



GUIMARÃES | 27 - 29
IABSE SYMPOSIUM 2019 | MARCH 2019



FINAL PROGRAMME

TOWARDS A RESILIENT BUILT ENVIRONMENT

RISK AND ASSET MANAGEMENT

Organised by:



In co-operation with:



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01. MESSAGE FROM THE PRESIDENT

It is with great pleasure that IABSE has received the invitation from the Portuguese Group of IABSE (APEE), the Institute for Sustainability and Innovation in Structural Engineering (ISISE) and the University of Minho to be in Guimarães in March 2019.



A handwritten signature in black ink that reads "F. Branco".

Fernando Branco
President of IABSE

This internationally renowned technical meeting joins members, colleagues and friends, during a few intense days of learning and discussing the new themes of Structural Engineering, arising from around the world.

With the theme 'Towards a Resilient Built Environment - Risk and Asset Management' the Symposium presents the discussion of the existing solutions as well as the evolution of our built environment to achieve a good performance during its service life, always trying to increase the wellbeing of our society.

This theme is especially important to our young colleagues, who are invited to join the Symposium and our famous Association, to take advantage of the 'IABSE Young Engineers Programme'. It is with them that the performance of our built environment must be discussed, as they will be the builders of the future.

The Organising Committee, with Paulo Lourenço as honorary chair, José Matos as executive chair and a Scientific Committee chaired by Luís Oliveira Santos, has prepared a very attractive and innovative Symposium with renowned keynote speakers and with sessions presented in tracks of specialised themes, allowing you to spend a few days to update your knowledge with the experience of colleagues from all over the world.

Besides the Symposium activities, an interesting technical visit, tours and a pleasant social programme have also been arranged to enjoy the historical city of Guimarães. The importance of its historical monuments was recognised by UNESCO who declared the city a World Heritage site in 2001.

Leave your office for a few days, and come to Guimarães in March 2019 to meet your friends again, to make new contacts, to learn more about the future of our profession and simultaneously walk among the main tourist attractions of the city or enjoy day tours to Braga, Porto or the Douro river valley.

02. MESSAGE FROM THE ORGANISING COMMITTEE



A handwritten signature in black ink that reads "Paulo B. Lourenço".

Paulo B. Lourenço
Honorary Chair, Organising Committee



A handwritten signature in black ink that reads "José Campos e Matos".

José Campos e Matos
Executive Chair, Organising Committee

The IABSE Symposium Guimarães 2019 'Towards a Resilient Built Environment - Risk and Asset Management' will be held on March 27-29, 2019, at Vila Flor Cultural Centre.

The Symposium aims at providing an international forum for the debate on, among others, issues such as the sustainability of the built environment, risk assessment and asset management in infrastructures. In addition to Future Trends, the conference shall be focusing on cutting-edge issues, such as Novel Management Tools for the Built Environment, Lifecycle Quality Control of Infrastructures, Advanced Frameworks for a Sustainable Built Environment and Risk Analysis Procedures. The Symposium is thus targeted at attendees from different stakeholders, respectively, from academia to industry.

Guimarães is a cosy and lively UNESCO city, considered as the cradle of Portugal. Attendees will have the opportunity to increase their network through a set of social events, such as the welcome reception and the gala dinner. Young attendees will also have the opportunity to enjoy the Symposium through a tailor-made young engineers programme, including a happy hour.

Preceding this Symposium is the final conference of COST Action TU 1406 on 'Quality specifications for roadway bridges, standardisation at a European level' (www.tu1406.eu), to be held on March 25-26 2019. We believe that such an event will also attract a large number of leading participants who may take advantage of both events being in the same location.

On behalf of IABSE, we are looking forward to welcoming you to Guimarães for this promising event.

03. MESSAGE FROM SCIENTIFIC COMMITTEE

Welcome to the IABSE
Symposium in Guimarães 2019!



Luís Oliveira Santos

Luís Oliveira Santos
Chair of the Scientific
Committee

We are living times where the built environment is becoming increasingly complex, due to its progressive ageing, the ever-growing demands of society and the rising environmental requirements, including the effects of more severe and frequent extreme climatic events.

The Symposium theme 'Towards a Resilient Built Environment – Risk and Asset Management' is highly relevant today when public entities and structural engineers have to make decisions taking into account technical, social, environmental, economic, financial and even political constraints. This requires a holistic approach, using advanced and innovative tools, to get solutions that are both economical and robust but also enhance the sustainability of the built environment. The Symposium is thus targeted at attendees from different stakeholders, from research and industry community, from public agencies and private companies.

The Symposium aims at providing an international forum for the debate on issues such as the sustainability of the built environment, risk assessment and asset management in infrastructures. Within the overall Symposium theme, the following topics were selected: Novel Management Tools for the Built Environment; Lifecycle Quality Control of New and Existing Infrastructures; Advanced Frameworks for a Sustainable Built Environment; Risk Analysis Procedures, from Theory to Practice; Future trends in Structural Engineering.

Based on over 400 submitted abstracts, received from all over the world, more than 240 papers were selected for oral presentations. Furthermore, five worldwide experts were invited as keynote speakers to present new developments and outcomes according to the symposium's topics.

I would like to take this opportunity to express my gratitude to the keynote speakers, authors, organizers of special sessions, and participants for their contributions, to the members of the Conference Scientific Committee for their efforts in handling of the papers and preparing an engaging technical program, and to the members of the Advisory and Organizing Committees for the time and effort they have devoted to making the IABSE Guimarães Symposium 2019 a successful event.

Finally, I wish all participants a fruitful work throughout this Symposium and a very pleasant stay in Guimarães.

04. ABOUT IABSE

The International Association for Bridge and Structural Engineering (IABSE) was founded in 1929 and has its seat in Zurich, Switzerland. Today, IABSE has members in over 100 countries and 50 National Groups around the world. IABSE's aim as a scientific and technical society is to promote the advancement of structural engineering practice while taking into account technical, economic, environment, aesthetic and social aspects. IABSE deals with all structures and with all materials.

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To fulfil its mission IABSE organises conferences and publishes the quarterly journal Structural Engineering International (SEI), conference reports, as well as books reflecting the work of its technical groups. It creates technical groups as required by needs and technological progress, offers activities within National Groups of IABSE, supports Young Engineers with a programme and presents annual awards for outstanding achievements in research and practice that advance the profession of structural engineering.



05. ABOUT UMINHO

The University of Minho (UMinho) aims to be a university without walls, focusing on the regional, national and international socio-economic environment. International activities are quite intense with a range of countries from all continents, including the Portuguese-speaking ones. UMinho is a research university engaged in the establishment of the chain Knowledge-Research, Development and Innovation - as evidenced by a series of indicators. The ratio between research projects and PhD students is over 0.5 and more than 150 PhD's are awarded every year. The average yearly production of refereed papers in scientific journals is impressive: above 2/FTE/year.

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Moreover, 250 R&D contracts are signed yearly with industry while, within the framework of FP7 programme, 2 ERC advanced grants have been awarded by UMinho. The 28 UMinho Research units evaluated by the FCT in 2014, one was considered Exceptional while 10 and 11 of them were ranked as Excellent and Very Good respectively. In terms of the Times Higher Education (THE) 100 under 50 ranking for 2014, UMinho was on the 75th position and according to the 2014 THE World University Rankings, UMinho was ranked in the range 350-400. Finally, based on the CWTS Leiden Ranking for 2014, UMinho is the best Portuguese university.



06. ABOUT ISISE

UMinho co-hosts (with the University of Coimbra) the Institute for Sustainability and Innovation in Structural Engineering (ISISE), which is a multidisciplinary research unit funded by the Portuguese Foundation for Science and Technology (FCT). In the last Research Assessment Exercise (RAE 2008-2013), ISISE was rated as Excellent. ISISE is an example of interaction and knowledge transfer between academic institutions and industry market stakeholders both in national and international environment. This institute has 60 PhD members, more than 100 PhD students, €8.5 millions of competitive funding granted, three European Master Courses while its international leadership has been already recognized.

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Regarding the structural configuration of ISISE, it is organized in three Research Groups, addressing the topics of construction technologies in historical materials and masonry, steel and mixed materials, and concrete. Presently, ISISE has employed several researchers with background on inspection and monitoring of existing structures with special emphasis to historical heritage buildings and sites. Along these lines, the research conducted by the institute aims mainly to develop an integrated life-time structural approach and tools for monitoring of existing structures and infrastructures, and assess and manage new and existing building stock, on both micro and macro scale in order to propose innovative methods and create useful guidelines.





'Aqui Nasceu Portugal' Historical Wall

07. COMMITTEES

Organising Committee

Paulo B. Lourenço, University of Minho [Honorary Chair]
José Campos e Matos, University of Minho [Executive Chair]
Susana Santos, University of Minho [Lead Secretariat and Communications]
Joaquim Barros, University of Minho [Lead International Liaisons]
Jorge Branco, University of Minho [Lead Social Programme and Technical Visits]
José Sena-Cruz, University of Minho [Lead Programme and Young Engineering Programme]
Rita Bento, Instituto Superior Técnico - Lisbon [Lead Sponsoring and Exhibition]
Rita Moura, Teixeira Duarte [Lead National Liaisons]
Rui Coutinho, Infraestruturas de Portugal [Lead Industrial Liaisons]

Advisory Committee

Antonio Adão da Fonseca, ADF [Chair]	Peter Simonsson, Sweden
Brian Uy, Australia	Philippe Menétrey, Switzerland
Bruno Godart, France	Sergio Hampshire de Carvalho Santos, Brazil
Ian Firth, United Kingdom	Yaojun Ge, China
Maria Dolores Pulido, Spain	Yozo Fujino, Japan

Scientific Committee

Luís Oliveira-Santos, LNEC [Chair]	João R. Correia, Instituto Superior Técnico [Vice-Chair]
Daniel V. Oliveira, University of Minho [Vice-Chair]	Hélder Sousa, University of Minho [Secretary]
Elsa Caetano, University of Porto [Vice-Chair]	

Members

Mitsuyoshi Akiyama, Japan	Arndt Goldack, Germany	Pedro Pacheco, Portugal
Carmen Andrade, Spain	Tong Guo, China	Vikram Pakrashi, Ireland
Mourad Bakhom, Egypt	Katrin Habel, Canada	Fabrizio Palmisano, Italy
Alok Bhowmick, India	Rade Hajdin, Switzerland	Ignacio Payá Zaforteza, Spain
Jan Bień, Poland	Sergio Hampshire Santos, Brazil	Armando Rito, Portugal
Bruno Briseghella, China	Niels Peter Hoj, Switzerland	Jose Romo Martin, Spain
Jorge de Brito, Portugal	Daniel Honfi, Sweden	Xin Ruan, China
Eugen Brühwiler, Switzerland	Boulet Imam, UK	Laurent Rus Jenni, Spain
Laura Caldeira, Portugal	Igor Kavrov, Germany	David Smith, UK
Rui Calçada, Portugal	Ho-Kyung Kim, Republic of Korea	Scott Thomas Smith, Australia
João Casagrande, Brazil	Risto Kiviluoma, Finland	Alfred Strauss, Austria
Joan Ramon Casas, Spain	Hyun-Moo Koh, Republic of Korea	Harshavardhan Subbarao, India
Eleni Chatzi, Switzerland	Andreas Lampropoulos, UK	Anton Syrkov, Russian Federation
Sorin Dan, Romania	Guy Larose, Canada	Julio Timerman, Brazil
Ane De Boer, The Netherlands	Heikki Lilja, Finland	Matias Valenzuela Saavedra, Chile
Stephanos Dritos, Greece	Maria Pina Limongelli, Italy	Rob Vergoossen, The Netherlands
Michael Havbro Faber, Denmark	Geert Lombaert, Belgium	Wagemans, Leo, The Netherlands
Ian Peter Thomas Firth, UK	Fernando Madrazo Aguirre, UK	David Wisniewski, Poland
Dan Frangopol, USA	Ana Mandić Ivanković, Croatia	Zhishen Wu, China
Carlos Galindo Mendez, Mexico	Andrew Martin, Denmark	Alphose Zingoni, South Africa
Yaojun Ge, China	Fausto Mistretta, Italy	Stefan Zmigrodzki, Canada
Carmelo Gentile, Italy	André Orcesi, France	

08. GUIMARÃES AND NORTH OF PORTUGAL

THE HISTORY

Guimarães, city of medieval origin, has its roots in remote century X. It was at this time that the Countess Mumadona Dias, widow of Hermenegildo Mendes built a monastery, which has become a centre of attraction and gave rise to the establishment of a population group. Parallel and defence cluster, Mumadona built a castle within walking distance on the hill, creating a second anchor point. Connecting the two nuclei formed the Santa Maria Street.

Later the monastery became a chapter house and acquired great importance due to the privileges and donations that kings and nobles were giving him.

It became a famous centre for pilgrimage, and everywhere flocked believers with prayers and promises. The village continued to grow and organizing, and then surrounded by a defensive wall. However the mendicant orders are installed in Guimarães and help shaping the city.

Subsequently, the two poles merge into a single, after the fifteenth century the city walls had been established. There is also be the construction of some churches, monasteries and palaces, the formation of the Misericórdia Square (now Largo João Franco) in the late seventeenth century and early eighteenth centuries, but its structure not be significantly altered.

It is from the late nineteenth century, with the new urban ideas on public health that the village, a city in 1853 by Queen Maria II, undergoes major changes: the Broad do Carmo (now Largo Martins Sarmento) and Countess of Juncal were built, streets and avenues were opened and then as well as the Colina da Foundation and the Alameda. However, almost everything was done in a controlled way, thus allowing the conservation of its magnificent Historic Centre.



