

Curriculum Vitae

Prof. Dr. Daniel Straub

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Engineering Risk Analysis Group, Technische Universität München, 80290 München

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Education

2004 Dr. sc. techn. in Engineering Risk Analysis, ETH Zürich.

2000 Diploma in Civil Engineering, ETH Zürich.

Employment History

Since 12.2008 Professor W2, Technical University Munich, tenured since 2011

Since 2013 Co-Founder and Partner, Eracons GmbH, München.

2008 Visiting Researcher, Instituto Mexicano de Petróleo, Mexico City.

2006 – 2008 Postdoctoral Scholar & Adjunct Professor, University of California, Berkeley.

2004 – 2008 Co-Founder & CEO, Matrisk GmbH, Zürich.

2004 – 2005 Research Associate (project manager), Civil Engineering Dept., ETH Zürich.

2001 Visiting Researcher, Marine Department, Bureau Veritas, Paris

2000 – 2004 Research Assistant, Institute of Structural Engineering, ETH Zürich.

Research Interests

Risk analysis and assessment; Bayesian methods in engineering; Decision analysis; Probabilistic modelling; Stochastic mechanics; Risk acceptance and communication.

Languages

German (mother tongue), English (fluent), Spanish (fluent), French (very good), Czech (intermediate)

Awards

2023 C. Allen Cornell Award, Civil Engineering Risk and Reliability Association

2022 Research Award, Geotechnical Safety Network

2022 SAE Ralph H. Isbrandt Automotive Safety Engineering Award

2013 IASSAR Early Achievement Research Award, Intern. Assoc. for Structural Safety and Reliability

2012 Honorary Professorship, University of Aberdeen

2005 René-Hornung-Medal of the Swiss Society for Nondestructive Testing (SGZP)

2005 Silbermedaille of ETH Zürich

Selected academic services

Member of the Joint Committee on Structural Safety, since 2009.

Member of the Probabilistic Methods Committee, ASCE, since 2008.

Core member of the Munich Data Science Institute (mdsi.tum.de), since 2023.

Member of the Advisory Council, TUM Institute of Advanced Studies, 2014 – 2020.

Member of CEN/TC 250/SC 10 WG1, Calibration of Safety Factors for Eurocode, since 2016.

Board of Directors, Civil Engineering Risk and Reliability Association (CERRA), 2011 – 2019.

Chair (2014-2016) and vice-chair (2010-2014) of the IFIP WG7.5 on Reliability and Optimization of Structural Systems.

Chair (2011-2013) and Board member of the Geotechnical Safety Network (Geosnet), 2011 – 2017.

Founding Member of the Munich Centre for Technology in Society (MCTS), 2012-2015

Member of the board, LRF Centre for Safety and Reliability, University of Aberdeen, 2011-2016.

Faculty search committee member at TUM for open-rank professor for Risk and Insurance (2019), full professor of Mathematical Statistics (2018), full professor in Geotechnical Engineering (2014), full professor of Hydrology (2012) and assistant/associate professor in Geological Engineering (2016, 2012). At TU Dresden for full professor in System Safety in Transport (2020/21).

Associate editor

ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems (since 2020)

Editorial board member

Reliability Engineering & System Safety, Elsevier (since 2020)

Journal of Infrastructure Preservation and Resilience, Springer (since 2019)

Georisk, Taylor & Francis (since 2018)

Structural Safety, Elsevier (since 2017)

Probabilistic Engineering Mechanics, Elsevier (since 2017)

Sustainable and Resilient Infrastructure, Taylor & Francis (since 2016)

ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems (since 2014)

Supervision of PhD projects (principal advisor)

Jakob Scheffels: Model reduction for structural reliability analysis (2024 -)

Daniel Koutas: Data-informed predictive maintenance for structures (2023 -)

Carmen Buliga: Infrastructure maintenance planning with reinforcement learning (2022 -)

Mara Ruf: Probabilistic decision support and sensitivity analysis for natural hazards, (2022 -)

Amelie Hoffmann: Uncertainty analysis in natural hazard risk management (2021 -)

Jianpeng Chan: Advanced reliability and rare event estimation for engineering systems (2019 - 2024)

Marco Kryda: Reliability of environment sensors in autonomous vehicles (2019 - 2023)

