems for real time applications 1

Press Room

10:00 – 11:40 Chair: Michael Schwarz (GERMANY) **Software**

Adaptive Wireless Sensor Networks for Crisis Management
Mraz, Lubomir (CZECH REPUBLIC) 10S-Fr2-1

Reliable System Design for Industrial Devices
Schwarz, Michael H. (GERMANY) 10S-Fr2-2

Dynamic Reconfiguration of FPGAs in Terms of Safety Systems
Hayek, Ali (GERMANY) 10S-Fr2-3

Towards safety analysis of model-based embedded software
Daw, Zamira (GERMANY) 10S-Fr2-4

A fast and efficient task splitting technique to maximise CPU utilization in dependable uniprocessor systems scheduled with non-preemptive EDF
Short, Michael (UNITED KINGDOM) 10S-Fr2-5

22-Fr2 Baltica — Environmental impact and climate change

10:00 – 11:40 Chair: Michael Knochenhauer (SWEDEN) **External**

Existing Environmental And Sustainable Initiatives Among Universities in Hong Kong
Lee, Wing Hang (HONG KONG, CHINA PR) 22-Fr2-1

Causality Test and Risk Analysis on Climate Change and Economic Growth for European countries, 1970-2008
Xue, Bing (CHINA) 22-Fr2-2

A novel methodology for quantitative ecological risk assessment for industrial accidents: an overview and case study
Duarte, Heitor Oliveira (BRAZIL) 22-Fr2-3

Managing Climate Change Risk – the development of a climate change risk assessment and scenario-based planning tool for the water sector
Rees, Daniel (UNITED STATES) 22-Fr2-4

Asset management methodology: a probabilistic approach to optimize NOx emission reduction investments for coal-fired power plants
Bickert, Hélène (FRANCE) 22-Fr2-5

17-Fr2 Marine Room — RI approaches for regulatory oversight

10:00 – 11:40 Chair: John Wreathall **Risk manag**

Risk Informed Regulatory Management of Aging Technology - Identification and application of policy alternatives for regulatory agencies
Mangalam, Srikanth (CANADA) 17-Fr2-1

Approaches to Ranking Various Nuclear Facilities With a Scope of Optimizing Regulatory Activities
Lankin, Mikhail (RUSSIAN FEDERATION) 17-Fr2-2

Providing a Risk-Informed Approach to the Regulatory Oversight of Medical Uses of Radioactive Materials
Wreathall, John (UNITED STATES) 17-Fr2-3

Use of the PSA in the Integrated Regulatory Safety Oversight in Switzerland
Schoen, Gerhard (SWITZERLAND) 17-Fr2-4

11:40 – 13:10 Lunch break

26-Fr2 SIL – high-level considerations

Eliel (hotel)

10:00 – 11:40 Chair: Henrik Kortner (NORWAY) **SIL**

The agri-motive safety performance integrity level – or how do you call it?
Schaebe, Hendrik (GERMANY) 26-Fr2-1

Safety integrity versus risk value
Fuchs, Pavel (CZECH REPUBLIC) 26-Fr2-2

Designing Safety Functions for Complex Systems: Treating multiple hazards and shared components
Alijagic, Edin (SWITZERLAND) 26-Fr2-3

Common cause failures in safety instrumented systems: Concepts and analytical approaches
Jin, Hui (NORWAY) 26-Fr2-4

Systematic failures, dependent failures and common cause failures – fundamental problems regarding definitions and applications
Isaksen, Stefan (NORWAY) 26-Fr2-5

20-Fr2 RAMS 2

Selim (hotel)

10:00 – 11:40 Chair: Jørn Vatn (NORWAY) **Industrial**

Performance analysis of process plant using reliability block diagram
Mokhtar, Ainul Akmar (MALAYSIA) 20-Fr2-1

Availability Analysis of Phased Mission Systems with Multiple Failure Modes
Matsumoto, Satoshi (JAPAN) 20-Fr2-2

A Complex Analysis of Repairable Systems using Petri Nets
Nyvlt, Ondrej (CZECH REPUBLIC) 20-Fr2-3

Safety and reliability studies in a large telescope
Carretero, José A. (SPAIN) 20-Fr2-4

Reliability Analysis of a Gas Thermo Plant Considering Different Operational Conditions
Saker, Leonardo (BRAZIL) 20-Fr2-5

RAMS-model for Mobile Work Machines with small production series
Ellman, Asko (FINLAND) 20-Fr2-6

02BS-Fr2 HRA and Bayesian analysis

Kino K13

10:00 – 11:40 Chair: **Mathematics**

An application of the integrated risk analysis methodology for the cooling systems of energy power plants
Leger, Aurélie (FRANCE) 02BS-Fr2-1