Castle of Guimarães



Largo do Toural - Guimarães Centre

GUIMARÃES AND SURROUNDING AREAS

The province of Minho, in the Northwest of Portugal, is full of scenic and historical sites, being particularly famous for the production of wine. To the North of the region, you will find the National Park of Peneda-Gerês with its rock-mountains, cascades, lakes and abundant wildlife.

To the East, you have the famous Douro river valley, where the Port wine grapes are grown. To the South, you will find the city of Porto, with its international airport, featuring an impressive architecture in the banks of the Douro River, the famous bridges and the Port wine cellars.

The city is famous for its architectural heritage, including worthwhile visits to: the historical centre, where its unique atmosphere of narrow streets and squares provides a meaning to the cultural heritage, which is the everyday reality for the local population; the palace of the House of Bragança, with its rare roofs and 39 large brick chimneys, that once was one of the most sumptuous residences in the Iberian Peninsula; the medieval castle, where the Portuguese history began; the Monastery of Santa Maria da Costa and the Penha Sanctuary, with a beautiful landscape.

The Guimarães municipality, with an area of 241 km², is located in Braga district in Northern Portugal. Elevated to the category of city in 1853, it is divided in 20 parishes with a total population of 158.000 inhabitants. The population of Guimarães is one of the youngest in Europe.

One of Portugal's most important historical cities, Guimarães is considered the "Cradle of Portuguese nationality", where the country was founded in the 9th century by King D. Afonso I (1109-1185), Portugal's first ruler. The value of the historic heritage of Guimarães has been potentiated over the years.

The conference facilities in Guimarães are excellent and private accommodation for the participants can be found in the city, at very reasonable prices. Participants can easily walk from the conference venue to the city centre and hotels.

TRAVELLING TO GUIMARÃES

The nearest airport to Guimarães is the Francisco Sá Carneiro Airport in Porto, which is about 50 km from Guimarães - around 30 min by car or 50 min by bus. The Francisco Sá Carneiro Airport operates with 73 destinations and 20 airlines, fly directly to Porto, like TAP Portugal, Lufthansa, Iberia, Air France, Transavia, Air Berlin, Luxair, as well as the ever-growing low cost airlines, such as Ryanair and Easyjet. The Francisco Sá Carneiro Airport was awarded the Best European Airport, by Airports Council International (ACI).

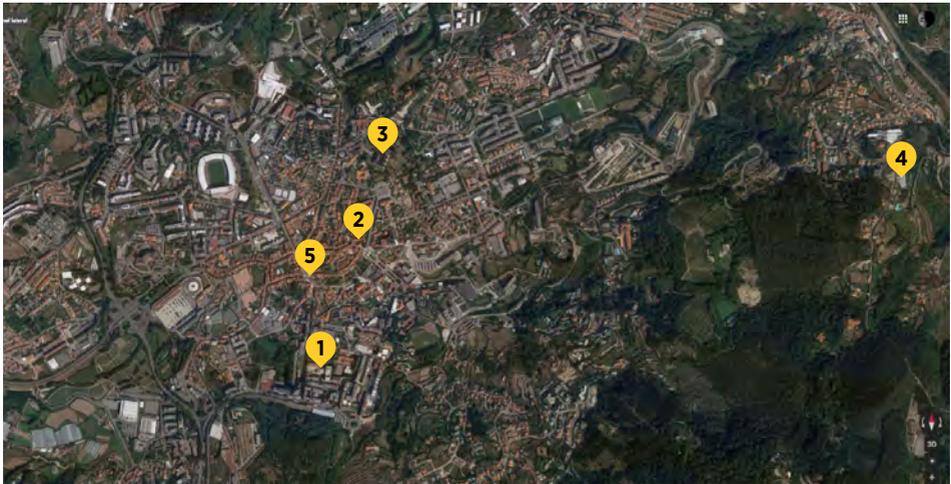
A direct shuttle bus (www.getbus.eu) can conveniently be taken from the arrivals terminal to Guimarães. A one-way ride is 8,00€, the round trip 14,00€ and can be booked online.

MAP OF THE CITY AND POINTS OF INTEREST

The conference venue is located close to the historic centre of Guimarães. The social events (IABSE HAPPY HOUR and Welcome Reception) are located at a walking distance of 10-15 minutes from the conference venue. The Gala Dinner will be on MIT Penha, located in the Penha hill overlooks Guimarães. Gala Dinner attendees should use motorized transportation (bus/taxi/uber).



Statue of D. Afonso Henriques



Map of Guimarães

1

Conference Venue

Centro Cultural Vila Flor CCFV
GPS 41.437378, -8.294989

2

IABSE Happy Hour

Alberto Sampaio Museum
GPS 41.442700, -8.292279

3

Welcome Reception

Ducal Palace
GPS 41.446590, -8.291332

4

Gala Dinner

MIT Penha
GPS 41.444782, -8.260376

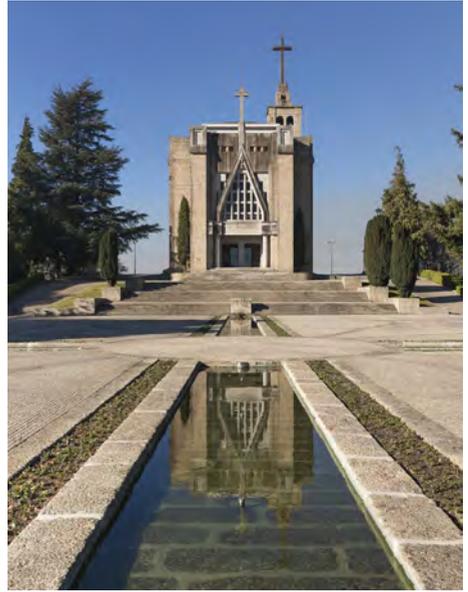
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Social Tours - "Aqui nasceu Portugal"

Rua Vieira Oliveira Arquitecto
GPS 41.441299, -8.295040



Ducal Palace



Penha Sanctuary



Oliveira Square



Historical Centre



D. João I Street - Historical Centre



Toural - Historical Centre

09. HOST VENUE

VILA FLOR CULTURAL CENTRE

The Vila Flor Cultural Centre is a respected and distinguished establishment on the Portuguese national cultural scene. The Cultural Centre, inaugurated on 17th September 2005, is the main cultural facility of Guimarães and it was born from the renovation of the Vila Flor Palace (18th century), and involving spaces. This space brings together the rich history of a manor house, its magnificent gardens and lovely architecture. The recovered Gardens received the Honors distinction in the category Exterior Spaces of Public Use of the National Prize for Landscape Architecture 2006.



The building was designed to hold all types of cultural events, namely, all resources are optimised in order to provide the highest quality facilities and spaces which guarantee that a wide range of events can be successfully hosted. With this objective, the Cultural Centre was equipped with two auditoriums, four meeting rooms, an exhibition area of 1000 m², a restaurant, a parking place and several gardens.

At this moment, the auditoriums of Cultural Centre are just right for accommodating a wide variety of needs, such as Conferences, Seminars, Summits and Colloquiums.

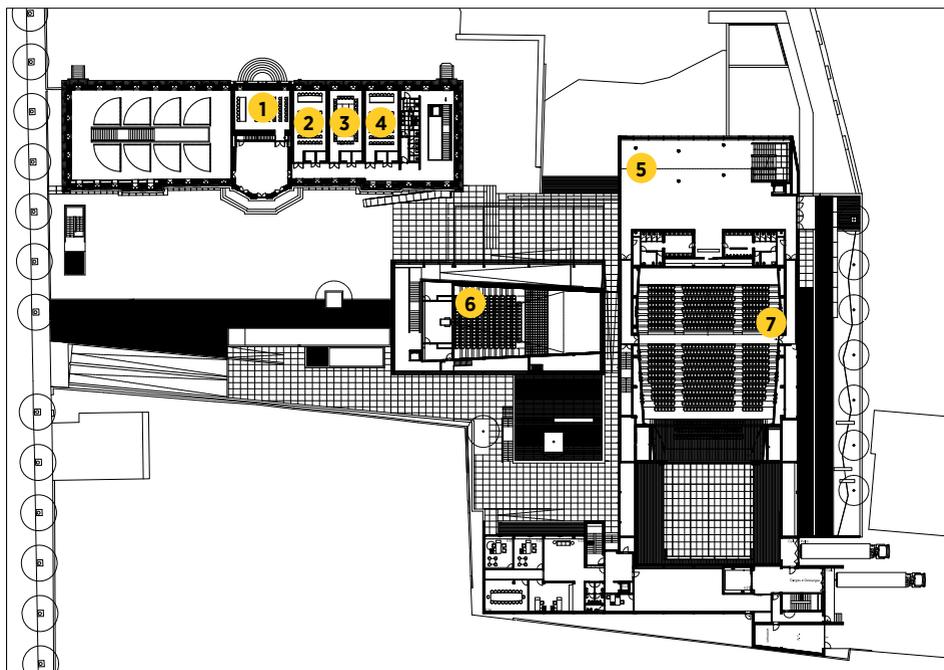




09.1. VENUE MAP - FIRST FLOOR



CENTRO CULTURAL VILA FLOR
GUIMARÃES



1

Arrábida Bridge Room
Room 1

2

Infante D. Henrique Bridge Room
Room 2

3

São João Bridge Room
Room 3

4

Freixo Bridge Slide Desk
Room 4

5

Exhibition Hall

6

D. Maria Pia Bridge Auditorium
Small Auditorium

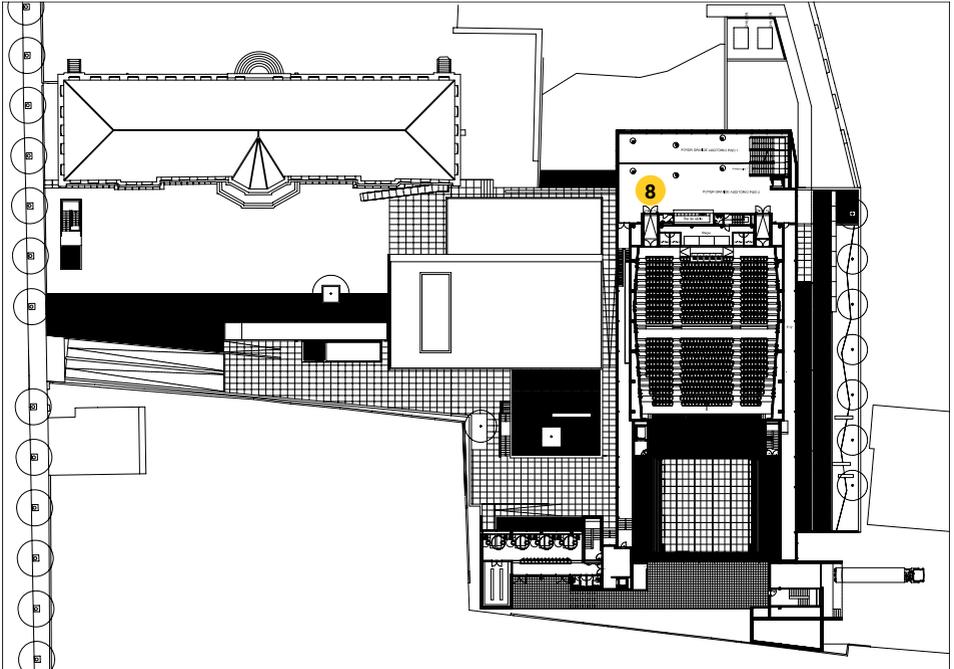
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Luiz I Bridge Auditorium
Grand Auditorium

09.2. VENUE MAP - SECOND FLOOR



CENTRO CULTURAL VILA FLOR
GUIMARÃES



8 Registration Desk / Tourism Info

09.3. THE BRIDGES OF PORTO

Luiz I Bridge

The Luiz I bridge was designed by engineer Théophile Seyrig, a disciple of Gustave Eiffel. Its construction started at the end of November of 1881 and was concluded after five years. This double-deck metal rack bridge connects the cities of Porto and Vila Nova de Gaia, spanning the river Douro. At the time of its opening in 1886, it was the longest arch bridge, with the span of 172 meters (lower deck). More recently, in 2003, the 395-meter-long upper deck was adapted for the metro system and, in 2006, to adapt this bridge for the demographic growth and increasing traffic loads, a project to enlarge the lower deck was carried out.



D. Maria Pia Bridge

The D. Maria Pia Bridge is a Double hinged arc bridge that spans the River Douro. From 1877, year of its inauguration, to 1884, its 160 metres span was the longest of its type in the world. Made of wrought iron, this bridge was designed by Gustave Eiffel and was built in less than a year by G. Eiffel & Co. Its latticework construction reproduces the later design of the renowned Eiffel Tower, erected in Paris. In 1990, the D. Maria Pia Bridge was classified as International Historic Civil Engineering Landmark by the American Society of Civil Engineers (ASCE).

Arrábida Bridge

The Arrábida Bridge is a reinforced concrete arch bridge crossing the Douro River at Porto. Designed by Edgar Cardozo, this bridge is 614-meter-long, has an arch span of 240 meters and stands 70 meters over the water level. The construction started on May of 1957 and when it was inaugurated, in 1963, it was the largest concrete arch in the world. Since 2016, the arch of the Arrábida Bridge became the only in Europe that is open for visitors.



Infante Dom Henrique Bridge

The Infante Dom Henrique bridge is a prestressed concrete bridge spanning the River Douro. With a unique design, this Maillart type arch bridge designed by Adão da Fonseca. Inaugurated in March 30th 2003, this twenty meter wide strait bridge was built to replace the upper deck lane of the Luiz I bridge, used now by the metro (Line D). The arch is 1.5 meters thick, 25 meters high and 250 meters long (span-rise ratio of 11.2), making the Infante Dom Henrique bridge one of the most elegant of its kind.