Antonis Kamariotis: Sequential decision making with structural health monitoring (2019 - 2023) [Jointly supervised with Eleni Chatzi, ETHZ]

Hugo Rosero: Near-real-time risk assessment of lifeline systems considering cascading failures (2018 - 2024)

Max Teichgräber: Safety formats in structural codes of the 21st century (2017 - 2024)

Max Ehre: Integration of reliability and sensitivity assessment with data assimilation for improved decision support (2017 - 2021)

Sebastian Geyer: Reliability assessment of large-scale hydraulic structures considering spatial variability (2016 - 2023)

Elizabeth Bismut: Asset integrity management of structural systems: a Bayesian network approach (2016 - 2022)

Felipe Uribe: Bayesian Updating Of Engineering Models with Spatially Variable Properties (2016 - 2020)

Mario Berk: Reliability of environment sensors in autonomous vehicles (2015 – 2019. Awarded with the Bauer Prize for the best PhD thesis of the department.)

Anke Scherb: Bayesian risk assessment for spatially distributed infrastructure systems (2014 - 2018)

Beatrice Dittes: Adaptive risk-based decisions for water infrastructure planning accounting for climate change (2014 - 2018)

Jesus Luque: Risk- and reliability based planning of inspections with Bayesian network (2013 - 2021)

Kilian Zwirgmaier: Bayesian networks for risk assessment (2013 - 2016)

Wolfgang Betz: Bayesian updating in FEM (2012 - 2017)

Yuan Ji: Near-real-time landslide risk assessment (2012 - 2016)

Martina Saettele: Quantifying the reliability of warning and alarm systems for natural hazards (2012-2015) [Supervised jointly with Dr. Bründl, SLF Davos.]

Ronald Schneider: Risk-Based Assessment of Existing Bridge Structures (2011 - 2019) [Supervised jointly with Dr. Thöns, BAM Berlin.]

Panagiota Papakosta: Communal Early Warning System for Wildfire Risk Assessment (2009 - 2015)

Alessandra Altamura: Reliability of mechanical components subjected to high-cycle variable-amplitude fatigue (2011 - 2013). [Supervised jointly with Prof. Beretta, Politecnico Milano.]

Co-supervision of PhD projects

Daniel Hettegger: Deep reinforcement learning for infrastructure maintenance planning (2022 -) (Jointly supervised with Alois Knoll)

Dafydd Cotoarba: Probabilistic digital twin for geotechnics (2022 -)(Jointly supervised with Ian Smith)

Qamar Mahboob (2010 – 2014, TU Dresden, with Prof. Trinkauf)

Daniel Frey (2010 – 2012, TUM, with Prof. Bammler)

Iason Papaioannou (2010 – 2012, TUM, with Prof. Rank. The work was awarded the Bauer Prize for the best PhD thesis of the department.)

Simona Miraglia (2010 – 2011, Università DI Napoli, with Prof. Rosati)

Michelle Bensi (2007 – 2010, UC Berkeley, with Prof. Der Kiureghian, MB is now Assistant Professor at University of Maryland)

Matthias Schubert (2004 – 2006, ETH, with Prof. Faber)

Adrienne Grêt-Regamey (2005 – 2006, ETH, with Prof. Schmid. AGR is now Associate Professor at ETH)

Vasiliki Malioka (2004 – 2006, ETH, with Prof. Faber)

Kazuyoshi Nijishima (2004 – 2006, ETH, with Prof. Faber. KN is now Associate Professor at Kyoto U.)

Long-term collaborations at TUM with senior researchers and scientific guests

Dr. Dimitris Georgiadis (2024 – , Humboldt foundation fellow): Probabilistic digital twin for real-time risk-informed decision-making of ships under extreme events.

