

Program

IABSE Workshop

Ignorance, Uncertainty and Human Errors in Structural Engineering

15-16 February 2017
Helsinki, Finland

Organizers

Finnish Group of IABSE



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Hokkaido University, Japan

Dr. Matias Valenzuela

Ministry of Public Works in Chile

Introduction and welcome

IABSE Workshop “Ignorance, Uncertainty and Human Errors in Structural Engineering” is the 5th edition of international engineering events by the organizers focusing to the fundamental aspects for making structures safe and functional. These have been considered from the end users point-of-view to identify and discuss the methods, routines and practices needed to adopt to guarantee the appropriate result.

Over several centuries the viewpoint of structural engineers to structural safety has been largely mathematical – compute the resistance of a structure using some generally accepted method; deterministic or probabilistic; for given or assumed loads or actions. Other things that might have influence the safety has been ruled out as being considered responsibility of the other professionals.

Despite of all numerical computing power, surveillance routines and instrumentation we have today, our knowledge of hazards and our skills on putting them to loads and mathematical models is limited and uncertain. The robustness concept of structures and design; our key theme in the workshops 2013 and 2015; is one direction to extend the above approach. In it, one want to achieve resistance of structures also to unidentified and unknown actions; in a sense that failure is not disproportional to the failure it is caused by.

Robustness-based design is obviously not the limit where we can stretch our minds. Some prominent recent megaprojects worldwide have failed in terms of schedule, cost estimate, safety or functionality. Provocatively, the biggest risk today in structural engineering is not an error in assessment or method; but that no structural assessment has been made at all. This could happen, e.g., due to overload of project information; rapid and frequency design changes; and interactive way of conducting the project where everybody wants to give his or her comment. Problems in practical engineering work could often be categorised as human and organizational errors. Taking into account that almost every accident, including structural failures, involve human errors, our view to safety cannot be comprehensive unless we understand the human errors better. Furthermore, our feel of safety in the context of typical accidents may be misleading, as after the accident humans do not react and behave as they are thought to.

Finally, despite the increasing amount of information available, ignorance is something that may be envisaged to be more prominent in the next decades. In the global business, research and education, not every expert is aware of specific conditions in every country. Furthermore, the trend in university-level education has moved from technical matters to science creation, narrowing graduates' focus and skills to solve practical problems. For a new structural engineer or researcher, it might be difficult to locate the important, proven and useful methods among thousands of pages design guidelines; thousands of research papers written on the topic; and varying media and advice found in and through the Internet.

We are happy to invite old and new participants to the workshop - to share your view-points and recent research results on the theme!



Prof., Dr. Risto Kiviluoma
Aalto University
Chair of the Finnish Group of IABSE



Ms. Helena Soimakallio
Managing Director
Finnish Association of Civil Engineers RIL

Purpose of the workshop

The workshop theme is “**Ignorance, Uncertainty and Human Errors in Structural Engineering**”. It address varying aspects of making structures safe and functional. All type of structures are covered, but the focus is on structures that can cause notable safety concerns like buildings, bridges, viaducts, tunnels, power plants, dams, harbour structures, stadiums, sport halls, public areas, malls and large urban developments, i.e., structures whose failure may cause the most significant consequences in the terms of fatalities, injuries and economic losses. Aside with traditional safety-concept in structural engineering all other topics that can make the end product to fail are considered. Most relevant topics for the workshop include

- structural safety
- robustness of structures and robust based design methods
- human and organizational errors in design, construction and usage of structures
- accidental situations on structures
- collapses and major damages of structures
- man-made hazards
- uncertainties and limitations of assessment methods
- uncertainties and limitations of non-destructive condition evaluation methods
- risk handling and recovery schemes in hazards and extreme events
- climate change effects to structures and to natural hazards
- effects of globalization on structural engineering profession and education.

The purpose of the workshop is to provide a meeting point and discussion forum to any professional interested in the theme. The theme is the continuation of the IABSE Workshops “Safety, Failures and Robustness of Large Structures” Helsinki 2013 (IABSE Reports Vol 100) and “Safety, Robustness and Condition Assessments of Structures” Helsinki 2015 (IABSE Report Vol. 103). Its targets were formulated at the discussions of the IABSE Summit “Global Risks in Structural Engineering” Helsinki-Barcelona 2016.

Keynote speakers are invited as multidisciplinary bases and aim to present the best skills and experience on their field. This gives the participants a possibility to learn new ideas and best practices. The workshop includes open call-for-papers sessions, in which experts will publish their scientific contribution to the theme. The abstracts and papers have been reviewed by the International Scientific Committee of the Workshop. Accepted papers will be published in the proceedings.