São João Bridge

In June 1991, the São João Bridge was inaugurated to replace the functionality of the still standing D. Maria Pia Bridge. This railway bridge was designed by Edgar Cardoso, is 1140 meters long (main bridge length of 500 meters) and stands 66 meters above the water level. Made of prestressed concrete, the São João Bridge is a remarkable civil engineering masterpiece, since at the time of its opening it was a world record for bridges of its kind, with the use of innovative vertical prestress and the 250 meters-long central span.

Freixo Bridge

The Freixo Bridge is an eight-span bridge made of prestressed concrete. Designed by Antonio Reis, this bridge has an overall length of 705 meters, stands 43 meters over the water level of the Douro River, and was inaugurated in 1995 as an attempt to mitigate the traffic from the bridges Arrábida and Luiz I. Nowadays, Freixo Bridge is one of the most used bridges in Porto.



10. SYMPOSIUM FORMAT

Topics are related, but not restricted, to important issues as the sustainability of the built environment, risk assessment and asset management in infrastructures.

Focus will be given to cutting-edge issues, such as Novel Management Tools for the Built Environment, Lifecycle Quality Control of New and Existing Infrastructures, and Advanced Frameworks for a Sustainable Built Environment and Risk Analysis Procedures.

Keynote Sessions will be given by renowned experts of each theme of the Symposium and will address the most innovative findings of their ongoing work.

Parallel Sessions will consist of the presentation of cutting-edge research results, technical developments on innovative and traditional methods, project and case studies presentations, as well as lessons learned and future prospects. Each contribution to these sessions consists of a paper of six to eight pages and a presentation.

Special Sessions will grant the opportunity to present developments related to a specific topic proposed by highly respected individuals on that field of research or technical practice. Each contribution to these sessions consists of a paper of six to eight pages and an oral presentation followed by an open floor discussion for the audience to participate in.

GUIDELINES FOR PRESENTING AUTHORS

Uploading of presentations

1. Please note that speakers will not be allowed to use their own laptops, tablets or other devices for the presentations.
2. Presentations must be uploaded at the Slide Desk (Freixo Bridge Room) on the day before the start of the Session. For presentations on the morning of the March 27th, upload must be made at least one hour prior to the beginning of the session. For presentation on the afternoon of the March 27th, upload must until the 12:30 of the March 27th.
3. Speakers will not be allowed to upload the Presentation by using the computers installed in the symposium rooms. Presentations must be submitted in advance by e-mail (scsecretariat@iabse2019.org) or uploaded at the Slide Desk. Acceptable presentation file formats: MS PowerPoint (ppt or pptx); Adobe Acrobat (pdf).

Submission by email: Speakers are encouraged to submit their presentation in advance by e-mail at scsecretariat@iabse2019.org. The email message should include day and time of the session, title of presentation and name of the speaker. In addition, speakers are advised to save a copy of the presentation on an USB memory pen and bring it to the conference room.

Uploading at the Slide Desk: Onsite uploading will be made available during the symposium. Presentations saved on an USB memory pen can be brought to the Slide Desk to be uploaded by the staff.

4. Regardless of the uploading procedure, speakers are required to carefully check their presentation at the Slide Desk before the session begins. Staff will assist speakers to preview their presentation to ensure a correct display.

Before your session takes place

1. Visit the symposium venue. Check the room where your session has been scheduled to and get familiarised with the space and A/V equipment.
2. Meet the Session Chairs at the session room at least 10 minutes prior to the start of the session.
3. Provide the Session Chairs with any last minute information regarding your name, title, affiliation and how you would like to be introduced.
4. The Session Chairs will inform you about the time of your presentation. The total time allocated for your presentation is 15 minutes: a 12 minute presentation followed by 3 minutes for questions and discussion.

During your session

1. Please deliver your presentation strictly within the allotted time, leaving time for questions and discussion.
2. As your presentation time nears the end, you will be alerted by the Session Chairs of the time left. Session Chairs are instructed to stop any presentation that runs over the allotted time.
3. At the end of the presentations, the Session Chairs will invite for further discussion from the audience (time permitting), therefore we encourage to remain on the room until the end of the session.

11. PROGRAMME OVERVIEW

Time	March 26 (Tuesday)	March 27 (Wednesday)	March 28 (Thursday)	March 29 (Friday)	March 30 (Saturday)
From 08:00		Registration	Registration	Registration	
09:00 09:45		Opening Ceremony	Keynote Lecture 2	Keynote Lecture 4	
09:45 10:30		Keynote Lecture 1	Keynote Lecture 3	Keynote Lecture 5	
10:30 11:00		Coffee break	Coffee break	Coffee break	
11:00 12:30		Parallel sessions	Parallel sessions	Parallel sessions	
12:30 14:00		Lunch	Lunch	Lunch	
14:00 16:00	Social tours to historical city of Guimarães	Parallel sessions	Parallel sessions	Parallel sessions	Technical Visit
16:00 16:30	Registration / BERD-FEUP WIBE Prize	Coffee break	Coffee break	Coffee break	
16:30 17:00		Parallel sessions	Parallel sessions	Closing Lecture	
17:00 18:00	Closing Ceremony				
18:00 18:30	Welcome Reception				
18:30 21:00		Happy Hour	Gala Dinner		
21:00 23:00					

Notes:

- On March 26, registration desk will take place at the Ducal Palace;
- On March 27-29, registration desk will take place on the Foyer of the Conference Venue (second floor);
- The social tours to the historical city will take place on March 26 to 29, starting at 14:00;
- The BERD-FEUP WIBE Prize has limited access (by invitation only).

12. THEMES AND TOPICS

OBJECTIVES

- Place the topic of Sustainability of the Built Environment in an International Discussion Forum
- Offer a worldwide discussion in risk assessment and infrastructure asset management with an exchange of knowledge from different stakeholders
- Discuss Performance and Costs of built environment assets, with a focus on “Zero Maintenance”
- Provide the adaptation of Young Engineers to the topics of Risk, Construction, Quality, Resilience and Management.

1. NOVEL MANAGEMENT TOOLS FOR THE BUILT ENVIRONMENT

- Infrastructure asset management
- Bridge management systems
- Management and conservation strategies of historical structures
- Maintenance, repair and retrofitting strategies

2. LIFECYCLE QUALITY CONTROL OF NEW AND EXISTING INFRASTRUCTURES

- Lifecycle performance-based design
- Lifecycle assessment of civil infrastructures
- Load carrying capacity and remaining lifetime
- Performance indicators
- Structural health monitoring
- Evaluation and assessment techniques
- Innovative inspection techniques

3. ADVANCED FRAMEWORKS FOR A SUSTAINABLE BUILT ENVIRONMENT

- Performance-based framework for structural resilience
- Adaptation to climate change and societal challenges
- Expanding structures service life
- Future structural and functional demands
- New design methods for sustainable infrastructures
- Aesthetics in structural design
- Wind and extreme load design
- Codes of practice for existing and new structures
- Strengthening and repurposing of structures
- Geotechnical design challenges
- Deterioration modelling
- Deconstruction and recycling
- Case studies

4. RISK ANALYSIS PROCEDURES, FROM THEORY TO PRACTICE

- Environmental risk assessment
- Insurance, reinsurance and management of risk
- Learning from previous errors: Forensic engineering
- Model updating, safety evaluation and reliability forecast
- Reducing risks of earthquakes and other natural hazards
- Reducing risks of fire and other man-made hazards
- Resilience of civil engineering structures
- Resilience of critical infrastructures
- Risk analysis and risk-informed decision making
- Risk perception and communication

5. FUTURE TRENDS IN STRUCTURAL ENGINEERING

- Advanced experimental testing and techniques
- Advanced numerical models and simulations
- Building Information Modelling tools
- Construction 4.0
- Information technology in structural engineering
- Innovative construction methods
- Innovative structural devices
- New materials and products
- Offshore and marine structures
- Passive and active control systems

13. KEYNOTE SPEAKERS

Wednesday, March 27 (9:45-10:30)



HOW WILL 'DIGITAL TECHNOLOGY' CHANGE ASSET MANAGEMENT IN THE RAILWAYS?

Andy Doherty

Chief Technology Officer for Network Rail, UK

Thursday, March 28 (09:00 - 09:45)



BRIDGES AND STRUCTURES: DESIGN PRACTICE AND NEW TRENDS

António Reis

*Professor of Bridges and Structural Engineering at University of Lisbon
Technical Director of GRID
International Consulting Engineers
S.A. Portugal*

Thursday, March 28 (09:45 - 10:30)



WE NEED MORE ACCURATE AND MORE USEFUL ENVIRONMENTAL ASSESSMENT OF INFRASTRUCTURE

Arpad Horvath

Professor of Civil and Environmental Engineering at the University of California, USA

Friday, March 29 (09:00 - 09:45)



RISK AND RESILIENCE OF CIVIL INFRASTRUCTURE SYSTEMS UNDER EXTREME EVENTS

Mitsuyoshi Akiyama

*Professor of Civil Engineering at Waseda University, Japan
co-author: Dan M. Frangopol
Professor of Civil Engineering at Lehigh University, USA*

Friday, March 29 (09:45 - 10:30)



DIGITAL CONSTRUCTION: BUILDING THE PRESENT - CREATING THE FUTURE, CHANGING THE WAY WE CREATE OUR BUILT ENVIRONMENT

Menno de Jonge

Director Digital Construction of Royal BAM Group, The Netherlands

14. CLOSING LECTURE

Friday, March 29 (16:30 - 17:00)



NEW TRENDS AND REQUIREMENTS IN BRIDGE AND STRUCTURAL ENGINEERING

Klaus H. Ostenfeld

Honorary Member and Fellow of IABSE, Denmark

15. SPECIAL SESSIONS

SPECIAL SESSION 1: MARCH 27 (14:00 - 16:00) - SÃO JOÃO BRIDGE ROOM

QUALITY SPECIFICATIONS AND PERFORMANCE-BASED MANAGEMENT OF HIGHWAY BRIDGES

Quality control frameworks are being implemented worldwide by bridge owners. This allows to develop a performance-based oriented management of their bridge stocks by the definition of a set of performance goals at component, system and network level and the proposal of the corresponding performance indicators.

COST Action TUI406 aims to bring together research and practicing communities in order to establish a European guideline. The session will cover not only the main results from such Action related to European initiative to the establishment of good practices and the use of quality control procedures for the life-cycle management of bridges, but also contributions from people working worldwide on this topic.



Joan R. Casas
UPC-Barcelona Tech
Spain



José Campos e Matos
University of Minho
Portugal

SPECIAL SESSION 2: MARCH 27 (16:30 - 18:00) - SÃO JOÃO BRIDGE ROOM

NOVEL ISSUES ON BRIDGES AND STRUCTURES MANAGEMENT

The main objective of this session is to discuss, among a set of worldwide experts, the current and propose novel frameworks for an economically efficient, environmentally friendly and socially reconcilable management of existing bridges and structures. It will focus the following topics:

1. data collection;
2. database modelling (including the Building Information Management (BIM));
3. performance assessment;
4. performance prediction models (incorporating the topic of risk, resilience, extreme events and climate change);
5. decision-making models and tools.



Rade Hajdin
IMC Consulting
Switzerland



José Campos e Matos
University of Minho
Portugal

SPECIAL SESSION 3: MARCH 28 (11:00 - 12:30) - INFANTE DOM HENRIQUE BRIDGE ROOM

TECHNICAL CODES ON SHM AND NDT: BRIDGING THE GAP BETWEEN RESEARCH AND APPLICATIONS

Structural health monitoring (SHM) and non-destructive testing (NDT) are strategic tools for the non-invasive assessment of the structural health state. Whilst research on these topics has seen important developments in the last 30 years, their large scale application proceeds with a slower pace.

The development of standards and guidelines can provide an effective support to designers and managers and foster the practical implementation of these technologies to real world cases.

The fib Action Group 9 is currently collecting background documents to support the formulation of a section of the MC2020 dedicated to SHM and Testing. The aim of this Special Session is to support the work of AG9 by bringing together researchers and professionals and foster discussions and further collaborations.

Potential topics of the Session include, but are not limited to: sensors, structural and damage identification, SHM supported life-cycle performance assessment, design by testing, NDT testing, SHM supported decision making, uncertainties quantification, performance indicators, case-studies.



Maria Pina Limongelli
Politecnico di Milano (PoliMI)
Italy



Alfred Strauss
Institut für konstruktiven
Ingenieurbau
Austria



Sylvia Keßler
Technical University of Munich
Germany



Helmut Wenzel
WENZEL Consulting Engineers
GmbH
Austria

SPECIAL SESSION 4: MARCH 28 (11:00 - 12:30 | 16:30 - 18:00) - SÃO JOÃO BRIDGE ROOM

FRP REINFORCEMENT FOR MORE DURABLE AND RESILIENT INFRASTRUCTURE

One of the key driving forces behind the development of innovative reinforcing solutions for concrete structures is the need for more durable infrastructure. The inherent corrosion resistance of Fibre Reinforced Polymers (FRP), along with their high strength to weight ratio, has driven the use of FRP in a wide range of civil engineering applications.

Engineers and asset owners are excited by the prospect of more durable structures, and researchers and code committees are continuously working towards the development of more refined design models to exploit fully the physical and mechanical properties of FRP.

This special session will progress the state-of-the-art and provide timely insights into the short and long term behaviour of FRP reinforced concrete structures. Topics include: cracking; deflections; bond; fatigue; durability; test methods and design models.