Dr. Xinyu Jia (2024 – , Humboldt foundation fellow): Hierarchical Bayesian analysis for engineering models

Prof. Elizabeth Qian (2023 – , Institute of Advanced Studies fellow): Model reduction for structural reliability analysis

Dr. Kai Cheng (2023 – , Humboldt foundation fellow): Machine learning for data-informed structural reliability analysis

Dr. Ji-Eun Byun (2021 – 2022, Humboldt foundation fellow): Predictive maintenance for infrastructure systems

Prof. Rafael Holdorf Lopez (2021 – 2023, Humboldt foundation fellow): Stochastic optimization for optimal life-cycle management of structures

Prof. Eleni Chatzi (2019 – 2023, Institute of Advanced Studies fellow): Data-informed decisions for structures and infrastructures

Dr. Oindrila Kanjilal (2019 – 2021, Humboldt foundation fellow): Reliability and sensitivity analysis of dynamic systems

Prof. Luyi Li (2017 – 2018, Humboldt foundation fellow): Reliability sensitivity analysis

Dr. Hyun-Joong Kim (2015 – 2018): Optimization of asset integrity management for ship structures

Dr. Shui-hua Jiang (2015 – 2017): Bayesian methods in geotechnical engineering

Dr. Iason Papaioannou (2011 –): Advanced reliability methods and stochastic FEM

Dr. Olga Špačková (2011 – 2017): Risk assessment for tunnel construction & natural hazard decision support

Dr. Chin Man Mok (2011 – 2014, TUM IAS Fellow): Environmental Decision Making

Dr. Giulio Cottone (2010 – 2013): Stochastic dynamics & reliability-based optimization of SHM

External referee for PhD projects

Elias Fekhari (2024, EDF Paris, Advisors: Bertrand Iooss & Vincent Chabridon)
Lukas Bodenmann (2023, ETH Zürich, Advisor: Prof. Bozidar Stojadinovic)
Andriy Kovryga (2023, TUM, Advisor: Prof. Jan-Willem van de Kuilen)
Julian Salomon (2023, Leibniz Universität Hannover, Advisor: Prof. Michael Beer)
Dimitris Georgiadis (2022, NTUA Athens, Advisor: Prof. Emmanuel Samuelides)
Wouter Jan Klerk (2022, TU Delft, Advisor: Prof. Matthijs Kok)
Nina Korshunova (2021, TUM, Advisor: Prof. Ernst Rank)
Reza Allahvirdizadeh (2021, KTH Stockholm, Advisor: Prof. Raid Karoumi)
Florian Bandtfort (2021, Technische Universität Kaiserslautern, Advisor: Prof. Jörn Sass)
Xiangfeng Guo (2020, University of Grenoble, Advisor: Prof. Daniel Diaz)
Johannes Wallner (2020, TUM, Advisor: Prof. Markus Lienkamp)
Kathryn Roscoe (2017, TU Delft, Advisors: Profs. J.K. Vrijling & Ton Vrouwenvelder)
Clément Walter (2016, Université Paris Diderot, Advisor: Prof. Josselin Garnier)
Ondřej Nývlt (2016, Czech Technical University in Prague, Advisor: Prof. Lukáš Ferkl)
Florian Dier (2015, TUM, Advisor: Prof. Konrad Zilch)
Peter Stapel (2014, TUM, Advisor: Prof. Jan-Willem van de Kuilen)
Qamar Mahboob (2014, Technische Universität Dresden, Advisor: Prof. Jochen Trinkauf)
Kristin Vogel (2014, Universität Potsdam, Advisor: Prof. Frank Scherbaum)
Nicolay Dimitrov (2013, Danish Technical University DTU, Advisor: Prof. Christian Bergreen)
Jannie Jessen Nielsen (2013, Aalborg University, Advisor: Prof. John Daalsgard Sorensen)
Yanchao Yue (2011, University of Trento, Advisor: Prof. Daniele Zonta)
Nicolas Kühn (2011, Universität Potsdam, Advisor: Prof. Frank Scherbaum)

Courses introduced and taught annually at TU München

(Evaluations are made at a scale of 1 to 5, where 1 is the best)
Reliability and safety analysis (MSc level, 4hrs/week, since 2023)
Trends in Risk and Safety (MSc level, 2hrs/week, since 2023, last evaluation 1.2)
Stochastik und Risiko (BSc level, 4hrs/week, since 2020, last evaluation 3.1)
Risk and Reliability Assessment (MSc level, 5hrs/week, since 2021, last evaluation: 1.8)
Risk Analysis: Uncertainty, information and prediction. (MSc level, 4hrs/week, since 2009, last evaluation: 1.8)

