

# 12<sup>th</sup> International Probabilistic Workshop

## November 4<sup>th</sup> - 5<sup>th</sup>

### Programme

Bauhaus-  
Universität  
Weimar

**Deltares**  
Enabling Delta Life 

**dynardo**  
dynamic software & engineering





## Welcome

It is with great pleasure that we welcome you to Weimar and to our Symposium "12<sup>th</sup> International Probabilistic Workshop".

In the previous years a series of probabilistic workshops on safety and risk in civil engineering were organized starting in 2003/2004 in Dresden, followed 2005 in Vienna, 2006 in Berlin, 2007 in Ghent, 2008 in Darmstadt, 2009 in Delft, 2010 in Szczecin, 2011 in Braunschweig, 2012 in Stuttgart and 2013 in Brno. We will continue this series with the 12th probabilistic workshop which will take place on 04<sup>th</sup> and 05<sup>th</sup> November 2014 at Bauhaus- University Weimar, Germany. The workshop is organised jointly by Bauhaus-University Weimar (Germany), Deltares (The Netherlands), University of Natural Resources and Applied Life Sciences (Austria) and Dynardo GmbH (Germany).

Safety, reliability and risk are key issues in a world with continuously increasing complexity. Road and railway accidents, tunnel fires or natural hazards like hurricanes, floods or earthquakes show the vulnerability of our technical facilities and the natural and social environment. Therefore the consideration of safety and risk is without doubt a very important issue during the design of technical facilities, such as civil engineering structures and infrastructure works. Questions about the analysis and treatment of safety and risk arise, as well as questions about optimal safety levels or questions about acceptable values.

The conference programme consists of 37 papers from international researchers and four invited internationally renowned key note speakers. The conference program is the result of the enthusiasm and efforts of our keynote lecturers and the authors who have contributed with their papers to this symposium. All these initiatives and efforts are gratefully acknowledged.

We believe that we have brought together all the main ingredients for a successful and worthwhile conference. We hope you all enjoy the conference and wish you welcome to pleasant days during the 12<sup>th</sup> International Probabilistic Workshop 2014.

Frank Werner, Maximilian Huber, Tom Lahmer,  
Thomas Most, Dirk Proske  
IPW 2014 committee

This Symposium is organized by four institutions: The **Bauhaus-University Weimar** (Germany), the **University of Natural Resources and Life Sciences Vienna** (Austria) and the companies **Dynardo** (Germany) and **Deltares** (The Netherlands). All four share knowledge on up to date technologies, methodologies and approaches in the field of stochastic simulations and modeling of situations in engineering and natural sciences, which are dominated by effects sharing a strong random character.

With faculties and areas of study such as Architecture, Art and Design, Civil Engineering and Media, the **Bauhaus-University Weimar** has a distinctive identity. The Bauhaus-University Weimar has become well-known for its wide range of teaching and research activities based on civil engineering and architecture-oriented disciplines. One major research field in the Faculty of Civil Engineering is devoted to the assessment of the qualities of coupled partial models, through the Research Training Group 1462, funded by the German Research Foundation (DFG) since 2008.

**Deltares** is an independent, institute for applied research in the field of water, subsurface and infrastructure. Throughout the world, we work on smart solutions, innovations and applications for people, environment and society. The main focus is on deltas, coastal regions and river basins. Managing these densely populated and vulnerable areas is complex, which is why Deltares works closely with governments, businesses, other research institutes and universities.

**Dynardo** is both a software developer and consultant in the fields of sensitivity analysis, multidisciplinary optimization, multiobjective optimization, robustness evaluation, reliability analysis, parameter identification, model calibration and shares its expertise in fields of consumer goods industry, mechanical and process engineering, energy industry, civil engineering, geomechanics, automotive industry, aerospace industry, bioengineering and micromechanics.

The **University of Natural Resources and Life Sciences Vienna** (Austria), is a university, which focuses on research and teaching in renewable resources. It follows the mission to use naturally occurring resources for their use for coming generations.