Maurizio Guadagnini
University of Sheffield
UK



Cristina Barris
University of Girona
Spain

SPECIAL SESSION 5: MARCH 28 (14:00 - 16:00) - INFANTE DOM HENRIQUE BRIDGE ROOM**MASONRY ARCH BRIDGES: THE CHALLENGE TO INCREASE THE LOADS AND TO EXTEND THEIR LIFE-TIME**

Masonry bridges are the backbone of the European railway network and still an important part of the road system. Therefore, not only maintenance is needed but also strengthening and retrofitting aiming at increasing the loads and improving the seismic performance. To this aim, a detailed knowledge of the bridge mechanics and of the testing and retrofitting techniques is needed to avoid economic losses originated by inadequate works.

The aim of this special session is to spread among the Structural Engineers the most up-to-date results of the scientific research in this field with the main focus on structural analysis procedures, either detailed and simplified, and on new retrofitting techniques deduced from the scientific research. Among these themes: new testing and analysis methods, assessment criteria, risk analysis, retrofitting strategies, monitoring techniques. Last not least, the cultural value of masonry bridges should never be forgotten when designing retrofitting works.



Antonio Brencich
University of Genova
Italy



Zoltan Orban
University of Pecs
Hungary

SPECIAL SESSION 6: MARCH 28 (16:30 - 18:00) - INFANTE DOM HENRIQUE BRIDGE ROOM**IMPROVED RESILIENCE OF BUILT ENVIRONMENT TO EARTHQUAKE-INDUCED LIQUEFACTION DISASTERS**

Recent events have demonstrated that earthquake-induced liquefaction events cause structural damages, which increase the total amount of losses due to the ground shaking. A resilient built environment reduces these negative effects on the community at whole.

How to effectively assess and improve resilience of built environment to earthquake events, and more in particular to earthquake-induced liquefaction events, is still a knowledge gap, which recently the scientific community is looking at.

In this context, this special session aims at bringing together contributions on recently developed methodologies to assess 1) soil liquefaction hazard, 2) vulnerability, risk and resilience of the built asset to this hazard, 3) efficiency of mitigation strategies and 4) strategic built asset management planning reducing soil liquefaction impact on structures.

The special session is open to articles presenting findings of the European H2020 project LiqueFACT (GA no. 700748) and any contribution from scholars working on these topics.



Keith Jones
Anglia Ruskin University
UK



Mariantonietta Morga
Anglia Ruskin University
UK



Carlo Giovanni Lai
University of Pavia
Italy



Claudia Meisina
University of Pavia
Italy

SPECIAL SESSION 7: MARCH 28 (16:30 - 18:00) - SÃO JOÃO BRIDGE ROOM**ASSET MANAGEMENT IN RAIL AND ROAD MOBILITY INFRASTRUCTURES**

Asset Management is not intended to direct management of assets. Anyway, it is a core competence of infrastructure maintenance and renewal with reference to the decision-making and planning processes, with the corresponding effects and connections between different dimensions in infrastructure companies – e.g. strategic planning, finance and control, purchasing and logistics, etc.

In a way, it is fair to say that Asset Management has not been implemented, having before evolved organically in the organizations preceding the modern infrastructure managers and creating the conditions for its establishment. During several years of experience in railway and road infrastructure management and operations, IP and BRISA have developed a set of asset management tools aligned with international best practices in the sector.

Asset Management develops around three pillars – Cost, Risk and Performance, well grounded in asset knowledge through the development inspection, diagnosis and planning activities.

**Rui Coutinho**

Infraestruturas de Portugal, SA
Portugal

**Carlos Biscaia Oliveira**

Brisa, SA
Portugal

SPECIAL SESSION 8: MARCH 29 (11:00 - 12:30) - ARRÁBIDA BRIDGE ROOM**STRENGTHENING OF CONCRETE AND METALLIC BRIDGES WITH FRP AND SMA MATERIALS**

There are a large number of concrete and metallic bridges, which are aging because of fatigue and corrosion damages. The increasing service loads and harsh environmental conditions make these structures even more vulnerable. There is clearly a need for studies that aim to develop feasible retrofitting methods, along with simple and safe design, for the strengthening of bridge structures.

This special session will share new research results on static and fatigue strengthening of concrete and metallic bridges using fiber-reinforced polymer (FRP) as well as shape memory alloys (SMA) and will provide a platform for researchers to discuss and compare their research results and to enhance future collaboration in this topic.

**Elyas Ghafoori**

Empa
Switzerland

**José Sena Cruz**

University of Minho
Portugal

SPECIAL SESSION 9: MARCH 29 (11:00 - 12:30) - INFANTE DOM HENRIQUE BRIDGE ROOM**FE MODEL UPDATING AS AN AVAILABLE TOOL FOR STRUCTURAL ASSESSMENT**

Finite element model updating based on the modal domain is gaining importance in the field of non-destructive identification techniques. One of its main advantages is that it can be carried out considering in-service conditions.

This method improves the accuracy of the FE models of structures based on their natural frequencies and vibration modes obtained experimentally via dynamic field tests.

The updated model allows reducing the uncertainties associated with the estimation of several physical parameters of the structure.

This session focuses in the different possibilities that this tool offers to assess the structural behaviour of structures (civil and building engineering).



Javier Alonso
Universidad de Sevilla
Spain



Pablo Pachón García
Universidad de Sevilla
Spain



Vila Flor Cultural Centre

SPECIAL SESSION 10: MARCH 29 (11:00 - 12:30) - SÃO JOÃO BRIDGE ROOM

WHY INVEST IN SHM OF CIVIL ENGINEERING INFRASTRUCTURES

Structural Health Monitoring (SHM) has been a subject of major international research in Civil Engineering structures mainly during the last 20 years.

While in the beginning, SHM mainly focused on sensor developments, nowadays practical implications regarding the acquisition, collecting and processing of data are being addressed. Indeed, SHM systems have been evolving along the two last decades and have been steadily implemented as a complement to visual inspections.

Nevertheless, the decision to invest on a SHM system should be set on evidence that a payback is given to the owners/authorities and/or to society in terms of reduced maintenance costs and/or increased structural safety. Indeed, the understanding of the value of SHM, particularly before its implementation, remains an open issue.

A novel utilization of applied decision analysis on how to assess the value of SHM is being addressed in the COST Action TU1402 - Quantifying the Value of SHM.

This approach allows to improve decision basis for design, operation and life-cycle integrity management of structures and facilitates more cost efficient, reliable and safe strategies for maintaining and developing the built environment to the benefit of society.

In this context, this special session aims to show evidence, mainly from an owner/authority perspective, of the benefit of applying SHM systems in Civil Engineering structures supported by the Value of SHM Information theory.

Hence, authors willing to submit a piece of work to this session need to keep in mind the targeted audience - owners/authorities - when structuring and writing the manuscript.

Applications of SHM systems on full scale structures are welcome, with a meaningful message, i.e. if there is a benefit or not in using this type of systems supported by the Value of SHM Information theory. Formal joint collaborations between both academia and industry, either in the manuscript and/or the oral presentation is a plus.



Helder Sousa
HSC / BRISA
Portugal



Jochen Köhler
Norwegian University of Science
& Technology, NTNU
Norway



Maria Giuseppina Limongelli
Politecnico di Milano (PoliMI)
Italy



Sebastian Thöns
Technical University of Denmark
Denmark



Ana Mandić
University of Zagreb
Croatia



Wim Courage
TNO – Innovation for life
Netherlands

SPECIAL SESSION 11: MARCH 29 (14:00 - 16:00) - D. MARIA PIA BRIDGE AUDITORIUM
SHM INFORMED DECISION MAKING FOR A RESILIENT BUILT ENVIRONMENT

Extreme events and acts of terrorism have highlighted the need for resilient communities, cities, and infrastructures that provide strategic functionalities for the society. Structural health monitoring systems may support the development of a resilient built environment by: (i) reducing risk through informed decision making, based on the integration of monitored aging conditions of the structures within the risk model; and (ii) improving recovery by prioritizing interventions, based on information available in the emergency phases following natural or man-made disasters. The aim of this Special Session is to bring together experts in SHM systems and risk management to share knowledge and foster future collaborations. The session will host contributions that cover, but are not limited to, SHM algorithms for identification and damage identification, real time monitoring systems and projects, SHM systems for multi-hazard environments, SHM supported emergency management, integration of SHM in procedures for risk assessment, Value of Information of SHM.



Maria Giuseppina Limongelli
Politecnico di Milano (PoliMI)
Italy



Dagang Lu
Harbin Institute of Technology
(HIT)
China



Michael Havbro Faber
Aalborg University (AAU)
Denmark



Paolo Gardoni
University of Illinois at
Urbana-Champaign
USA

SPECIAL SESSION 12: MARCH 29 (14:00 - 16:00) - ARRÁBIDA BRIDGE ROOM
APPLICATION OF RISK, RELIABILITY AND TREATMENT OF UNCERTAINTIES IN STRUCTURAL ENGINEERING

The role of structural engineering for the sustainable development of our society is of central importance. Engineering structures provide the functionality of the built environment and the safety of its users, and, consequently, a large proportion of the societal economic resources are invested into the continued development, maintenance and renewal of structures. For society it is of crucial importance that decisions related to structures are optimal in the sense that the benefit of structures as well as the possible adverse consequences such as loss of lives, damage to the qualities of the environment and the direct and committed costs are considered. Advanced methods for risk and reliability analysis have continuously evolved in the last decades and now offer the foundation for rational decision making. While the application of these methods is well established in some subdomains of structural engineering, like marine engineering, they are rarely used in general. In the present session, examples on the application of advanced risk and reliability based analysis will be presented. The examples are taken from real engineering projects and demonstrate the benefits of advanced analysis.



Jochen Köhler
Norwegian University of Science
& Technology, NTNU
Norway

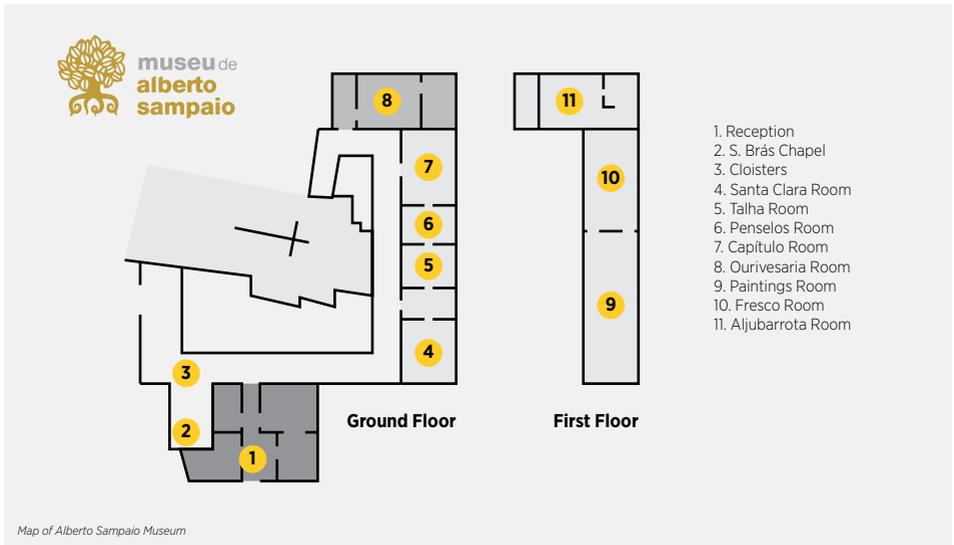
16. THE YOUNG ENGINEERS PROGRAMME

IABSE YOUNG ENGINEERS AWARDS

Any Young Engineer, who personally presents his/her paper as the main author at the Symposium, will be considered for recognition. An independent jury will select the two best contributions, and each will receive a prize of **1,000 EURO**. The prizes are offered by the IABSE Fellows and the Organising Committee and will be announced at the Closing Session of the Symposium.

IABSE HAPPY HOUR

An icebreaker challenging game bringing together two generations, Young and Senior Engineers, is proposed to the Symposium participants, composed of groups of six participants randomly selected at the registration stage. The event will be held at the **Cloisters of the Alberto Sampaio Museum** (R. Alfredo Guimarães 39, 4810-284 Guimarães) and includes a structural engineering quiz with an interactive platform, ambient music and cocktail. Awards will be granted to the best performance. The event is limited to 150 participants.



Alberto Sampaio Museum - Cloisters



Alberto Sampaio Museum

17. REGISTRATION

Registration Category	Early Bird fee	Standard Fee	On site *
	Until December 15, 2018	December 16, 2018 - until March 25, 2019	March 26, 2019
IABSE Member	600 €	700 €	800 €
Non Member	750 €	850 €	950 €
Non-Member PLUS *	770 €	870 €	970 €
COST TUI406 & Portuguese Engineers Order members	650 €	750 €	850 €
Young Participant **	300 €	350 €	400 €
Accompanying Person ***	100 €	150 €	200 €
Gala Dinner	75 €	75 €	100 €

* Includes a one year IABSE membership

** Born after 01/01/1985

*** Accompanying persons are understood to be family members only

Registration should be made on the following link:

www.iabse.org/guimaraes2019-registration

VAT IS INCLUDED IN REGISTRATION FEE:

Payments through bank transfer will be valid after payment successfully received, participant should send bank draft in order to complete registration.

Payment by credit card (VISA, American Express or Master Card) is automatically confirmed upon authorisation by the participant.

REGISTRATION FEE INCLUDES:

- Congress bag and programme & Book of Abstracts + Proceedings
- Access to all scientific sessions & Opening and Closing Ceremony
- Access to exhibition
- Lunch & coffee breaks
- Welcome reception & Happy Hour
- Social Tours in historical city - Guimarães

ACCOMPANYING PERSON FEE INCLUDES:

- Opening and Closing Ceremony
- Access to exhibition
- Lunch & Coffee breaks
- Welcome Reception
- Social Tours in historical city - Guimarães

CANCELLATION:

- Cancellation until December 15, 2018: 75% of registration fee refunded.
- Cancellation after December 15, 2018: No refund.