Structural Reliability Methods. (MSc level, 2hrs/week, since 2010, last evaluation: 1.4)
Landslides (MSc level, 4hrs/week, together with Profs. for Geology and Surveying, since 2012, last evaluation 1.6)
Probabilistic life cycle analysis and integrity management of infrastructures (MSc level, 3hrs/week, 2018 – 2020, since 2021 taught by Elizabeth Bismut)
Zuverlässigkeit und Lastannahmen (BSc level, 2hrs/week, 2009-20, last evaluation: 1.8)
Risk Assessment: Decisions, optimization and management. (MSc level, 3hrs/week, 2010-20, last evaluation: 1.4)
Reliability of Engineering Systems (MSc level, 2hrs/week, 2015-20, last evaluation: 1.6)
Geostatistik und Risikomanagement (BSc level, 4hrs/week with Prof. for Hydrology, 2015-20)
Einführung in das Risikomanagement (BSc level, 2hrs/week, 2009-13, last evaluation: 1.4)
PhD Seminar in Risk and Reliability (PhD & MSc level, 2hrs/week, since 2009)

Other courses taught

CE93 Engineering Data Analysis. (UC Berkeley, 2008, substitute lecturer for 6 lectures)
CE193 Engineering Risk Analysis. (UC Berkeley, 2007, 4hrs/week, course evaluation: 6.7 out of 7)
Bayesian networks for engineering risk analysis. (UC Berkeley, 2006, PhD Lecture series)

Lectures at summer schools

Sequential decision making, influence diagrams and Bayesian networks (Summer school on Value of Information in SHM, within the EU COST action TU1402, Trogir, Croatia, 2018)
Decisions under Uncertainty (French-German Summer School on Modeling and Numerical Methods for Uncertainty Quantification, Porquerolles, France, 2014)
Learning, fusing and assessing models with Bayesian methods (DFG Summer school, Bauhaus University Weimar, 2013, half-day course)
Risk-based decision support for engineering applications. (KIT Summer school, 2011).
Bayesian methods for model selection and model fusion (DFG Summer school Bauhaus University Weimar, 2010, 1-day course)
Análisis de riesgo y confiabilidad para estructuras marinas fijas. (Universidad de Ciudad del Carmen, Mexico, 2009, one week course together with Prof. Faber)
Reliability Based Assessment of Pipeline Integrity (University College London, 2004, 1-day workshop)
Risk Analysis and Inspection Planning. (Universidad de Ciudad del Carmen, Mexico, 2003, one week course together with Prof. Faber)

Courses for industry

Structural Reliability (2 day course, with Dr. Iason Papaioannou and Dr. Wolfgang Betz, 2018 & 2019)

Reliability Based Code Calibration (3 day course with Prof. Faber. Client: IMP, 2007).

Engineering Risk Analysis (3 day course with Prof. Faber. Client: IMP, 2007).

Engineering Risk Analysis (4 day course with Prof. Faber, in Spanish. Client: COMIMSA, 2006).

Risk Based Inspection Planning (4 day course with Prof. Faber, in Spanish. Client: Pemex, 2005).

Major research projects as PI

(Many of these projects were carried out in collaboration. For these projects, the stated financial sums are approximate and correspond to the contribution for which I was technically and financially responsible).