George Apostolakis Fellowship Award Winner

Use of a SPAR-H Bayesian Network for predicting Human Error Probabilities with missing observations
Groth, Katrina (UNITED STATES) **02BS-Fr2-2**

Experiences from Adapting Structured HRA Methods to the Oil and Gas Industry
He, Xuhong (SWEDEN) 02BS-Fr2-3

The UK Experience In Managing Risks Arising From Human Error
Embrey, David (UNITED KINGDOM) 02BS-Fr2-4

Evaluating the Bayesian Belief Network as a Human Reliability Model – the effect of unreliable data
Stempfel, Yann (SWITZERLAND) 02BS-Fr2-5

New Thinking in Human Reliability Assessment: How to asses human reliability in dynamic, interactive environments
Embrey, David (UNITED KINGDOM) 02BS-Fr2-6

16A-Fr3 Europaea — Modeling power systems

13:10 – 14:30 Chair: Antti Tarkiainen (FINLAND) **PRA NPP**

On-site power systems of the new nuclear power plants
Andrija, Volkanovski (SLOVENIA) 16A-Fr3-1

Application of corrective factor for the modelling of grid recovery in PSA
Picca, Paolo (ITALY) 16A-Fr3-2

Probabilistic safety assessment applied to power systems reliability
Cepin, Marko (SLOVENIA) 16A-Fr3-3

16B-Fr3-1 Fennia 2 — HRA – panel discussion: Errors of commission – Where do we stand?

13:10 – 14:30 Chair: James Chang (UNITED STATES) **PRA NPP**

As probabilistic safety assessment (PSA) is being increasingly used to support safety-related decision making, it is useful to examine important areas of uncertainty in order to identify what work needs to be done to improve the fidelity of the PSA models. For nuclear power plant PSA, one such area involves so-called human "errors of commission" (EOC) as exemplified by the operators' termination of high-pressure makeup during the March 28, 1979 accident at Three Mile Island (TMI). Current thinking within the human reliability analysis (HRA) community is that the identification, modeling, and quantification of such errors require consideration of operator decision making as affected by scenario context. The technical challenges associated with such an analysis are sufficiently great that now, over 30 years after TMI, these errors are not yet incorporated in workaday PSA models. Indeed, this gap is explicitly acknowledged in current guidance documents on risk-informed decision making (e.g., U.S. NRC Regulatory Guide 1.174, "An Approach For Using Probabilistic Risk Assessment In Risk-Informed Decisions On Plant-Specific Changes To The Licensing Basis").
This panel session will explore the current state of HRA/PSA technology with respect to the treatment of EOCs (and other potentially risk significant errors not included in PSA models1
) and the work needed to incorporate these errors into current, routine analyses. The session will involve brief presentations by panelists addressing operational experience, simulator observations, and PSA modeling and application needs, as well as HRA research and development, followed by facilitated discussion.
In particular, the following topics are expected to be explored:
• For cases where EOCs have been incorporated into PSA (e.g., guidance for fire HRA that is about to be published jointly by EPRI and NRC-RES), what is the motivation for including EOCs? Also, what limitations (if any) are there for inclusion?
• What PSA experience do we have on including EOCs?
• What "real world" events involve EOCs in a significant way?
• What are the challenges for including EOCs in existing PRAs?
• What other impediments (if any) are there to including EOCs?
Keywords: HRA, errors of commission

16C-Fr3 Fennia 1 — NPP reliability data

13:10 – 14:30 Chair: Albert Kreuser (GERMANY) **PRA NPP**

The Centralized Reliability and Events Database (ZEDB), Trend Analyses of Component Populations
Abusharkh, Yousef (GERMANY) 16C-Fr3-1

Data Collection in Nuclear Power Plants
Baumann, Dagmar (GERMANY) 16C-Fr3-2

Evaluation of criteria for assessing component reliability paramers for use in nuclear PSA – A comparison of the German and Nordic approaches
Swaling, Vidar H. (SWEDEN) 16C-Fr3-3

Experiences from implementation of updated reliability data for piping components using R-Book
Swaling, Vidar H. (SWEDEN) 16C-Fr3-4

14:30 – 14:40 **Break**

02-Fr3 Tools for RAMS assessment

Nordia

13:10 – 14:30 Chair: John Andrews (UNITED KINGDOM) **Mathematics**

RAATSS, an extensible Matlab® toolbox for the evaluation of repairable dynamic fault trees
Chiacchio, Ferdinando (ITALY) 02-Fr3-1

Overcoming non-determinism in testing smart devices: How to build models of device behaviour
Bishop, Peter (ITALY) 02-Fr3-2

Updating the MeDISIS Dysfunctional Behavior Database with knowledge from reliability repositories
Cressent, Robin (FRANCE) 02-Fr3-3

Reliability management in conceptual design - experiences from two practical cases
Valkokari, Pasi (FINLAND) 02-Fr3-4