18. CERTIFICATE OF ATTENDANCE

Certificate of attendance will be sent by email after the Symposium.

19. WIFI ACCESS

Complimentary Wi-Fi within the Convention Centre is being provided to all Delegates and Symposium participants. The Wi-Fi (**IABSE2019GUIM**) access is **free** and no credentials are needed.

If you upload photos online or on social media, we invite you to use the hashtag: **#IABSE2019GUIM**

A Symposium App will be provided to all registered symposium participants via email and QR Code at the venue.

20. FOOD SERVICE

Coffee breaks will be served in the **Exhibition Hall**. Drinks (water, coffee and tea) will be continually available in the Exhibition Hall. Lunch will be served in the Restaurant Café Concerto, located in the **floor -1**.

Note: food restrains should be mentioned at the registration.

21. THE SOCIAL PROGRAMME

WELCOME RECEPTION

The Welcome Reception will take place on the March 26th at the Ducal Palace, an impressive Heritage site on a medieval estate that also integrates the Guimarães Castle, the Church of São Miguel and the statue of Afonso Henriques, our founder King.



MitPenha



Ducal Palace

GALA DINNER

The Gala Dinner will be held on March 28th, at MITPenha, in Guimarães. This modern construction, located in the Penha hill overlooks Guimarães.

22. THE TECHNICAL VISIT

March 20 (14:00 - 18:00)

R. do Godinho, Portaria junto do monumento Senhor do Padrão, 4450-208 Matosinhos
(GPS: 41.177308, -8.700775) - Price: **75€**



Porto Cruise Terminal

The Porto Cruise Terminal is the largest project for the consolidation of the Port of Leixões as an important gateway of the region. It is located just 3 km from the city of Porto. Since April 2011, the new pier with a length of 340 metres has received the biggest and the most glamorous cruise ships from the worldwide cruise fleet, boosting the cruise tourism in the North of Portugal region.

The visit will be done accompanied by the architect, Luis Pedro Silva, and the leader of the Engineering team, Jose Carlos Lino. This technical visit will be followed by a cruise trip to the bridges of Porto. The cruise will go up river beginning on the margins of Porto and following the Douro river within the so-called Porto Six Bridges Cruise. During this cruise, Prof. Adão da Fonseca will give a lecture about those magnificent bridges structures.



Douro River



Arrábida Bridge - Porto



D. Luis Bridge - Porto

23. ACCOMMODATION

In Guimarães it is possible to find accommodation at very competitive prices. In this segment, we can find hotels, hostels, rural tourism and local accommodation.

Examples of available hotels in Guimarães are given below:

The prices (all with breakfast included) are around:

- 3 stars - Single (30-40 euro); Double (45-45€)
- 4 stars - Single (50-65 euro); Double (60-80€)
- 5 stars equiv. historic hotels - Single (120-155€); Double (130-165€)



Hotel Toural ****

Situated in the historic center of Guimarães, Hotel Toural is equipped with internet access throughout the building via wireless networking (wireless).

Hotel de Guimarães ****

Hotel unit that combines four-star all an atmosphere of modernity and excellence in a harmonious response to the needs of comfort and customer welfare.



Hotel Fundador ***

The Hotel Fundador is a luxurious 3-star hotel is in the city of Guimarães, cultural heritage of humanity.



Santa Luzia **** ArtHotel

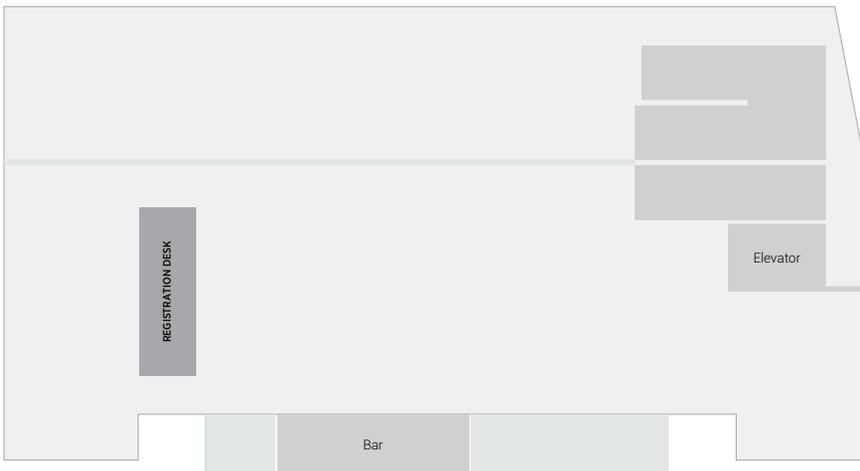
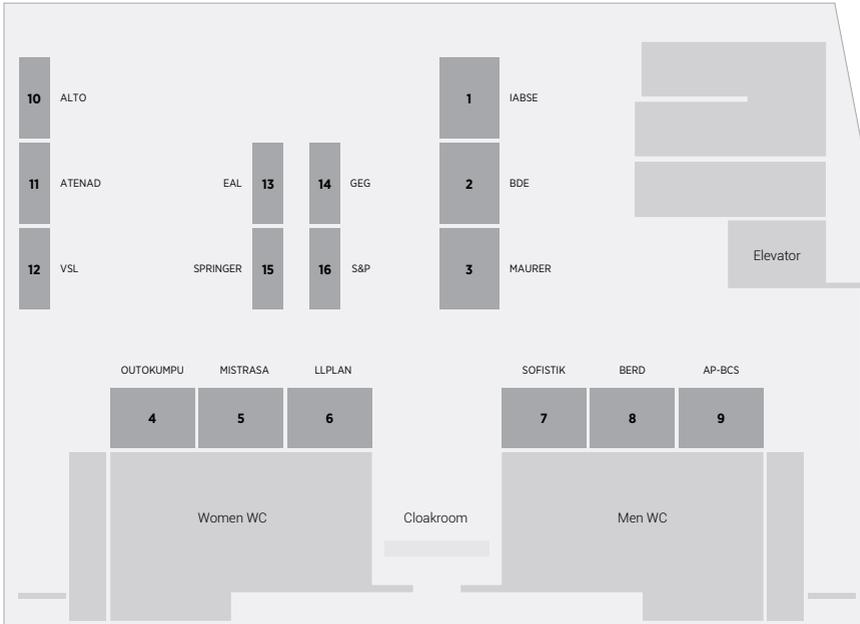
With an exceptional location in one of the oldest and typical streets of the city, the Santa Luzia combines comfort and modernity of a 4 * hotel with genuine experience to feel the daily life of this ancient city.



24. EXHIBITION

This is an excellent opportunity to present your company, products and services and to interact with key decision makers and potential new clients.

The exhibition area, located in upper and lower foyers of the Grand Auditorium of Vila Flor Cultural Centre, will be combined with the coffee break stations, an area with high traffic of delegates. The exhibition booths are presented in the following Exhibition floor plans.



25. SPONSORSHIPS

Gold Sponsorship



Silver Sponsorship



Bronze Sponsorship



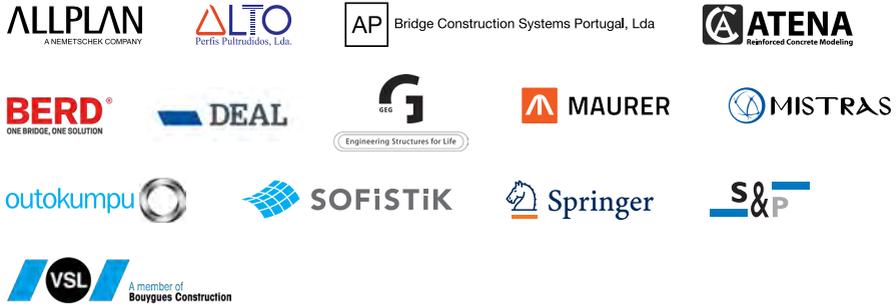
Welcome Reception



Coffee Break Sponsorship



Exhibitors



Associated Partners



International Media Partner



TECHNO-
LOGY PROTECTING
AGAINST
EARTH-
QUAKES

Photo: Hans-Joachim Braun, Ulmer Group

MAURER SIP®-Adaptive

NEWEST GENERATION SLIDING ISOLATION PENDULUM

Plan with maximum seismic protection:

Reduced starting resistance, reduced structural acceleration, reduced wear: The 3-in-1-System of MAURER SIP®-Adaptive Sliding Isolation Pendulum protects vulnerable buildings such as hospitals, schools, research institutes, government buildings and museums even better – and longer. The isolator withstands 5 MCEs.





MAURER

QUICK FACTS ABOUT MAURER SE

The MAURER Group is a leading specialist in mechanical engineering and steel construction with over 1,000 employees worldwide. The company is market leader in the area of structural protection systems (bridge bearings, expansion joints, seismic devices, tuned mass dampers, monitoring systems). It also develops and produces vibration isolation of structures and machines, roller coasters and Ferris wheels as well as special structures in steel.

MAURER participates at many spectacular projects worldwide, like for example the world's biggest structural bearings for the Signature Bridge in Wazirabad, Delhi, earthquake resistant expansion joints for the Bosphorus bridges in Turkey, semi-active tuned mass dampers for the Donau City tower in Vienna, or uplift bearings for the Zenit-Football-Arena in St. Petersburg. Among the most prestigious steel structures are the BMW World in Munich or the Terminal 2 of Munich Airport. MAURER's most spectacular amusement rides include the world's biggest transportable Ferris wheel hi-Sky in Munich, the Rip Ride Rockit Roller Coaster in the Universal Studios Orlando or the Fiorano GT Challenge in Abu Dhabi.

KURZINFO MAURER SE

MAURER SE ist ein führender Spezialist im Maschinen- und Stahlbau mit weltweit über 1.000 Mitarbeitern. Das Unternehmen ist Marktführer im Bereich Bauwerkschutzsysteme (Brückenlager, Fahrbahnübergänge, Erdbebenvorrichtungen, Schwingungsdämpfer und Monitoringsysteme). Es entwickelt und fertigt darüber hinaus Schwingungsisolierung von Gebäuden und Maschinen, Achterbahnen, Riesenräder sowie Sonderkonstruktionen im Stahlbau.

MAURER ist an vielen spektakulären Großprojekten beteiligt, z.B. den weltgrößten Brückenlagern in Wasirabad, erdbebensicheren Dehnfugen an den Bosphorus-Brücken, semiaktiven Schwingungsdämpfern im Donau City Tower oder Druck-Zug-Lagern für das Zenitstadion St. Petersburg. Im Stahlbau zählen die BMW Welt und das Flughafenterminal II in München zu den Vorzeigeobjekten. Spektakuläre Fahrgeschäfte sind z.B. das weltgrößte mobile Riesenrad hi-Sky in München, die Rip-Ride-Rokit-Achterbahn in den Universal Studios Orlando oder der Fiorano GT Challenge in Abu Dhabi.

26. TECHNICAL PROGRAMME INFORMATION

Time	March 27				
	Luiz I Bridge Auditorium (Main Auditorium)	D. Maria Pia Bridge Auditorium (Small Auditorium)	Arrábida Bridge Room (Room 1)	Infante Dom Henrique Bridge Room (Room 2)	São João Bridge Room (Room 3)
11:00 12:30	Lifecycle Quality Control of New and Existing Infrastructures 1	Future trends in Structural Engineering 1	Advanced Frameworks for a Sustainable Built Environment 1	Novel Management Tools for the Built Environment 1	Risk Analysis Procedures, from Theory to Practice 1
14:00 16:00	Lifecycle Quality Control of New and Existing Infrastructures 2	Future trends in Structural Engineering 2	Advanced Frameworks for a Sustainable Built Environment 2	Novel Management Tools for the Built Environment 2	Special Session 1: Quality Specifications and Performance-based Management of Highway Bridges
16:30 18:00	Lifecycle Quality Control of New and Existing Infrastructures 3	Future trends in Structural Engineering 3	Advanced Frameworks for a Sustainable Built Environment 3	Novel Management Tools for the Built Environment 3	Special Session 2: Novel issues on bridges and structures management

Time	March 28				
	Luiz I Bridge Auditorium (Main Auditorium)	D. Maria Pia Bridge Auditorium (Small Auditorium)	Arrábida Bridge Room (Room 1)	Infante Dom Henrique Bridge Room (Room 2)	São João Bridge Room (Room 3)
11:00 12:30	Lifecycle Quality Control of New and Existing Infrastructures 4	Future trends in Structural Engineering 4	Risk Analysis Procedures, from Theory to Practice 2	Special Session 3: Technical codes on SHM and NDT: bridging the gap between research and applications	Special Session 4: FRP reinforcement for more durable and resilient infrastructure (I)
14:00 16:00	Lifecycle Quality Control of New and Existing Infrastructures 5	Future trends in Structural Engineering 5	Risk Analysis Procedures, from Theory to Practice 3	Special Session 5: Masonry arch bridges: the challenge to increase the loads and to extend their life-time	Special Session 4: FRP reinforcement for more durable and resilient infrastructure (II)
16:30 18:00	Lifecycle Quality Control of New and Existing Infrastructures 6	Future trends in Structural Engineering 6	Risk Analysis Procedures, from Theory to Practice 4	Special Session 6: Improved resilience of built environment to earthquake-induced liquefaction disasters	Special Session 7: Asset management in rail and road mobility infrastructures