Scientific and technical coordinators

Prof. Dr.-Ing. habil. F. Werner, Germany

Dr.-Ing. M. Huber, The Netherlands

Prof. Dr.rer.nat. T. Lahmer, Germany

Dr.-Ing. habil. T. Most, Germany

Dr.-Ing. habil. D. Proske, Austria

Scientific Committee

Prof. K. Bergmeister, Vienna, Austria

Prof. C. Bucher, Vienna, Austria

Prof. H. Budelmann, Braunschweig, Germany

Prof. R. Caspeelee, Belgium

Prof. B. Ellingwood, Atlanta, USA

Prof. M. H. Faber, Lyngby, Denmark

Prof. D. Frangopol, Lehigh, USA

Prof. K. Geißler, Berlin, Germany

Prof. P. van Gelder, Delft, Netherlands

Prof. C.-A. Graubner, Darmstadt, Germany

Prof. K. Gürlebeck, Weimar, Germany

Prof. M. Hicks, Delft, Netherlands

Prof. J. Hildebrand, Weimar, Germany

Prof. M. Holicky, Praha, Czech Republic

Prof. C. Könke, Weimar, Germany

### Scientific Committee

Prof. G. Mancini, Torino, Italy  
Prof. R. Melchers, Callaghan, Australia  
Prof. G. Morgenthal, Weimar, Germany  
Prof. F. Nadim, Oslo, Norway  
Prof. K. Smarsly, Weimar, Germany  
Prof. D. Straub, Munich, Germany  
Prof. A. Strauss, Vienna, Austria  
Prof. P.D. Spanos, Houston, USA  
Prof. L. Taerwe, Ghent, Belgium  
Prof. K.-J. Witt, Weimar, Germany  
Prof. F. Wuttke, Kiel, Germany

### Acknowledgements

The organising committee thanks to Anne-Marie Nöthlich, Frank Zigan, Klaus Krämer and Dr.-Ing. Lars Abrahamczyk for their support in preparing this event.

## Conference programme

### November 3<sup>rd</sup> 2014:

20:00 **Welcome reception**  
*Restaurant Erbenhof, Brauhausgasse 10-14, 99234 Weimar*

### November 4<sup>th</sup> 2014

Chairman: F. Werner

#### Opening, Keynote 1

Lecture Room 6, Coudraystrasse 9

09:00 **Opening of the 12<sup>th</sup> International Probabilistic Workshop**  
Prof. F. Werner  
*Bauhaus University Weimar; Germany*

09:15 **Keynote lecturer: B.-O. Küppers**  
*Professor em. of Natural Philosophy, University Jena, Germany*  
Safety through certainty?

### November 4<sup>th</sup> 2014

Chairman: F. Werner

#### 1<sup>st</sup> Parallel Session

Lecture Room 6, Coudraystrasse 9

10:05 **D. Proske**  
*University of Natural Resources and Life Sciences Vienna, Austria*  
Uncertain natural hazards estimation in probabilistic computations.

10:30 **D. Legatiuk, H. B. Motra, F. Scheiber, F. Werner**  
*Bauhaus University Weimar, Germany*  
On the coupling of mathematical and physical models.

10:55 **Coffee Break**

11:20 **T. Most**  
*Dynardo, Germany*  
Variance-based sensitivity analysis for correlated random variables by means of efficient meta-modelling.

## Conference programme

11:45      **C. Mudersbach, J. Bender**  
*Bochum University of Applied Sciences, Germany*  
Identifying time-dependent changes in design discharges by means of stochastic time-series.

12:15      **Lunch**  
*Lecture room 6, Coudraystrasse 9*

**November 4<sup>th</sup> 2014**

Chairman: D. Proske

**2<sup>nd</sup> Parallel Session**

Lecture Room 001, Coudraystrasse 11C

10:05      **J. Weselek, U. Häußler-Combe**  
*Technical University Dresden, Germany*  
Sensitivity analysis of strengthened RC beams with stochastically distributed material properties.

10:30      **M. Sykora, D. Diamantidis, M. Holicky, R. Lenner , P. Mañas**  
*Technical University Prague, Klokner Institute, Czech Republic*  
Risk-informed decision making on protective measures for highway bridges.

10:55      **Coffee**

11:20      **W. Botte, R. Caspeepe, L. Taerwe**  
*Ghent University, Belgium*  
Influence of uncertainty modelling on membrane action in concrete plates in the framework of robustness assessment.

11:45      **M. Achenbach**  
*LGA Prüfamnt für Standsicherheit, Germany*  
Full probabilistic analysis of reinforced concrete columns subjected to standard fire.