The workshop includes general closing discussions where the state-of-the-art can be reviewed. If urged, the organizers on the behalf of workshop participants, can gather statements or recommendations towards IABSE or openly to national structural engineering associations. These may include recommendation for arranging future events or other modes of collaboration on specific topics.

Scientific program

Scientific program consists on invited key-note lectures and an open call-for paper sessions. At the end of the both workshop days, panel discussions are arranged and time is reserved for common discussions.

Publication

Accepted papers will be published in the proceedings book as IABSE Report Series Vol 107. The book is in digital format and will be available at the beginning of the workshop.



Program

	TUESDAY February 14, 2017	WEDNESDAY February 15, 2017	THURSDAY February 16, 2017
8.00		Registration desk open	Registration desk open
9.00		OPENING SESSION Opening words and purpose of the Workshop Risto Kiviluoma	SESSION 4 "Projects and case studies" Chair Risto Kiviluoma
9.15		Keynote 1 Understanding the origins of human errors Marija Bertovic	Keynote 4 Natural hazards in South America. Application methodology of local risk disaster management on Chilean Patagonia Matias Valenzuela
9.30			Causes of structural failures and incidents with steel structures Göran Alpsten
9.45		Keynote 2 Review of bridge collapses worldwide 1966 - 2017 Anton Syrkov	Structural failure studies Jan Bujnak
10.15		Coffee at 10.15-10.30	
10.30		SESSION 1 "Human factor and ignorance" Chair Risto Kiviluoma	SESSION 5 "Uncertainties 2" Chair Matias Valenzuela
		Invited lecture Strength defects of new concrete structures in Finland Jouni Punkki	Keynote 5 Strength properties of existing timber structures – uncertainty of the estimation Gerhard Fink
11.00		Risk-based thinking and knowledge in engineering organizations Jörg-Martin Hohberg	Improving structural safety in the alteration and refurbishment of old buildings David Oloke
11.20		Should we focus on human or organizational factors? Karel Terwel	Can independent proof of structural design projects be substituted by qualification of the personal and by internal check? Wolfram Jäger
11.40		Influence of human error on structural reliability Eric Brehm	Shortsighted Leadership in Construction Peter Sarlos
12.00		Lunch at 12.00-13.00	
13.00		SESSION 2 "Uncertainties 1" Chair Reijo Kouhia	SESSION 6 "Robustness" Chair Gerhard Fink
		Application of rough set theory to rule-type knowledge discovery from field inspection data on highway bridges Ayaho Miyamoto	Design of steel and composite structures for robustness Nadine Hoffmann
13.20		Analysis and repair of Vestmoen Bridge Lars Toverud	A simplified method for evaluation of robustness of bridges Martyna Kainulainen
13.40		Structural safety assessment of a suspension bridge using analysis model updating Junyong Park	Structural robustness at the conceptual stage Aurélie Deschuyteneer
14.00		Hidden defects in bridges, guidance on detection and management – forthcoming CIRIA report Marcos Sanchez	Check bridges on survivability Alexandr Vasiliev
14.20		Coffee 14.20-14.40	Coffee at 14.20-14.40
14.40		SESSION 3 "Analysis" Chair Anton Syrkov	PANEL DISCUSSION 2 Moderator Risto Kiviluoma Panel Discussion of workshop themes, keynote speakers of the workshop and the audience Closing of the Workshop
		Keynote 3 Pitfalls in numerical analysis of structures Reijo Kouhia	
15.10		Uncertainties and human errors in the design and execution of steel structures Göran Alpsten	
15.15	Check-in to the hotel starting at 14.00	Estimation of structural safety for internally grouted post-tensioned external tendons Yeun Chul Park	Bus transportation to the airport and Helsinki City centre at 15.15
15.30		Analytical study of fatigue-crack propagation on web-gap plates Ryo Tobita	
15.50		Break	
16.10		PANEL DISCUSSION 1 Moderator Risto Kiviluoma Panel discussion of day's topics Keynote speakers of the day and the audience	
16.15			
16.45			
18.00	Get-together at Gustavelund at 18.00-20.00		
18.30			
19.00		Dinner at Gustavelund at 19.00-22.00	

Keynotes



Understanding the origins of human errors

Dr. **Marija Bertovic**, Germany

BAM, Federal Institute for Materials Research, Berlin

Dr. Marija Bertovic, born 1981, obtained her diploma degree in psychology (Dipl. psych) at the University of Rijeka, Croatia, and her doctoral degree at the Technical University in Berlin, Germany. Since 2006 she has been working on topics related to human factors in non-destructive testing at BAM and at the German Society for Non-Destructive Testing (DGZfP) - Education and Training Ltd. The focus of her research has been on identifying and studying risks arising from the interaction of people with technical systems and organisation, as well as on developing strategies to address those risks. The domains in which she has conducted her research include nuclear power plants, final disposal of spent nuclear fuel, and railway.