Time	March 29				
	Luiz I Bridge Auditorium (Main Auditorium)	D. Maria Pia Bridge Auditorium (Small Auditorium)	Arrábida Bridge Room (Room 1)	Infante Dom Henrique Bridge Room (Room 2)	São João Bridge Room (Room 3)
11:00 12:30	Risk Analysis Procedures, from Theory to Practice 5	Future trends in Structural Engineering 7	Special Session 8: Strengthening of Concrete and Metallic Bridges with FRP and SMA Materials	Special Session 9: FE Model Updating as an Available Tool for Structural Assessment	Special Session 10: Why invest in SHM of Civil Engineering infrastructures?
14:00 16:00	Lifecycle Quality Control of New and Existing Infrastructures 7	Special Session 11: SHM informed decision making for a resilient built environment	Special Session 12: Application of risk, reliability and treatment of uncertainties in structural engineering		

	Luiz I Bridge Auditorium (Main Auditorium)	D. Maria Pia Bridge Auditorium (Small Auditorium)	Arrábida Bridge Room (Room 1)	Infante Dom Henrique Bridge Room (Room 2)	São João Bridge Room (Room 3)
11:00 12:30	Lifecycle Quality Control of New and Existing Infrastructures 1	Future trends in Structural Engineering 1	Advanced Frameworks for a Sustainable Built Environment 1	Novel Management Tools for the Built Environment 1	Risk Analysis Procedures, from Theory to Practice 1
Co-chairs	<i>Joseph Tortorella Chandan Gowda</i>	<i>Jose Turmo Diogo Figueira</i>	<i>Túlio Nogueira Bittencourt Filipe Ribeiro</i>	<i>João Casagrande</i>	<i>Niels Peter Høj</i>
11:00 11:15	Performance-based assessment of Nahr Al-Fidar bridge <i>N. Makhoul</i>	Duplex stainless steels as a structural material for long life bridge construction <i>S.H. Mameng; A. Backhouse; J. McCray; G. Gedge; R. Södergren</i>	Towards a code of practice for the use of bio-based materials in construction <i>S.J. Farrar</i>	Framework for the management of a large stock of earth retaining structures <i>J. Amado; L. Freire; F.A. Santos</i>	Reliability evaluation of structural safety factor using a global resistance approach <i>S.H.C. Santos; M.T.R. Monteiro Jr; L.F. Marthá; C. Interlandi</i>
11:15 11:30	Uncertainty in condition prediction of bridges based on assessment method – case study in Estonia <i>S. Sein; J. Idrurm; Jose C. Matos</i>	Duplex stainless steel in infrastructure: applications, challenges and opportunities <i>N. Baddoo</i>	Evaluating the effect of climate change on snow load on structures <i>P. Croce; P. Formichi; F. Landi; F. Marsili</i>	Operation and maintenance of Osmangazi Bridge <i>F. Zeybek</i>	Assessing uncertainty in the computation of seismic failure rates due to record-selection process <i>M.A. Zanini; L.Hofer; F. Faleschini; C. Pellegrino</i>
11:30 11:45	Towards an assessment tool of anobid damage of pine timber structures <i>L. Nunes; J.L. Parracha; P. Faria; P. Palma; A. Maurício; M.F.C. Pereira</i>	Segmented footbridge made of UHPFRC <i>P. Tej; J. Mourek; M. Blank; P. Kněž</i>	Functionally graded concrete elements composed of vertical layers of different mixes <i>G. Torelli; J.M. Lees</i>	Conceptual definition of a megaproject feasibility analysis method <i>C. Mylonas; Y. Xenidis</i>	Corrosion risk assessment for structures using BS EN ISO 9223 (2012) and BS EN ISO 9224 (2012) <i>G. Gedge; E. Walport; B. Frydman</i>
11:45 12:00	Sustainability assessment of maintenance based on concrete – a systematic review <i>M. Vogel; E. Guenther</i>	Innovative construction methods of Osmangazi Bridge <i>F. Zeybek</i>	Damage detection in structures – Examples <i>I. Duvnjak; D. Damjanović; N. Sabourova; N. Grip; U. Ohlsson; L. Elfgrén; Y. Tu</i>	Life cycle cost analysis of two structural systems for buildings <i>H. Wang; G. Du; H. Hou; T.C. Buch-Hansen; C. Wang</i>	Value of information-based inspection planning using a population approach <i>M.R. Dann</i>
12:00 12:15	Assessment of roadway bridges damaged by human errors using risk indicators and robustness index <i>N. Galvão; J. Campos e Matos; D. Oliveira; C. Santos</i>	Optical methods and wireless sensors for monitoring of bridges <i>C. Popescu; B. Täljsten; T. Blanksvärd; G. Sas; A. Jimenez; D. C. Gärdin; L. Elfgrén; A. Carolin</i>	An overview on H2020 Project "ReSHEALience" <i>L. Ferrara; P. Baramonte; C.S. Falcó; F. Animato; C. Pascale; A. Tretjakov; E.C. Torregrosa; P. Deegan; S. Sideri; E.M.G. Brac; P. Serna; V. Mechtcherine; M.C. Alonso; A. Peled; R.P. Borg</i>	Transport infrastructures and asset management in Portugal: Past, present and future <i>S. Costa; V. Brito; T. Mendonça</i>	The RISCONA system: constructability appraisal through the identification and assessment of technical project risks sources <i>D. Kifokeris; Y. Xenidis</i>
12:15 12:30	Evaluating existing structures due to adjacent construction <i>J.R. Halpern; J.W. Feuerborn Jr.; L. Balsamo; J. McCoy; J. Wu</i>			The development of multi-Asset performance indicators for the management of the portuguese road and rail networks <i>J. Morgado; J. Amado; N. Carlos; M. Pinheiro</i>	Probabilistic Design for Deteriorating Reinforced Concrete Structures with Time-Variant Finite Element Analysis <i>T. Kouta; C. Bucher</i>

	Luiz I Bridge Auditorium (Main Auditorium)	D. Maria Pia Bridge Auditorium (Small Auditorium)	Arrábida Bridge Room (Room 1)	Infante Dom Henrique Bridge Room (Room 2)	São João Bridge Room (Room 3)
14:00 16:00	Lifecycle Quality Control of New and Existing Infrastructures 2	Future trends in Structural Engineering 2	Advanced Frameworks for a Sustainable Built Environment 2	Novel Management Tools for the Built Environment 2	Special Session 1: Quality Spec. and Performance-based Management of Highway Bridges
Co-chairs	<i>André Orcesi Claudia Caruso</i>	<i>João Ramôa Correia Cristina Barris</i>	<i>Mitsuyoshi Akiyama</i>	<i>Jose Romo Martin</i>	<i>Joan R. Casas José Campos e Matos</i>
14:00 14:15	Assessment and identification of concrete box-girder bridges properties using surrogate model calibration. Case study: El Tablazo Bridge <i>E.A. Baron</i>	Minimisation of maintenance-related disruption to bridge serviceability by the use of the right key structural components <i>C. Mendez-Galindo; N. Meng; C. O'Suilleabhain</i>	Multi-criteria decision analysis methods to support sustainable infrastructure construction <i>K. Ek; A. Mathern; R. Rempling; L. Rosén; C. Claesson-Jonsson; P. Brinkhoff; M. Norin</i>	The evolution of the profile of bank branches infrastructure in four districts of the city of São Paulo <i>M.A. Oneto; A. Scabbia</i>	Finding the link between visual inspection and key performance indicators for road bridges <i>A.M. Ivanković; M.K. Marić; D. Štokandić; E. Njirić; J. Šiljeg</i>
14:15 14:30	Decision analysis and scenarios for the assessment of existing timber structures <i>M. Stepinac; V. Rajčić; D. Honfi</i>	Key aspects of digital image correlation in impact tests of reinforced concrete beams <i>M. Johansson; R. Rempling; G.S.D. de Ulzurrun; C. Zanuy</i>	The 'Eco-Shed': An example of a domestic scale building constructed using the principals of the circular economy. <i>S.J. Farrar</i>	Aligning technical and financial management of public school buildings <i>F. Salvado; N. Almeida; A. Vale e Azevedo</i>	Final overview of COST Action TU1406 – Quality control of existing bridges <i>J.C. Matos; J.R. Casas; S. Fernandes</i>
14:30 14:45	Structural Impacts of Nonconformity of Concrete in a Multi-Storey Building <i>B. Favoretto Silva; C. Abdalla; M. Caetano</i>	Impact propagation effects along reinforced concrete beams <i>G.S.D. de Ulzurrun; C. Zanuy; M. Johansson; R. Rempling</i>	Building rehabilitation proposal from a sustainable and solidary approach <i>L.A. Juárez R.; S. del Pozo C.</i>	Building the world's largest high speed train arch viaducts with overhead movable scaffolding systems <i>A. Povoas; J. Delgado</i>	Categorization of classical and innovative performance indicators within road bridge management <i>A. Strauss; J.C. Matos; J.R. Casas; S. Fernandes</i>
14:45 15:00	Lifecycle Quality Control of New Locks in a Public Private Partnership setup <i>P. Žanen; T. Lambert</i>	Rate-dependency study of reinforced concrete piers with cyclic loading tests, hybrid simulations, and shake table testing <i>M. Park; C.Y. Kim; S. Choi; Y. Chae</i>	A Sustainable Timber Footbridge Complementing an Historic and Sensitive Environment <i>L. Edwards; S. Heaney; T. Harris; H.B. Pereda</i>	The future of BIM and bridge management systems <i>D. Isalović; M. Petronjević; R. Hajdin</i>	Quality control plan for road bridges – overview of COST Action TU1406 WG3 final report <i>M. Kušar; P. Linneberg; J. Amado; S. Mašović; N. Tanasić; R. Hajdin</i>
15:00 15:15	Incorporating flexibility in life-cycle analysis of infrastructure <i>S.T. Rincón; M.S. Silva; D.F. Villarraga</i>	Behaviour of laminar RC structures subjected to cyclic loading <i>R. Varma; J. Barros; J. Sena-Cruz</i>	Forensic engineering: Risks of performance-based engineering for sustainability or resilience <i>J.B. Kardon</i>	A proactive approach to the conservation of historic and cultural Heritage: the HeritageCare <i>M.J. Morais; M.G. Masciotta; L.F. Ramos; D.V. Oliveira; M. Azenha; E.B. Pereira; P.B. Lourenço; T.C. Ferreira; P. Monteiro</i>	Developing case studies for implementing COST TU1406 Quality control plan procedure for typical highway bridges <i>A. Kedar; S. Sein; N. Ademovic; P. Panetsos; P. Ryjáček; A. Duke; J.C. Matos</i>
15:15 15:30	Evaluation of the sustainability level in real estate buildings in the city of Lima, Peru <i>M.S. Regalado E.; E. D. María</i>	CFRP Strengthening of RC tensile members with stiff and soft adhesives <i>R. Sedlmair; L. Stempniewski</i>	Multi-fidelity modelling for structural identification <i>S.G.S. Pai; I.F.C. Smith</i>	Maintenance management of railway bridges and tunnels <i>A.I. Silva</i>	Inspection of existing bridges – Moving on from condition rating <i>R. Hajdin; J.R. Casas; J. Matos</i>
15:30 15:45	Reliability analysis of carbonation for recycled aggregate concretes <i>F. Faleschini; M.A. Zanini; L. Hofer</i>	Effect of bond in the development length of CFRP pretensioned beams <i>E. Toumpanaki; J.M. Lees; G.P. Terrasi</i>	SSS.infra Guideline: a new quantitative tool for the performance assessment of civil infrastructure <i>E. Anvari; L. Leardini; M. Cont</i>	Smart and resilient system for a conditioned predictive maintenance of railway infrastructures <i>G.S. Salamero</i>	Guidelines and Recommendations from COST TU1406 <i>H. Wenzel; V. Pakrashi</i>
15:45 16:00	Testing of key bridge components to ensure good life-cycle performance <i>C. Mendez-Galindo; N. Meng; C. O'Suilleabhain</i>		On the advantages in sustainability of structural concrete bubbled deck slabs <i>N. Oukaili; H. Merie</i>		Different bridge maintenance strategies and life cycle costs: Comparison of costs in Croatia, Slovenia and the Netherlands <i>S.S. Skaric; V. Stipanovic</i>