12:15      **Lunch**  
*lecture room 6, Coudraystrasse 9*

## Conference programme

November 4<sup>th</sup> 2014

Chairman: M. Huber

Keynote 2

Lecture Room 6, Coudraystrasse 9

13:30 **Keynote lecturer: B. Sudret**

*ETH Zürich, Switzerland*

Advanced computational methods for structural reliability analysis - applications in civil engineering.

November 4<sup>th</sup> 2014

Chairman: M. Huber

3<sup>rd</sup> session

Lecture Room 6, Coudraystrasse 9

14:20 **K. Breitung**

*Technical University München, Germany*

40 Years FORM: Some new aspects?

14:45 **M. Oberguggenberger, M. Schwarz**

*University of Innsbruck, Austria*

Fourier integral operators in stochastic structural analysis.

15:10 **M. Huber**

*Deltares, The Netherlands*

On the application of history matching techniques in geotechnical engineering.

15:35 **Coffee Break**

*lecture room 6, Coudraystrasse 9*

15:50 **S. Glowienka, A. Fischer**

*Hochtief Engineering GmbH, Germany*

Analysis for foundations of electricity pylons.

16:15 **P. Zhu, M. Huber, K.-J. Witt**

*Bauhaus-University Weimar, Germany*

*Deltares, The Netherlands*

The effect of load on the spatial variability of soil properties.

## Conference programme

16:40 **M. Raschke**  
*Free researcher*  
Estimation of uncertainties in the probabilistic seismic hazard analysis.

18:30 **Guided tour through Weimar**

20:00 **Conference dinner**

**November 4<sup>th</sup> 2014**

Chairman: T. Lahmer

**4th Parallel Session**

Lecture Room 001, Coudraystrasse 11C

14:20 **J. Bender, C. Mudersbach**  
*University of Siegen, Germany*  
Considering the non-simultaneous occurrence of extremes in the bivariate design using copula functions.

14:45 **F. Marsili**  
*University of Pisa, Italy / Technical University Braunschweig, Germany*  
Increasing the robustness of Bayesian analysis for the reliability assessment of existing structures.

15:10 **S. Keßler, D. Kanzler, C. Gehlen**  
*TU München, Germany*  
Evaluation of potential mapping using POD.

15:35 **Coffee Break**  
*lecture room 6, Coudraystrasse 9*

15:50 **I. Reichert, P. Olney, T. Lahmer**  
*Bauhaus-University Weimar, Germany*  
Comparison of different model-based design of experiment approaches under moderate systematic errors.

16:15 **T. Lahmer, S. Bock, J. Hildebrand, K. Gürlebeck**  
*Bauhaus-University Weimar, Germany*  
Identification of residual stresses in steel under uncertain model components.

## Conference programme

- 16:40     **S. Mohanty, S. Stothoff, M. Muller**  
*Geosciences and Engineering Division Southwest Research Institute, USA*  
Probabilistic modeling of radionuclide transport evaluation  
for geological disposal in France.
- 18:30     **Guided tour through Weimar**
- 20:00     **Conference dinner**

**November 5<sup>th</sup> 2014**

Chairman: K.-J. Witt

**Keynote 3**

Lecture Room 6, Coudraystrasse 9

- 09:00     **Keynote lecturer: D. Ucinski**  
*University of Zielona Góra, Polen*  
Robustness of optimal sensor location for parameter  
estimation of spatio-temporal systems.

**November 5<sup>th</sup> 2014**

Chairman: K.-J. Witt

**1<sup>st</sup> Parallel Session,**

Lecture Room 6, Coudraystrasse 9

- 09:55     **R. van Coile, R. Caspee, L. Taerwe**  
*Ghent University, Belgium*  
Reliability-based equivalent fire duration for concrete  
elements exposed to natural fires.
- 10:20     **M. Holicky, M. Sykora, J.V. Retief**  
*Czech Technical University Prague, Czech Republic*  
General approach to model uncertainties.
- 10:45     **R. van Wyk, C. Viljoen**  
*Stellenbosch University, South Africa*  
Reliability of thin-walled single screwed connections in cold-  
formed steel against tilt-and-bearing failure.
- 11:10     **Coffee Break**  
*lecture room 6, Coudraystrasse 9*