10S-Fr3 Safety systems for real time applications 2

Press Room

13:10 – 14:30 Chair: Josef Börcsök (GERMANY) **Software**

A stochastic approach to the probability of failure on demand (PFD) with regard to the Standard IEC 61508
Wacker, Hans-Dieter (GERMANY) 10S-Fr3-1

A new algorithm to predict the residual number of critical software failures based on imperfect debugging
Krini, Ossmane (GERMANY) 10S-Fr3-2

Considering security aspects in safety environment
Ugljesa, Evzudin (GERMANY) 10S-Fr3-3

Safe wireless communication for safety related systems with bluetooth technology
Pendli, Pavan Kumar (GERMANY) 10S-Fr3-4

SILCas – How to calculate right safety parameters
Boercsoek, Josef (GERMANY) 10S-Fr3-5

22-Fr3	Flooding risks	
Baltica		
13:10 – 14:30	Chair:	External

The VNK2-project: Quantifying flood risks in the Netherlands
Jongejan, Ruben (NETHERLANDS) >>> Moved to session 24-Mo2 — 22-Fr3-1

Extreme weather, sea level rise and nuclear power plants in the present and future climate in Finland
Johansson, Milla (FINLAND) — 22-Fr3-2

Reliability-based analysis of river dikes during flood waves
Pham Quang, Tu (NETHERLANDS) — 22-Fr3-3

28-Fr3	Railway safety and reliability modeling	
Marine Room		
13:10 – 14:30	Chair:	Transport

Challenges in quantifying risks in railway systems – Examples and insights from use of risk analyses in the Scandinavian railway sector
Alme, Inge A. (NORWAY) — 28-Fr3-1

The revision of regulation 352/2009/EC for the common safety method on risk assessment and the role of the assessment bodies in its framework
Duquenne, Nathalie (FRANCE) — 28-Fr3-2

Conceptual design of advanced condition monitoring for a self-optimizing system based on its principle solution
Meyer, Tobias (GERMANY) — 28-Fr3-3

Complex system understanding: Back to basis!! The Functional Analysis Track – Railway System Case
Cointet, Alain (FRANCE) — 28-Fr3-4

14:30 – 14:40	Break

25-Fr3 Health care 2

Eliel (hotel)

13:10 – 14:30 Chair: Henning Boje Andersen (DENMARK) **Health**

A standardised FMECA and risk factors monitoring method for clinical risk assessment: Results from a Multi Centric Application
Trucco, Paolo (ITALY) 25-Fr3-1

A hybrid methodology for modeling risk of adverse events in complex healthcare settings
Kazemi, Reza (UNITED STATES) 25-Fr3-2

The nature of operating room time in interdisciplinary surgical operations
Høyland, Sindre (NORWAY) 25-Fr3-3

Usability evaluation of an adaptation of the WHO classification for patient safety
Thommesen, Jacob (DENMARK) 25-Fr3-4

Using explorative simulation to drive user-centered design and IT-development in healthcare
Thommesen, Jacob (DENMARK) 25-Fr3-5

20-Fr3 Risk assessment applications 3

Selim (hotel)

13:10 – 14:30 Chair: Veikko Rouhiainen (FINLAND) **Industrial**

Considering interactions between risks in a large contract-based project
Bouissou, Marc (FRANCE) 20-Fr3-1

The geometry of risk to workers in uranium fuel cycle facilities
Damon, Dennis (UNITED STATES) 20-Fr3-2

Approaches and challenges for Swedish public agencies in the performance of risk and vulnerability analyses
Hassel, Henrik (SWEDEN) 20-Fr3-3

CL-Fr4 | **Closing plenary: Ali Mosleh (USA)**

Europaea

14:40 – 15:10 | Chair: Kurt Petersen (DENMARK) | **Plenary**

Prof. Ali Mosleh *is the Nicole J. Kim Professor of Reliability Engineering and Director of the Center for Risk and Reliability at the University of Maryland. He is a member of the US National Academy of Engineering, Fellow of the Society for Risk Analysis, recipient of several scientific achievement awards, and technical advisor to numerous national and international organizations, including his appointment by President George W. Bush to membership on the U.S. Nuclear Waste Technical Review Board, a position in which he continues to serve in the administration of President Barack Obama. He conducts research on methods for probabilistic risk analysis and reliability of complex systems and has made many contributions in diverse fields of theory and application. These include methods and tools for dynamic PRA, cognitive models for human reliability analysis, models of the influence of organizational factors on system risk, Bayesian methods for inference with uncertain evidence, analysis of data and expert judgment, treatment of model uncertainty, risk-informed decision making under uncertainty, on-line system health monitoring, reliability growth methods, and many of the methods currently used for the treatment of common cause failures. On these topics he holds several patents, and has edited, authored, or co-authored over 400 publications. He has chaired or organized many international conferences on risk and reliability and is on the Editorial Board of several technical journals. Dr. Mosleh has led numerous projects on reliability, risk, safety, and security assessment for the nuclear, chemical, telecommunication, and aerospace industries. He has also led the design and development of more than ten major risk and reliability analysis software currently used by many industries government agencies around the world.*