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11:00 12:30	Lifecycle Quality Control of New and Existing Infrastructures 3	Future trends in Structural Engineering 3	Advanced Frameworks for a Sustainable Built Environment 3	Novel Management Tools for the Built Environment 3	Special Session 2: Novel issues on bridges and structures management
Co-chairs	<i>Jan Bien</i>	<i>Jonathan McGormley</i>	<i>Carlos Mendez-Galindo</i>	<i>Rita Bento Hugo Patrício</i>	<i>Rade Hajdin José Campos e Matos</i>
16:30 16:45	SHM system vs. FEM model – comparison between measured and calculated data of a cable-stayed bridge <i>J. Biliszczuk; P. Hawryszków; M. Teichgraber</i>	ALLPLAN bridge - A new BIM tool tailored for bridge engineering <i>V. Samec; J. Stampler; G. Strekelj</i>	Influence of shear modulus and drift capacity on non-linear static analysis of masonry buildings <i>M.L. Beconcini; P. Cioni; P. Croce; P. Formichi; F. Landi; C. Mochi</i>	Experimental study of deformations and vibrations of beams using Unmanned Aerial Vehicles <i>E. Polydorou; D. Robinson; S. Taylor; P. McGetrick</i>	Technological developments as an answer to bridge management challenges <i>A. Orcesi; B. Godart; L. Gaillat; F. Schmidt; N. Bardou; M.P. Limongelli; P. Carreaud; F. Lenoir; F.G. Baron</i>
16:45 17:00	Bridge Health monitoring using accelerometer responses to passing traffic <i>E. Obrien; D. McCrum; M.A. Khan</i>	Optimum design of long-span cable-supported bridges using robustness index <i>M. Shoghjavian; U. Starossek</i>	Increase of the working life of expansion joints thanks to the use of innovative solutions <i>L. Paroli</i>	Assessment of the seismic response of isolated bridges under extra-stroke displacement demands <i>M. Furinghetti; A. Pavese</i>	Changeability as an alternative to traditional design <i>D.F. Villarraga; S. Torres; M. Sánchez Silva</i>
17:00 17:15	Quality control index survey for railway bridge health monitoring <i>A.C. Neves; J. Leander; I. González; R. Karoumi</i>	New launching method of composite steel-concrete decks for replacing two bridges in Luxembourg <i>J.J.O. Pedro; A. Salmon</i>	Reconstruction of Wangduephodrang Dzong, Bhutan – protecting the heritage and improving earthquake resilience <i>A. Galmarini; N. Dorji</i>	Detection of sparse damages in structures <i>N. Sabourova; N. Grip; U. Ohlsson; L. Elfgrén; Y. Tu; I. Duvnjak; D. Damjanović</i>	Method for sustainable large-scale bridges survey <i>A. Pucci; M.L. Puppino; L. Giresini; H.S. Sousa; J.C. Matos; M. Sassu</i>
17:15 17:30	Application of a model-free ANN approach for SHM of the Old Lidingö Bridge <i>S.M.S. Lajevardi; J.C. Matos; P.B. Lourenço</i>	Coura and Valença bridges on Minho railway line – old structures, updated performance <i>M. Guimarães; A. Teixeira</i>	A review on wall-to-timber floor anchorages in URM buildings <i>E. Solarino; D.V. Oliveira; L. Giresini</i>	Geometrical characterization of Yucatan churches <i>I. Perez; G. Vasconcelos; P.B. Lourenço</i>	Deep learning based active monitoring for anti-collision between vessels and bridges <i>L. Chen; Y. Xia; D. Pan; C. Wang</i>
17:30 17:45	Research on cable safety based on monitoring data and time-dependent reliability <i>N. Hou; L. Sun</i>	Modelling the construction of cable stayed bridges stressed with the strand by strand technique <i>J.A. Lozano-Galant; J. Turmo</i>	Loko Oweto bridges on the Benue River, Nigeria <i>M.B. Petri</i>	In-plane seismic performance of plain and TRM-strengthened rammed earth components <i>R. Allahvirzideh; D.V. Oliveira; R.A. Silva</i>	Use of BIM in rehabilitation and sustainability of the built heritage <i>H. Sousa; C. Sguazzo; M. Cabaleiro</i>
17:45 18:00			Conceptual design of bridges and sustainability <i>J. Romo</i>		infFaros – Road infrastructure management system for research and practice <i>R. Hajdin; F. Schiffmann</i>

	Luíz I Bridge Auditorium (Main Auditorium)	D. Maria Pia Bridge Auditorium (Small Auditorium)	Arrábida Bridge Room (Room 1)	Infante Dom Henrique Bridge Room (Room 2)	São João Bridge Room (Room 3)
11:00 12:30	Lifecycle Quality Control of New and Existing Infrastructures 4	Future trends in Structural Engineering 4	Risk Analysis Procedures, from Theory to Practice 2	Special Session 3: Technical codes on SHM and NDT: bridging the gap between research and applications	Special Session 4: FRP reinforcement for more durable and resilient infrastructure (1)
Co-chairs	<i>Hélder Sousa Chandan Gowda</i>	<i>Bruno Briseghella Diogo Figueira</i>	<i>Thomas Vogel</i>	<i>Maria Pina Limongelli Alfred Strauss</i>	<i>Maurizio Guadagnini Cristina Barris</i>
11:00 11:15	Numerical analysis of techniques to extract bridge dynamic features from short records of acceleration <i>A. González; K. Feng; M. Casero</i>	Numerical study on rectangular hollow section beam to column connections <i>P. Chomchuen; P. Kaewmanee</i>	Management of risk of exceeding design loads for reinforced concrete highway bridges <i>A.I. Vasilyev</i>	Implementation of COST Action TU1406 Quality Control framework as a part of bridge management system in Saint Lucia <i>S. Sein; K.M. Sirvio</i>	Fire tests on the pre-cast concrete sandwich walls with GFRP connectors <i>M.M. Haffke; M. Pahn; C. Thiele</i>
11:15 11:30	Prediction of chloride profiles and discussion of time variant alterations <i>F. Binder</i>	Numerical modeling of a resilient hinge (RH) for accelerated bridge constructions <i>K. Katakalos; P. Kagioglou; S. Mitoulis</i>	Bridge failures analysis as a risk mitigating tool <i>A. Syrkov</i>	The new French interactive guide for investigations on structures <i>B. Godart; C. Aubagnac</i>	Overview of AASHTO design specifications for GFRP-RC bridges 2nd edition: Toledo Bridge as case study <i>M. Rossini; A. Nanni; F. Matta; S. Nolan; W. Potter; D. Hess</i>
11:30 11:45	Forced time-transient response analysis of acoustic emission signals in bridge cables based on semi-analytic finite element method <i>K. Wan; L. Sun; Y. Yang</i>	Numerical assessment of shear connection for steel and concrete composite floors <i>T. Lima; I. Valente</i>	A qualitative prioritization of the risks imposed on bridges due to climate change <i>A. Nasr</i>	Non-destructive testing in civil engineering: A valuable source of information for reliability assessments <i>S. Küttenbaum; S. Maack; A. Taffe; T. Braml</i>	Durability of glass FRP reinforcing bars: A state of the art <i>T. D'Antino; M.A. Pisani</i>
11:45 12:00	"Autopista Urbana Siervo de la Nación"- Flyover at México City Lake Zone <i>A. Campos e Matos; J.L. Barbosa; M. Durão; R. Leite</i>	Models for evaluating shear strength on members with circular cross section <i>J. Turmo; G. Ramos; A.C. Aparicio</i>	Define urban limit conditions by applying performance goals <i>A. Basaglia; E. Spacone; G. Brando; A. Gonzalez; A. Aprile</i>	Retrofitted corrosion monitoring in cracked concrete of infrastructure buildings <i>F. Hiemer; S. Keßler; C. Gehlen</i>	Influence of the local bond stress distribution of FRP rebars on the anchorage in concrete <i>C. Caspari; M. Pahn</i>
12:00 12:15	Overview on performance predictive models – Application to Bridge Management Systems <i>M. Santamaria; J. Fernandes; J.C. Matos</i>		General approach to safety and risk management in bridge construction <i>J. Soares; P. Pacheco; H. Coelho; A. Resende; D. Carvalho; A. Torres</i>	Toward the development of standardized procedures for structural health monitoring <i>M.P. Limongelli</i>	Pull-out capacity of GFRP connectors in the edge area of precast concrete sandwich walls <i>S. Carstens; M. Pahn</i>
12:15 12:30	Intelligent, sustainable and integrated system of management of structures <i>M.M. Royes; L.G. Gil; A.P. Caldentey; J.G. Vila; A.C. Lasso; O.M. Navascues</i>		New specific approaches in Romania regarding the code for historic building structures with respect to multiple hazard and fracturing theories <i>M. Mironescu; A.M. Stanescu; T. Brotea; R.F. Comanescu; D.D. Purdea; M.V. Stanescu</i>	Structural health monitoring of a masonry viaduct with Fibre Bragg grating sensors <i>H. Alexakis; A. Franza; S. Acikgoz; M. DeJong</i>	Durability of GFRP bars with different bar diameter <i>M.L. Keller; M. Pahn</i>

	Luiz I Bridge Auditorium (Main Auditorium)	D. Maria Pia Bridge Auditorium (Small Auditorium)	Arrábida Bridge Room (Room 1)	Infante Dom Henrique Bridge Room (Room 2)	São João Bridge Room (Room 3)
14:00 16:00	Lifecycle Quality Control of New and Existing Infrastructures 5	Future trends in Structural Engineering 5	Risk Analysis Procedures, from Theory to Practice 3	Special Session 5: Masonry arch bridges: the challenge to increase the loads and to extend their life-time	Special Session 4: FRP reinforcement for more durable and resilient (II)
Co-chairs	<i>Elsa Caetano</i>	<i>Jorge Branco</i>	<i>Sérgio Hampshire Santos</i>	<i>Antonio Brencich Zoltan Orban</i>	<i>Maurizio Guadagnini Cristina Barris</i>
14:00 14:15	São Vicente suspension bridge rehabilitation and cable substitution <i>R. Timerman</i>	Necessity and invention: Leveraging a megaproject to advance the use of computational design <i>Z. Kostura; M.C.J. Clark; J.R. Olson</i>	Seismic risk assessment of an old RC frame-wall building in Lisbon <i>C. Caruso; R. Bento; J.M. Castro</i>	Discrete-continuum approach to assess 3D failure modes of masonry arch bridges <i>B. Pulatsu; E. Erdogmus; P.B. Lourenço</i>	Deformation and cracking behaviour of concrete beams reinforced with glass fibre-reinforced polymer bars <i>G. Kaklauskas; E. Timinskas; P.L. Ng; A. Sokolov</i>
14:15 14:30	Experimental validation of the FE model for dynamic analysis of a composite railway viaduct's deck slab <i>J. Malveiro; C. Sousa; R. Calçada; D. Ribeiro</i>	Analysis of BIM methodology implementation in structure projects <i>A.Z. Sampaio</i>	Reliability of a bridge subjected a multi-hazard: Scour and earthquakes <i>B.A. Olvera Ramirez; B. Olmos; J.M. Jara</i>	Uncertainty sources in the structural assessment of masonry arch bridges: A case study of a single-span stone arch bridge <i>B. Conde; B. Riveiro; M. Cabaleiro; J.C. Caamaño; G.E. Stavroulakis</i>	Crack spacing model for FRP reinforced concrete beams based on stress-transfer approach <i>G. Kaklauskas; P.L. Ng; A. Sokolov</i>
14:30 14:45	Testing existing structures – Compressive strength and tensile splitting strength of the Lahntal Bridge Limburg <i>D. Gebauer; S. Marx; G. Schacht</i>	Digital workflows vs. spatial structures design <i>M. Luczkowski; S.H. Dwyik; J.H. Mork; A.N. Rønquist</i>	Seismic vulnerability assessment of masonry buildings through BIM <i>E. Ambrassa; A. Comune; S. Podestà; L. Diana; P. Lestuzzi</i>	Measurement errors in vision based displacement monitoring of masonry bridges <i>S. Acikgoz; M.J. DeJong; K. Soga</i>	A review on experimental flexural cracking in FRP reinforced concrete members <i>C. Barris; P. Zubillaga; L. Torres</i>
14:45 15:00	Risk identification and remedials for concrete bridges and buildings <i>J.G.M. Wood</i>	BIM practical application new Bugesera international airport (RWANDA) <i>J. Soares; H. Marques; J. Oliveira; A. Araújo</i>	Seismic vulnerability assessment of multi span reinforced concrete bridges in Republic of Macedonia <i>M. Vitanova; V. Hristovski; E.D. Jovanovska</i>	A low-cost retrofitting technique for masonry arch bridges: experimental validation <i>A. Brencich; D. Pera</i>	Modelling the temperature effects at the interface between GFRP bar and concrete <i>A. Veljkovic; V. Carvelli; S. Solym; G.L. Balázs; M. Rezagadeh</i>
15:00 15:15	Effects of median strip connecting twin bridges on dynamic performance <i>H. Wu; Y. Xia; X. Yi; P. Sun</i>	Roadway deck of a marine terminal facility in Egypt <i>J.J.O. Pedro; J. Dámaso; L.V. Durmen; H.V. Meulen</i>	Traditional techniques on masonry buildings that improve performance under seismic risk <i>M.B.C. Reis; J.M. Mascarenhas; J.F. Branco</i>	An innovative approach for the assessment of masonry bridges based on two new limit analysis theorems <i>G. Stagnitto; A. Pederzani</i>	Bond behaviour of chemically prestressed textile reinforced concrete <i>K. Zdanowicz; B. Schmidt; H. Naraniecki; S. Marx</i>
15:15 15:30	Dynamic identification and collapse assessment of Rubbianello Bridge <i>L. Ragni; F. Scozzese; E. Tubaldi; F. Gara</i>	Bending test of a composite steel-timber beam jointed by bolts <i>M. Fujita; M. Ohtaki; M. Iwata</i>	Seismic fragility assessment of RC high-rise buildings in Montenegro <i>J.R. Pejovic; N.N. Serdar; R.R. Pejovic; M. Knezevic; M. Cvetkovska</i>	Contributions for experimental and numerical characterization of the structural behaviour of stone arch bridges <i>C. Costa; A. Arède; A. Costa; R. Calçada</i>	A novel approach to residual stiffness analysis of flexural concrete elements with composite reinforcement <i>V. Grilbniak; A. Sokolov; A. Rimkus; H.A. Sultani; M.C. Tuncay; L. Torres</i>
15:30 15:45	Chilean performance indicator by region applied to road bridges <i>M. Valenzuela; M. Marquez; L. Acuña; K. Zuñiga; C. Barraza</i>	Finansparken Bjergsted: An innovative timber-framed office building <i>M. Rando; G. Mo; K. Overton; F. Ibáñez; M. Sánchez-Solis</i>	Seismic risk assessment of RC curved bridges through fragility curves <i>N. Serdar; J. Pejovic; R. Pejovic; M. Knezevic</i>	Structural analysis of a stone arch bridge under incremental railway static loadings <i>R. Silva; C. Costa; A. Arède; R. Calçada; D. Oliveira</i>	Influence of elevated temperatures on the bond behaviour of GFRP bars to concrete – pull-out tests <i>I. Rosa; J. Firmo; J.R. Correia; P. Mazzuca</i>
15:45 16:00	Portal and cantilever sign/signal gantries – Inspection and retrofitting <i>T. Mendonça; V. Brito; M. Almeida</i>	Lateral tests on a two-story CLT house <i>J. M. Branco; F.T. Matos; P.B. Lourenço; T. Demschner; P. Rocha</i>		Structural assessment of masonry arch bridges with settled supports <i>P. Zampieri; M.A. Zanini; F. Faleschini; L. Hofer; N. Simoncello; C. Pellegrino</i>	