## Conference programme

- 11:25     **N. L. Tran**  
*Technical University Darmstadt, Germany*  
Reliability analysis of slender HSC and UHPC columns.
- 11:50     **T. Abbas, G. Morgenthal**  
*Bauhaus-University Weimar, Germany*  
Assessment of the flutter stability of bridges using a probabilistic approach.
- 12:15     **Lunch break**  
*lecture room 6, Coudraystrasse 9*

**November 5<sup>th</sup> 2014**

Chairman: J. Hildebrand

**2<sup>nd</sup> Parallel Session**

Lecture Room 001, Coudraystrasse 11C

- 09:55     **T. Weidl, M. Kaposvari**  
*TÜV SÜD Industrie Service GmbH, Germany*  
Assessment of ice throw and ice fall risks nearby wind energy installations.
- 10:20     **N. Reybrouck, M. A. Maes, R. Caspeele, L. Taerwe, P. Criel**  
*Ghent University, Belgium*  
Modelling of the effect of random environmental influences on stochastic creep in concrete members.
- 10:45     **J. Kohoutek, N. L. Tran, C.A. Graubner**  
*TU Darmstadt, Germany*  
Thermal actions on box girder bridges made of prestressed concrete.
- 11:10     **Coffee break**  
*lecture room 6, Coudraystrasse 9*
- 11:25     **S. Chowdhury, M. Deeb, V. Zabel**  
*Bauhaus-University Weimar, Germany*  
Reliability based quality assessment of fatigue crack.

## Conference programme

11:50 **C. Miranda, A. Teixeira, M. Huber, T. Schweckendiek**  
*Deltares, The Netherlands*  
Probabilistic design of relief wells as piping mitigation measure in The Netherlands.

12:15 **Lunch break**  
*lecture room 6, Coudraystrasse 9*

**November 5<sup>th</sup> 2014**

Chairman: V. Zabel

**Keynote 4**

Lecture Room 6, Coudraystrasse 9

13:30 **Keynote lecturer: G. Lombaert**  
*KU Leuven, Belgium*  
A probabilistic framework for robust topology optimization of structures sensitive to geometric imperfections.

**November 5<sup>th</sup> 2014**

Chairman: V. Zabel

**3<sup>rd</sup> Parallel Session,**

Lecture Room 6, Coudraystrasse 9

14:20 **A. Hoffmann, G. Klein, T. Weidl**  
*TÜV SÜD Industrie Service GmbH, Germany*  
Risk acceptance criteria.

14:45 **A. Beschorner, M. Voigt**  
*Technical University Dresden, Germany*  
Monte Carlo cross validation for response surface benchmark.

15:10 **R. Schmidt, M. Voigt, K. Vogeler**  
*Technical University Dresden, Germany*  
Engineering approach for the extension of Latin Hypercube samples while maintaining the correlation structure.

**November 5<sup>th</sup> 2014**

**Plenar Discussion**

Lecture Room 6, Coudraystrasse 9

15:45 **Plenar discussion: Possibilities and limitations of probabilistic methods – academic playground or engineering reality?**

## Conference programme

November 5<sup>th</sup> 2014

Chairman: K. Smarsly

4th Parallel Session

Lecture Room 001, Coudraystrasse 11C

- 14:20 **T. Takada**  
*The University of Tokyo, Japan*  
Determination of design ground motions for important structures in performance-based earthquake engineering.
- 14:45 **S. Marzban, J. Schwarz, L. Abrahamczyk**  
*Bauhaus-University Weimar, Germany*  
*Experience based assessment of yield displacement estimates for reinforced concrete walls.*
- 15:10 **J. Li, J. Xu**  
*Tongji University, China*  
Probability density evolution equation for probability dissipative system.

November 5<sup>th</sup> 2014

Plenar Discussion

Lecture Room 6, Coudraystrasse 9

- 15:45 **Plenar discussion: Possibilities and limitations of probabilistic methods – academic playground or engineering reality?**

## General information

### Conference Location

The conference takes place in the Lecture room 6, Coudraystraße 9 A and Lecture room 001, Coudraystraße 11 C in Weimar.