Review of bridge collapses worldwide 1966 - 2017

Dr. **Anton Syrkov**, Russian Federation

PLC Transmost, St. Petersburg

Anton is a bridge engineer and Honorary Road Builder of the Russian Federation. His fields of expertise are the design, assessment of structural condition, life cycle problems, risk analysis and management. He participated in the design of 14 major bridges and dozens of ordinary bridges for roads and railways of Russia. Over the last 16 years he has in particular expertise in assessment of bridges condition, elaborating of routine and heavy maintenance plans, structural health monitoring systems, risk analysis and life cycle optimization of bridge structures. Since 2004, he has taken the initiative to collect and analyse data on failures and collapses of bridges in order to improve technical solutions and risk management. Anton acts as a head of Life Cycle Department in PLC Transmost and an associate professor of St. Petersburg State University of Architecture and Civil Engineering in Russia.



Pitfalls in numerical analysis of structures

Prof., Dr. **Reijo Kouhia**, Finland

Tampere University of Technology

Reijo (born 1960, Hämeenlinna, Finland) received his doctoral degree from Helsinki University of Technology, Finland. Currently he is Professor of Solid Mechanics at Tampere University of Technology. His research interests lie in non-linear continuum mechanics - especially stability analysis, constitutive modelling, multi-physical problems and numerical solution techniques related to them.



Natural hazards in South America. Application methodology of local risk disaster management on Chilean Patagonia

Dr. **Matias Valenzuela**, Chile

Ministry of Public Works in Chile

Matias has got P.E. Civil Engineering from the University of Chile. He graduated M.Sc. of Structural and Construction Engineering and got Ph.D. in Construction Engineering from Technical University of Catalonia, Barcelona, Spain. Matias is Fiscal Inspector at Ministry of Public Works in Chile and Head of Design and Engineering of the Chacao Multi-Span Suspension bridge. He works actively in international engineering associations including PIARC, IABSE and IABMAS. His research areas include cable-supported bridges, heuristic optimization methods, management of structures, and maintenance of large structures.



Strength properties of existing timber structures – uncertainty of the estimation

Prof., Dr. **Gerhard Fink**, Finland

Aalto University

Gerhard (born 1982, Austria) is Professor for Wooden Structures at the Department of Civil Engineering at Aalto University. He studied civil engineering at the Technical University of Graz in Austria. From 2009 to 2014 he worked at ETH Zurich in Switzerland where he performed his PhD study and worked as a Postdoc. Before he starts at Aalto University he worked, as a scientific employee and project leader, at the Structural Engineering Research Laboratory at Empa in Switzerland. His research activities cover several areas in timber engineering and in structural reliability, including innovative solutions for development of more reliable and efficient engineered wood products.

Invited lecture



Strength defects of new concrete structures in Finland

Prof., Dr. **Jouni Punkki**, Finland

Aalto University

Jouni (born 1963, Finland) received his doctoral degrees from Norwegian University of Technology and from Helsinki University of Technology, Finland. Currently he is Professor of Practice in Concrete technology at Aalto University. During his career, he has been working as researcher in universities, development and management positions in pre-cast concrete industry and as entrepreneur in his own consulting company. His research activities cover concrete material research, concrete durability and production technology.

Social program

Social program of the workshop includes a get-together reception at the venue (on Tuesday evening) and the workshop dinner (on Wednesday evening). The dinner takes place at restaurant Krapihovi, which will be reached by guided walk of about 10-15 min or by taxi.

For those willing to experience winter running, an unofficial race around the lake Tuusula will be arranged from the venue on Tuesday morning. The course follows the maintained walkways and has total length about 20 km. Contact the workshop secretariat for details.

Participants

The workshop is intended to engineers, architects, researchers, actuarial mathematicians and officials working with structures. The workshop is also an excellent possibility for young engineers and postgraduate students to get familiar with the theme and the IABSE organisation.

Registration and fees

Registration can be made via the website www.ril.fi/iabse2017.

The registration fee will include participation to the workshop days (incl. lunch and coffee), get-together reception, dinner and the workshop proceedings. There will be three different fee categories:

- regular fee 795 eur
- IABSE and RIL member fee 595 eur
- young-engineer fee (born 1987 or later) 425 eur

The above fees include VAT 24%.

For any questions please contact the workshop secretariat: ville.raasakka@ril.fi or +358 50 366 8687.