Delivering on the Promise:
PRA, Real Decisions, and Real Events

Probabilistic Risk Assessment is now a well-established discipline with growing applications in support of rational decision-making involving important technological and societal risks. But has PRA delivered on the promise? How do we gage PRA performance? Are there disparities between what we get and what we think we are getting form PRA and its various derivatives? What should be our expectation, and how do we address potential gaps? Prof. Mosleh will examine these questions and offer his perspective and suggestions along conceptual, methodological, and practical lines.

Closing | **Closing of the conference**

Europaea

15:10 – 15:20 | Chairs: Reino Virolainen (FINLAND) and Terje Aven (NORWAY) | **Closing**

15:20 – 16:00 | **Strawberry social and adjourn in the foyer outside Europaea**

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Map of Helsinki City Center

PSAM 12

Sheraton Waikiki
Honolulu, Hawaii, USA
22-27 June 2014
12th International Probabilistic Safety Assesment and Management Conference

First Announcement

Important Dates

Abstracts Submission Deadline	30 September 2013
Notification to Authors	30 October 2013
Full Paper Submission Deadline	30 January 2014
Early Registration Deadline	31 March 2014
Conference Dates	22-27 June 2014

Previous Conferences

PSAM 1	Beverly Hills, USA	1991
PSAM 2	San Diego USA	1994
PSAM 3 & ESREL '96	Crete, Greece	1996
PSAM 4	New York, USA	1998
PSAM 5	Osaka, Japan	2000
PSAM 6	San Juan, Puerto Rico	2002
PSAM 7 & ESREL '04	Berlin, Germany	2004
PSAM 8	New Orleans, USA	2006
PSAM 9	Hong Kong, China	2008
PSAM 10	Seattle, USA	2010
PSAM 11 & ESREL '12	Helsinki, Finland	2012

Hula on Oahu - Authentic hula throughout Oahu at seasonal festivals, competitions, luau and live performances at hotels and resorts.

Conference website: www.psam12.org

Email contact: secretariat@psam12.org

In June 2014, the PSAM conference will take its rotation back to the United States in beautiful Honolulu, Hawaii. It is hoped that this twelfth edition of conference will be the largest PSAM yet, and attendees are encouraged to bring their families to beautiful Sheraton Waikiki.

The conference brings together experts from various industries, research organizations, regulatory authorities and universities. It offers a platform for contacts between different fields from nuclear, process and chemical industries, off-shore and marine, transportation, space and aviation, IT and telecommunications, bio and medical technology, civil engineering, financial management and other fields.

The multi-disciplinary Conference is aimed to ensure the cross-fertilization of methods, technologies and ideas for the benefit of all.

www.psam12.org

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Technical Disciplines
- Consequence Modeling and Management
- Digital I&C and Software Reliability
- Enterprise Risk Management
- Environmental Impact Assessment
- Fire Simulation and Analysis
- Human Reliability Analysis
- Industrial Safety and Accident Analysis
- Lifetime and Ageing Management
- Maintenance Modelling and Optimisation
- Non-probabilistic/Soft Methods in Reliability Analysis
- Occupational Safety
- Operational Experience and Data Analysis
- Phenomena Modeling
- Policy Making and Legislative Issues
- Reliability Analysis and Risk Assessment Methods
- Risk and Hazard Analyses
- Risk Governance and Societal Safety
- Risk Informed Applications
- Risk Informed Licensing and Regulation
- Risk Management in Large Projects
- Risk Perception and Communication
- Safety Assessment Software and Tools
- Safety Culture and Human & Organizational Factors
- Safety Integrity Level (SIL)
- Safety Management and Decision Making
- Structural Reliability Analysis Methods
- Uncertainty and Sensitivity Analyss, Bayesian methods
- Other (Please, specify)

Application Areas
- Automotive Engineering
- Aviation and Space
- Biotechnology and Food Industry
- Chemical and Processing Industry
- Civil Engineering
- Crisis and Emergency Management
- Electrical and Electronic Engineering
- Energy Production and Distribution
- Environment and Sustainable Development
- External Hazards and Climate Risks
- Health and Medicine
- Information Security
- Infrastructures
- Insurance and Finance
- IT and Telecommunications
- Manufacturing and Mechanical Systems
- Marine Engineering
- Nanotechnology
- Nuclear Engineering
- Offshore Oil and Gas
- Public Planning and Policy Decisions
- Security and Defense
- Training and Education
- Transportation
- Waste Management