### Registration desk and secretariat

The registration for the conference takes place at the conference location from 08:30 on Tue 04.11.2014. The conference staff is here to help you during the whole conference, and to assure you have a nice stay in Weimar. Please do not hesitate to ask any question or bring forward any problem on your mind. The secretariat is located at the main entrance of the conference location.

### Conference badges

Delegates are kindly requested to wear the conference name badge at all meetings.

### Proceedings

The papers presented at the 12<sup>th</sup> International Probabilistic Workshop are included in the proceedings of the conference to be published by the Bauhaus-University Weimar. The proceedings are distributed upon registration at the conference in each delegate's pack.

### Language

The official language of the conference is English. No simultaneous translation is available.

12<sup>TH</sup> INTERNATIONAL PROBABILISTIC WORKSHOP  
November 04<sup>th</sup> – 05<sup>th</sup> 2014

## **General information**

## Instructions for speakers

### Presentations and discussion of papers

Each presentation has been allocated 20 minutes with 5 additional minutes for discussion. Authors may give short bios to the session chair in advance. Please try to meet the session chair before the session.

### Uploading Presentation Data

All speakers are kindly asked to bring the data of their presentation on a USB memory stick. The presentation material should be uploaded and checked at latest during the break before your session.

### Computer and Software

In every session room you will find a notebook with Microsoft Windows 7, Microsoft Office 2010 and 2003 as well as Acrobat Reader installed. Please use the PowerPoint 2010 format (\*.pptx) for your presentation materials, if possible. You can use your own notebook, if you prefer.

### Backup Presentation

It is recommended that you should bring the presentation material in PDF format as well, for backup, in case there are any problems with your PowerPoint presentation.