Venue, accommodation and transportation

Workshop venue is **Gustavelund** (address: Kirkkotie 36, Tuusula), which is located 35 km from Helsinki city centre and close to the Helsinki-Vantaa airport.

The venue has own accommodation facilities with total 84 rooms reserved to the workshop participants. Accommodation needs to be booked separately. In Gustavelund, specially negotiated room rates to workshop participants are:

Single room (standard)	85 eur / night
Double room (standard)	115 eur / night

Room reservations directly from the hotel:

Tel. + 358 9 273 751

E-mail: reception@gustavelund.fi

Booking code: IABSE



Booking code is valid until January **16th** unless sold out before.

Recommended transport from the airport is taxi, which takes about 15 min. Driving instructions and information of the public transport can be found at **www.gustavelund.fi**. There exist regular local bus traffic about once per hour to and from the venue and the city of Helsinki.

After the workshop, bus transportation will be arranged to the airport and to the Helsinki city centre. The bus is scheduled to leave on Thursday at 15.00. The estimated arrival to the airport is at 15.45 and Helsinki City centre at 16.30.

Workshop dates

February 13, 2017	On-line registration ends
February 14, 2017	Get-together at the venue
February 15-16, 2017	the Workshop



View to the Helsinki Market Square and Cathedral.



Finland has about 188'000 lakes: example of the landscape on a winter day.

General information

Language

The official language of the workshop is English. Oral presentation and discussion will be in English only.

Winter weather in Helsinki region

The month of February is considered winter also in the Southern Finland. If you plan to do outdoor activities, remember to bring a warm jacket, walking shoes, gloves and hat with you. Walking paths might be icy and slippery.

Helsinki, Finland

The capital, Helsinki, and the neighbouring towns, Espoo and Vantaa, form the fast growing Helsinki metropolitan region, which is now home to almost a million Finns. Helsinki was founded by King Gustav Vasa of Sweden in 1550 and became the capital city of the independent Finland in 1917. Surrounded by the sea and its own exotic archipelago, Helsinki offers visitors an endless number of possibilities.

The workshop is held in Tuusula, about 30 km from Helsinki city centre and 15 min from Helsinki-Vantaa airport. Tuusula is a small town with the population of 36.000. Tuusula has a strong cultural heritage. The first Finnish museum road - Tuusula Rantatie – is located close to the workshop venue. This road hosts the homes of many Finnish artists, such as Pekka Halonen, Juhani Aho, Venny Soldan-Brofeldt, Aleksis Kivi, Eino Leino, Eero Järnefelt and Jean Sibelius.

Finland (Finnish name Suomi) is a republic which became a member of the European Union in 1995. Its population is 5.3 million. Finland is an advanced industrial economy: Metal, engineering and electronics industries account for about 60 % of export revenues and the forest products industry for about 20 %. Finland is situated in northern Europe between the 60th and 70th parallels of latitude. A quarter of its total area lies north of the Arctic Circle. Forest covers about 75 % of Finland, while bodies of water - mainly lakes - cover almost 10 %.

Local organizers

The Finnish Group of IABSE is more than sixty years old and one of the oldest national groups inside the IABSE organization. The Finnish Group together with RIL have organized several IABSE events, including:

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| 2016 | IABSE Summit "Global Risks in Structural Engineering", Helsinki-Barcelona |
| 2015 | Helsinki Workshop "Safety, Robustness and Condition Assessments of Structures" |
| 2014 | Nordic IABSE Summit "Engineering and Beyond", Helsinki-Tallinn |
| 2013 | Helsinki Workshop "Safety Failures and Robustness of Large Structures" |
| 2008 | Helsinki Conference "Information and Communication Technology (ICT) for Buildings, Bridges and Construction Practice" |
| 2001 | Lahti Conference "Innovative Wooden Structures and Bridges" |
| 1988 | Helsinki Congress "Challenges to Structural Engineering" |

Finnish Association of Civil Engineers (RIL) is an organization for civil engineers with Master of Science degrees and university students of civil engineering. RIL supports the development of building, urban planning and environmental technology and acts to preserve solid and durable building and maintenance traditions. RIL also supervises the benefits of its members and promotes their professional skills and welfare. Read more from: www.ril.fi.

About IABSE

The International Association for Bridge and Structural Engineering (IABSE) was founded in 1929. The mission of IABSE is to promote the exchange of knowledge and to advance the practice of structural engineering worldwide in the service of the profession and society. To accomplish its mission, IABSE organizes conferences and publishes the quarterly journal Structural Engineering International (SEI), as well as reports and other monographs. IABSE also presents annual awards for outstanding achievements in research and practice that advance the profession of structural engineering.

More information about IABSE:

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Not yet a member? Join IABSE at <http://www.iabse.org/join>

Further information

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