	Luiz I Bridge Auditorium (Main Auditorium)	D. Maria Pia Bridge Auditorium (Small Auditorium)	Arrábida Bridge Room (Room 1)	Infante Dom Henrique Bridge Room (Room 2)	São João Bridge Room (Room 3)
16:30 18:00	Lifecycle Quality Control of New and Existing Infrastructures 6	Future trends in Structural Engineering 6	Risk Analysis Procedures, from Theory to Practice 4	Special Session 6: Improved resilience of built environment to earthquake-induced liquefaction disasters	Special Session 7: Asset management in rail and road mobility infrastructures
Co-chairs	<i>Heikki Lilja Pawel Hawryszków</i>	<i>Bruno Godart Rita Moura</i>	<i>Dawid Wisniewski</i>	<i>Keith Jones Mariantonietta Morga</i>	<i>Rui Coutinho Carlos Biscaia Oliveira</i>
16:30 16:45	A study on efficiency improvement of diagnosis in maintenance of highway bridge deck <i>H. Yokoyama; Y. Maki; H. Masuya; K. Kakuma</i>	3-D-Printing with Steel: Additive Manufacturing of Connection Elements and Beam Reinforcements <i>J. Lange; T. Feucht</i>	Nonlinear static analysis by finite elements of a Fujian Hakka Tulou <i>B. Briseghella; V. Colasanti; L. Fenu; C. Nuti; E. Spacone; H. Varum</i>	Earthquake-induced soil liquefaction risk: Macrozonation of the European territory taking into account exposure <i>C.G. Lai; D. Conca; C. Meisina; R. Boni; F. Bozzoni</i>	Risk based approach in maintenance planning in the context of road and railway infrastructure <i>H. Patricio</i>
16:45 17:00	The diagnostic techniques for the assessment of the historical steel bridges <i>P. Ryjáček</i>	The effect of loading direction on the compressive behaviour of a 3D printed cement-based material <i>B. Zahabizadeh; V.M.C.F. Cunha; J. Pereira; C. Gonçalves</i>	Robustness: a practitioner's perspective <i>P. Tanner; R. Hingorani</i>	Guidelines and codes for liquefaction mitigation by ground improvement <i>G. Modoni; P. Croce; R. Proia; R.L. Spacagna</i>	Railway track asset management, from long-term vision to completion <i>A. Grossinho</i>
17:00 17:15	Protection coating of metal bridges <i>H.S. Fernandes</i>	Development of cement-based mortars for 3D printing through wet extrusion <i>B. Zahabizadeh; V.M.C.F. Cunha; J. Pereira; C. Gonçalves</i>	A scenario-based procedure for structural robustness assessment <i>M. El Hajj Diab; A. Orcesi; C. Desprez; J. Bleyer</i>	The LRG Software for liquefaction mitigation planning and decision support <i>A. Meslem; H. Iversen; D. Lang; T. Kaschwich; S.L. Drange; K. Jones</i>	Infraestruturas de Portugal experience on developing a strategic asset management plan <i>M.M. Pinheiro</i>
17:15 17:30	Inspection and short, medium and long-term monitoring of a historic Brazilian bridge <i>A.B. Colombo; R. Freitas; A.P.C. Neto; R.P. Hune; T.N. Bittencourt</i>	Innovative green roof with high water retention and durability <i>T. Cornelius; G. Du; D.J. Duffus</i>	Mode specific evacuation planning in infrastructure risk management <i>B. Rutten; S. Bollars</i>	Toolkit for resilience assessment of critical infrastructures to earthquake-induced soil liquefaction disasters <i>M. Morga; K. Jones</i>	Brisa's journey on asset management system modelling <i>C.B. de Oliveira</i>
17:30 17:45	Chelsea Bridge - The assessment of a 1937 self-anchored suspension bridge <i>L. Loewenthal; D. Collings</i>		Displacements needed for collapse in masonry arches <i>J. Antuña; J.I. Hernandez; F. Magdalena; A. Aznar</i>	Experimental evidences of the effectiveness of some liquefaction mitigation measures <i>E. Blotta; A. Chiardonna; G. Fasano; A. Flora; L. Mele; V. Nappa; S. Lirer; V. Fioravante</i>	Asset management practical approach to decision making - Brisa Experience - "Brisa's model for life cycle performance monitoring and decision-making process <i>C. Oliveira</i>
17:45 18:00	Multi-level classification of bridge defects in asset management <i>J. Bień; M. Gładysz-Bień</i>		Judgement methods of fire resistance time of hybrid reinforced concrete beams <i>J. Tian; W. Qu</i>	Cost-benefit analysis of liquefaction mitigation strategies <i>K. Jones; M. Morga; N. Wanigarathna; F. Pascale; L. Yarovaya</i>	Brisa Experience - Risk assessment and capital investment planning at Brisa <i>S.S. Santiago</i>

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11:00 12:30	Risk Analysis Procedures, from Theory to Practice 5	Future trends in Structural Engineering 7	Special Session 8: Strengthening of Concrete and Metallic Bridges with FRP and SMA Materials	Special Session 9: FE Model Updating as an Available Tool for Structural Assessment	Special Session 10: Why invest in SHM of Civil Engineering infrastructures?
Co-chairs	<i>Luis Oliveira Santos</i>	<i>Daniel Oliveira</i>	<i>Elyas Ghafoori</i> <i>José Sena-Cruz</i>	<i>Javier Jiménez Alonso</i> <i>Pablo Pachón García</i>	<i>Helder M. Sousa</i> <i>Jochen Köhler</i>
11:00 11:15	An infrastructure management system for railway bridges: overview and application to a case study <i>J. Fernandes; M. Santamaria; J.C. Matos; D.V. Oliveira; L. Costa; A.A. Henriques</i>	Structural performance of the church of São Miguel de Refojos <i>R. Ramirez; N. Mendes; P.B. Lourenço</i>	CFRP strengthening and long-term monitoring of an old metallic roadway bridge in Melbourne <i>E. Ghafoori; A. Hosseini; R. Al-Mahaidi; X.L. Zhao; M. Motavalli; Y.C. Koay</i>	Determining the best Pareto-solution in a multi-objective approach for model updating <i>M. Infantes; J. Naranjo-Pérez; A. Sáez; J.F. Jiménez-Alonso</i>	Case studies for quantifying the value of structural health monitoring information: lessons learnt <i>S.Thöns; W.J. Klerk; J. Köhler</i>
11:15 11:30	Infrastructure Public Private Partnership Implementation and Risk Management – Lessons from Albanian Approach <i>J. Keçi</i>	Assessment of the connection properties of a prefabricated wooden sandwich panel under static and cyclic loads <i>D.P. Pasca; C. Myhrvold; R. Tomasi; O.A. Høibø; A.Q. Nyrud</i>	Behaviour of RC structures strengthened with prestressed CFRP laminates: a numerical study <i>J. Sena-Cruz; L. Correia; P. França</i>	Probabilistic finite element model updating of civil engineering structures: A comparative study <i>J.F. Jiménez Alonso; E.J. Hudson; A. Pavic; A. Sáez</i>	A pro-active concept in asset management supported by the quantified value of structural health monitoring <i>H. Sousa; A. Rozsas; A.Slobbe; W. Courage</i>
11:30 11:45	Extending Service Life Expectation by Restoration and Strengthening Concrete Structure of Åland Maritime Museum in Finland <i>K.C. Avellan; E. Belopotocanova</i>	Design of freeform gridshell structures – Simplifying the parametric workflow <i>S.H. Dyvik; M. Luczkowski; J.H. Mork; A. Rønnquist; B. Manum</i>	A novel loading arrangement to evaluate EB-FRP strengthening schemes <i>K. Katakalos; G.C. Manos</i>	Finite element model updating of a grandstand as basis to assess its vibration serviceability limit state <i>J. Naranjo-Pérez; A. Sáez; J.F. Jiménez-Alonso; N. González-Gómez; F. García-Sánchez</i>	Quantifying the value of B-WIM: Assessing costs and benefits for value of information analysis <i>D. Skokandić; A.M. Ivanković; A. Žnidarić; S. Thöns</i>
11:45 12:00	Active protection system for Main cable of suspension bridge against HGV or Hazardous material fires <i>M. Inoue; Y. Takai; M. Yanagihara; M. Durmaz; A. Kara; I.B. Kroon</i>	Assessment of current design guidelines for vertical ties in relation to progressive collapse of RC structures <i>D. Droogné; W. Botte; R. Caspeele</i>	Ribbed iron-based shape memory alloy bars for pre-stressed strengthening applications <i>B. Schranz; C. Czaderski; M. Shahverdi; J. Michels; T. Vogel; M. Motavalli</i>	Ambient vibration testing, dynamic identification and model updating of a historical bridge <i>P. Pachón; E. García; V. Compán; R. Castro</i>	An information value guide for infrastructure design and operation executives – fundamental idea & concept <i>H. Sousa; H. Wenzel; S. Thöns</i>
12:00 12:15	Development of Fragility Curves for Multi-Span RC Bridges using Generalized Pushover Analysis <i>C. Perdomo; R. Monteiro; H. Sucuoğlu</i>	Electrical resistivity of sustainable fiber reinforced concretes for smart marine structures <i>I. Pereira; E. Pereira; T. Miranda</i>	Finite element modelling of FRP-strengthened structural elements <i>T. Zhelyazov</i>	A hybrid UKF-MGA algorithm for finite element model updating of historical constructions <i>J. Naranjo-Pérez; A. Sáez; J.F. Jiménez-Alonso; P. Pachón; V. Compán</i>	Value of site-specific information for the design of offshore wind farms <i>J.M. Espinosa; J. Köhler</i>
12:15 12:30	Influence of local scour at multiple piers on the vibration characteristics of a bridge under seismic excitation <i>A. Anžlin; L.J. Prendergast</i>	Monitoring of pedestrian patterns of an office floor under normal walking activity <i>Z.O. Muhammad; P. Reynolds</i>	Strengthening of steel beams using iron-based shape memory alloy (Fe-SMA) strips <i>M. Izadi; E. Ghafoori; A. Hosseini; J. Michels; M. Motavalli</i>		

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14:00 16:00	Lifecycle Quality Control of New and Existing Infrastructures 7	Special Session 11: SHM informed decision making for a resilient built environment	Special Session 12: Application of risk, reliability and treatment of uncertainties in structural engineering
Co-chairs	<i>Joaquim Barros Luís Correia</i>	<i>Maria Pina Limongelli Dagang Lu</i>	<i>Jochen Köhler</i>
14:00 14:15	Torsional strengthening of thin-walled tubular reinforced concrete structures using NSM-CFRP laminates: Experimental work <i>C.C. Gowda; J.A.O. Barros; M. Guadagnini</i>	Osmangazi bridge structural health monitoring system <i>F. Zeybek</i>	Fatigue accumulation comparison of simulated traffic flow and design loads <i>T. Lunabba; M. Ranta; K. Julku; H. Lillja</i>
14:15 14:30	Long-term structural and durability performances of RC elements strengthened in flexure with CFRP laminates: a research project <i>J. Sena-Cruz; J.R. Cruz; L. Correia; S. Cabral-Fonseca; J. Michels; C. Czaderski</i>	Using data-interpretation to enhance post-seismic decision making at urban scale <i>Y. Reuland; L. Diana; P. Lestuzzi; I.F.C. Smith</i>	Risk and reliability based design – practical examples and challenges for standardisation <i>J. Köhler</i>
14:30 14:45	Cementitious adhesives for NSM carbon laminate strengthening system with treated surfaces <i>R.M. Firouz; E.N.B. Pereira; J.A.O. Barros</i>	Structural health monitoring for cultural heritage constructions: a resilience perspective <i>M.P. Limongelli; Z.I. Turksezer; P.F. Giordano</i>	Risk acceptance criteria for extreme fjord crossings <i>I.L. Johansen; T. Askeland</i>
14:45 15:00	Role of maintenance in reducing building vulnerability to extreme events <i>L. Pham; E. Palaneeswaran; R. Stewart</i>	Value of information in resilience management of infrastructure systems <i>J. Qin; M.H. Faber; M. Liu; W. Zhang; D. Lu</i>	Suitable degree of crudeness in engineering practice <i>I. Björnsson; O.L. Ivanov; D. Honfi; H. Gabrielsson; M. Fröderberg; T. Lechner</i>
15:00 15:15	Change of load-carrying capacity of real bridge structure due to modified reliability levels and planned remaining lifetime <i>P. Kotes; J. Vican; J. Prokop</i>	Continuous monitoring system of metro lines to assess long-term behaviour of massive train wheels <i>E. Pistone; H. Töll; T. Hauser</i>	Life cycle costs. The importance of the users' costs <i>J.C. Almeida; J. de Brito; P. Cruz</i>
15:15 15:30	Structural restoration and reinforcement of desengano bridge <i>R.V. Alves; M.S.P.L. Perlingeiro; F.M. de Souza Judice</i>	3D discrete macro-modelling approach for masonry arch bridges <i>I. Calio; S. Caddemi; F. Cannizzaro; D. D'Urso; G. Occhipinti; B. Pantò; D. Rapiavoli</i>	Performance indicators for cost-benefit analysis applied to investment projects <i>M.J. Falcão Silva; F. Salvado; P. Couto; M. Baião</i>



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