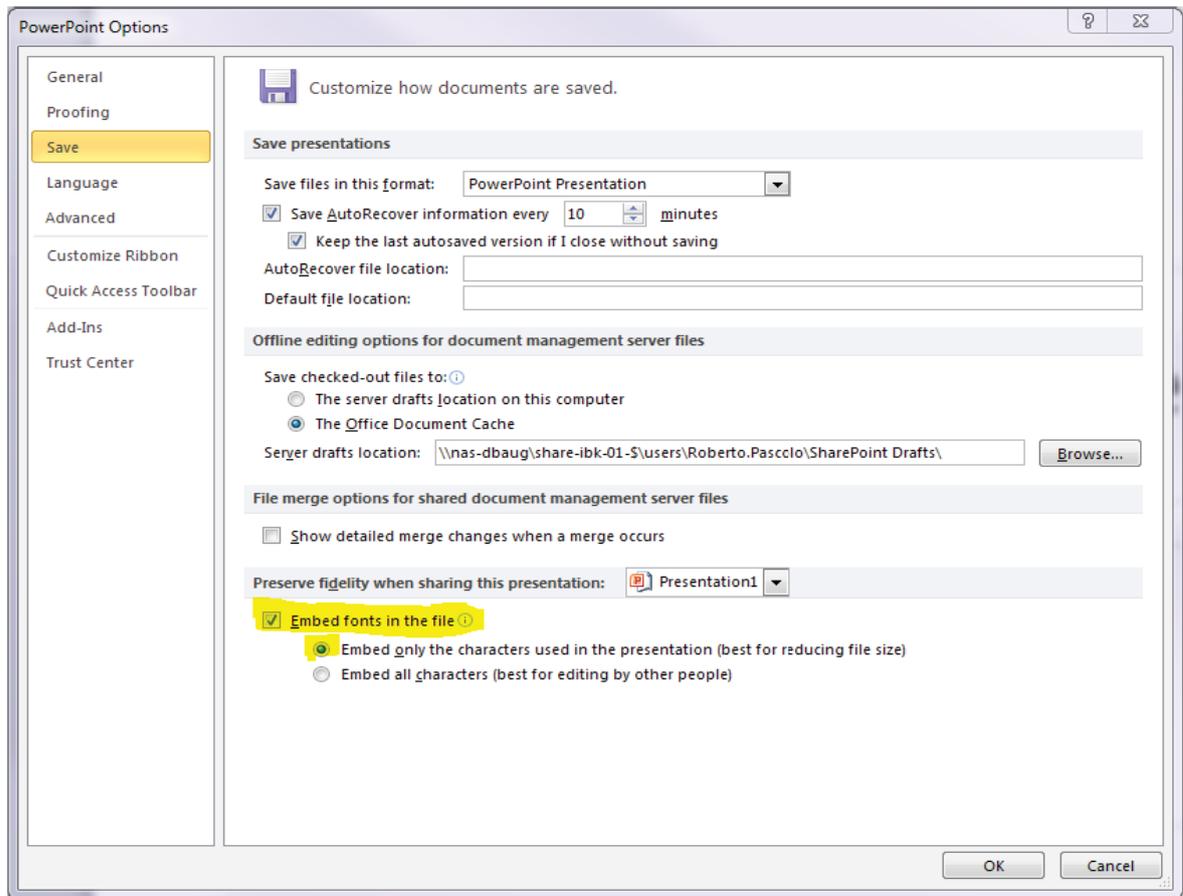
### Movies in PowerPoint

If you embed a movie in PowerPoint you should use \*.wmv format and bring a copy of the movie in a separate file on your USB memory stick.

### Fonts

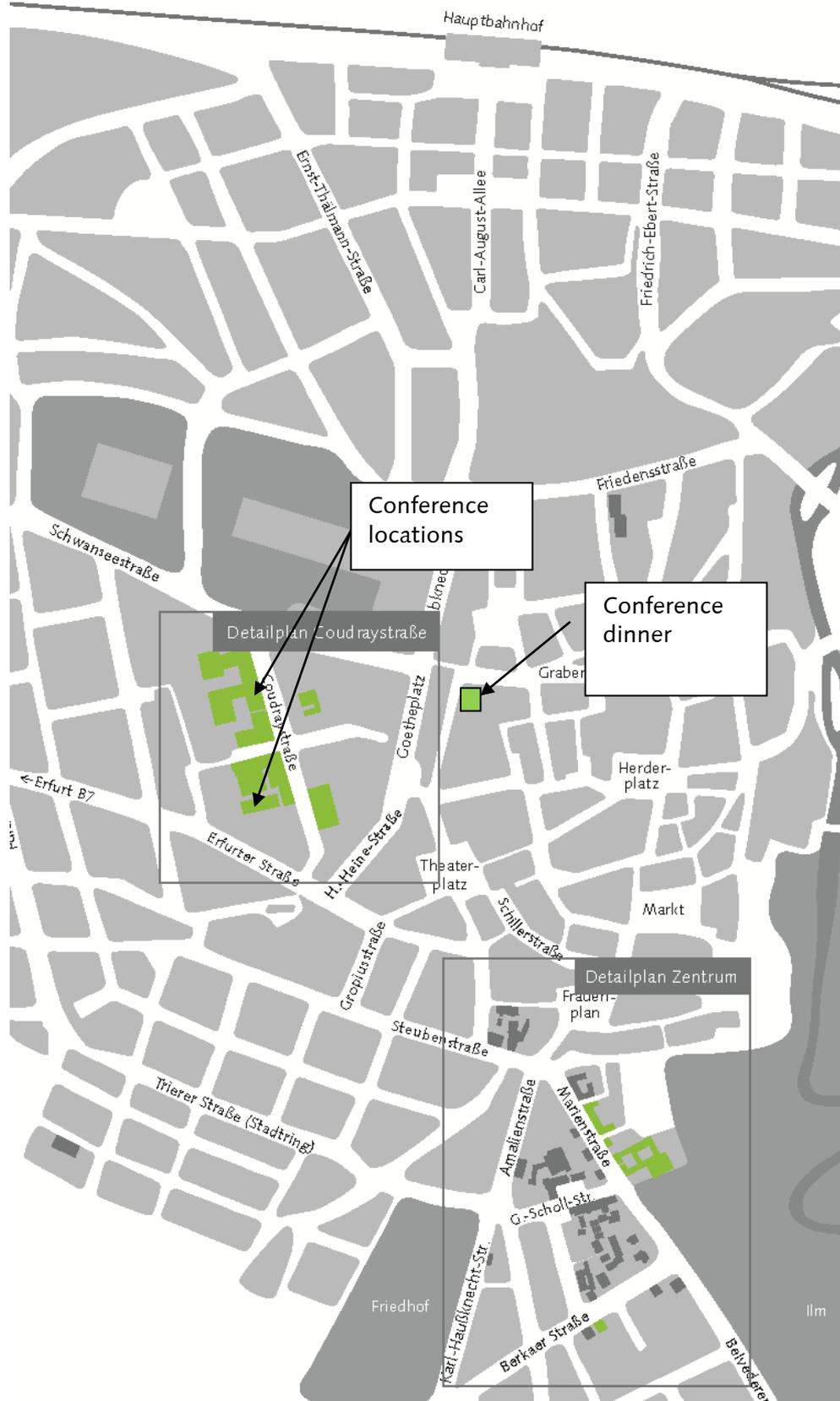
Use standard fonts only! Please embed the fonts in your PowerPoint presentation!

## Instructions for speakers

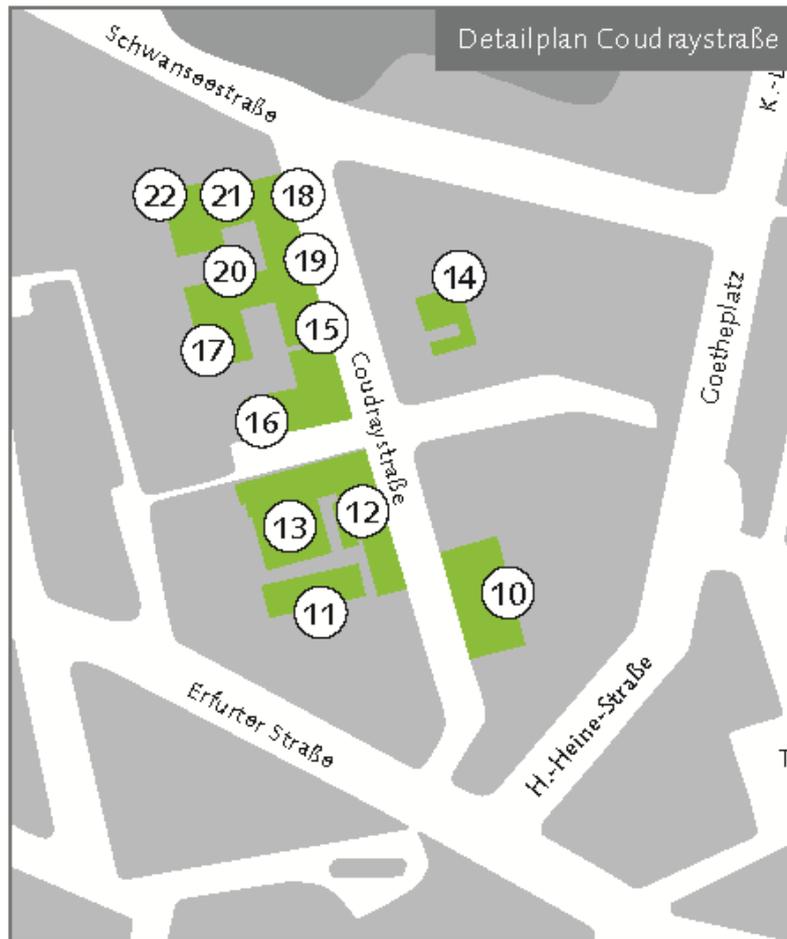


## Maps

### Conference locations



## Maps



12 Lecture room 6, Coudraystr.9 A

17 Lecture room 1, Coudraystraße 11 C

### Conference dinner

The conference dinner will take place at 04.11.2014 at 20:00 in the Kasseturm, Goetheplatz 10, 99423 Weimar.

### Guided tour through Weimar

A guided tour through the city center of Weimar will be held before the dinner on 04.11.2014.

## List of participants

Lars	Abrahamczyk	Bauhaus-University Weimar, Germany
Marcus	Achenbach	LGA Prüfamt für Standsicherheit, Hof, Germany
Jens	Bender	University of Siegen, Germany
Andre	Beschorner	Technical University Dresden, Germany
Wouter	Botte	Ghent University - Magnel Laboratory for Concrete Research, Belgium
Karl	Breitung	TU München, Germany
Sharmistha	Chowdhury	Bauhaus Universität Weimar, Germany
Maher	Deeb	Bauhaus-University Weimar, Germany
Ngoc Linh	Dr. Tran	TU Darmstadt Institut für Massivbau, Germany
Kosmas	Dragos	Bauhaus University Weimar, Germany
Yasunori	Endo	University of Tsukuba, Japan
Alexander	Fischer	HOCHTIEF Engineering GmbH, Frankfurt am Main, Germany
Simon	Glowienka	HOCHTIEF Engineering GmbH, Frankfurt am Main, Germany
Luise	Göbel	Bauhaus-University Weimar, Germany
André	Hoffmann	TÜV SÜD Industrie Service GmbH, München, Germany
Maximilian	Huber	Deltares, Delft Netherlands
Zouhour	Jaouadi	Bauhaus University, GRK Group, Germany
Sylvia	Keßler	Centre for Building Materials, TU München, Germany
Jaroslav	Kohoutek	TU Darmstadt Institut für Massivbau, Germany
Tom	Lahmer	Bauhaus University Weimar, Germany
Dmitrii	Legatiuk	GRK 1462, Bauhaus University Weimar, Germany
Geert	Lombaert	KU Leuven, Belgium
Marc	Maes	Ghent University, Belgium
Stefano	Marelli	ETH Zurich, Switzerland
Francesca	Marsili	University of Pisa (IT) / TU Braunschweig (DE)
Samira	Marzban	Bauhaus-University Weimar, Germany
Gregory	Mathieu	IRSN, Fontenay-aux-Roses Cedex , France
Hem Bahadur	Motra	Graduiertenkolleg 1462 "Modellqualitäten", Germany
Thomas	Most	Dynardo, Weimar, Germany
Christoph	Mudersbach	Bochum University of Applied Sciences, Germany
Fabian	Netzel	Bochum University of Applied Sciences, Germany
Michael	Oberguggenberger	University of Innsbruck, Austria
Peter	Olney	Bauhaus-University Weimar, GRK 1462 , Germany

## List of participants

Dirk	Proske	Axpo Power AG   Kernenergie (CH) & BOKU Vienna, Austria
Mathias	Raschke	Free researcher
Ina	Reichert	Bauhaus-University Weimar, GRK 1462, Germany
Nicky	Reybrouck	Ghent University - Magnel Laboratory for Concrete Research, Belgium
Roman	Safar	Faculty of Civil Engineering of CTU in Prague, Czech Republic
David	Sanio	Ruhr-University Bochum, Germany
Frank	Scheiber	Bauhaus-University Weimar, Germany
Robin	Schmidt	TU Dresden, Germany
Martin	Schwarz	University of Innsbruck, Austria
Kay	Smarsly	Bauhaus-University Weimar, Germany
Maria	Steiner	Graduiertenkolleg 1462, Bauhaus-University Weimar, Germany
Miroslav	Sykora	Czech Technical University in Prague, Klokner Institute, Czech Republic
Tsuyoshi	Takada	The University of Tokyo, Japan
Ana	Teixeira	Deltares, Delft Netherlands
Dariusz	Ucinski	University of Zielona Gora, Poland
Frank	Werner	Bauhaus University Weimar, Germany
Rudolf	van Wyk	Stellenbosch University, South Africa
Matthias	Voigt	TU Dresden, Germany
Thorsten	Weidl	TÜV SÜD Industrie Service GmbH, München, Germany
Jörg	Weselek	Technical University Dresden, Germany
Karl Josef	Witt	Bauhaus-University Weimar, Germany
Jun	Xu	Tongji University, Shanghai, China
Pengtao	Zhu	Civil Engineering Department, Bauhaus Uni. Weimar, Germany

12<sup>TH</sup> INTERNATIONAL PROBABILISTIC WORKSHOP  
November 04<sup>th</sup> – 05<sup>th</sup> 2014

**IPW committee:**

Prof. Dr.-Ing. habil. Frank Werner, Bauhaus-Universität Weimar, Germany

Dr.-Ing. Maximilian Huber, Deltares, The Netherlands

Prof. Dr. rer. nat. Tom Lahmer, Bauhaus-Universität Weimar, Germany

Dr.-Ing.habil. Thomas Most, Dynardo GmbH, Germany

Dr.-Ing.habil. Dirk Proske, University of Natural Resources and Applied Sciences, Austria

**Contact information**

Web page: [www.uni-weimar.de/ipw2014](http://www.uni-weimar.de/ipw2014)

Email: [ipw2014@uni-weimar.de](mailto:ipw2014@uni-weimar.de)

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