- 2024 – 2028 IntelliWind – Intelligent systems for autonomous Wind power plant operations (EU Horizon MSCA, 520 k€)
- 2024 – 2028 FOURIER – Artificial intelligence methodologies for monitoring and maintaining large-scale complex infrastructures (EU Horizon MSCA, 520 k€)
- 2024 – 2026 BIG-ROHU – Data-driven health and usage monitoring system for helicopters (BMBF, 290 k€)
- 2023 – 2026 Model reduction for structural reliability analysis (with Prof. Elizabeth Qian, funded by TUM Institute of Advanced Studies, 200 k€)
- 2023 – 2026 Uncertainty quantification and global reliability analysis of complex concrete structures – collaboration with Tongji University (DFG/NSFC Sino-German Center, 100 k€)
- 2022 – 2025 X-RISK-CC – How to adapt to changing weather extremes and associated compound risks in the context of climate change (Interreg Alpine Space, 430 k€)
- 2022 – 2026 INFRA.RELEARN – Intelligent infrastructure maintenance with deep reinforcement learning (Nemetscheck Foundation, 500 k€)
- 2021 – 2024 RIESGOS II – Scenario-based multi-risk assessment for the Andes region: Subproject Critical Infrastructure (BMBF – Federal Ministry of Education and Research, 370 k€)
- 2020 – 2023 Bayesian Multilevel Uncertainty Quantification for Decision Support (funded by German Science Foundation DFG)
- 2020 – 2022 Integral probabilistic cost-benefit analysis for fluvial flood protection (funded by Bavarian Environmental Agency, 332 k€)
- 2019 – 2022 Value of information in structural health monitoring (funded by TUM Institute of Advanced Studies, 150 k€)
- 2019 – 2022 Reliability validation of sensor perception (funded by AUDI, 350 k€)
- 2017 – 2021 Reliability of hydraulic structures considering spatial variability (BAW – Federal Waterways Engineering and Research Institute, 356 k€)
- 2017 – 2021 Grusbau 2.0 – Structural Codes for the 21st century (Deutsches Institut für Bautechnik, 330 k€)
- 2017 – 2020 RIESGOS – Multi-risk assessment for the Andes region: Subproject Cascading effects (BMBF – Federal Ministry of Education and Research, 250 k€)

- 2016 – 2019 Integration of reliability and sensitivity assessment with data assimilation for improved decision support (German Science Foundation DFG, 270 k€)
- 2016 – 2018 Integral analysis and assessment of monitoring and inspection in aging structures: a Bayesian network approach (German Science Foundation DFG, 190 k€)
- 2016 – 2018 Reliability analysis and updating of complex infrastructure systems by Bayesian network (German Science Foundation DFG, 180 k€)
- 2016 – 2019 Bayesian Updating of Engineering Models with Spatially Variable Properties (funded by TUM International Graduate School for Science and Engineering, DFG, 170 k€)
- 2015 – 2018 Performance assessment of environment sensor systems (funded by AUDI, 321 k€)
- 2015 – 2018 COST TU1402: Value of Information of Structural Health Monitoring. Member of the Steering Committee. (Horizon 2020.)
- 2015 – 2016 SAPHIR – Safety Preferences for Health-related Industrial Risks (Eranet, 30 k€)
- 2014 – 2017 AdaptRisk: Risk-informed decision making for flood management and water resource planning under climate change uncertainty (TUM International Graduate School for Science and Engineering, DFG, 170 k€)
- 2014 – 2017 Adaptive Decision Making for Infrastructure Risk Management (Det Norske Veritas, Oslo, 60 k€)
- 2014 – 2017 SAFEPEC – Preventive Safety Framework Driven by Innovative Inspection Capacities. (EU FP 7, 256 k€)
- 2013 – 2015 Integral analysis and assessment of monitoring and inspection in aging structures: a Bayesian network approach (German Science Foundation DFG, 230 k€)
- 2013 – 2015 SAMSYS – Safety Management System for Flight Operation (Lufthansa & Federal Ministry for Education and Research BMBF, 120 k€)
- 2012 – 2014 Intelligent Bridges – Prototype for assessing the condition state of bridge elements (Bundesanstalt für Strassenwesen, 180 k€)
- 2012 – 2015 Smart watershed operation and risk management using Bayesian methods. (Funded by TUM IGSSE, 120 k€).
- 2011 – 2012 Concept and framework for reliability-based smart bridge management (Bundesanstalt für Strassenwesen, FE 15.0508/2011, 150 k€)
- 2011 – 2013 Development of guidelines for natural hazard protection strategies in Alpine catchments. (Bavarian Environmental Agency, 90k€)
- 2010 – 2012 ROSA – Reliability Oriented Optimization of Structural Replacement Strategies for Aircraft Structures. (Funded by CleanSky, EU, 80k€)
- 2009 – 2010 Methodology for risk-based planning of inspections for roadway bridges. (Bundesanstalt für Strassenwesen, project FE 88.0002/2009, 44 k€)
- 2006 – 2008 Decision analysis for large and complex engineering systems. (Swiss National Science Foundation, 125 kSFr)

Additional funding

Additional funding for research projects and scientific meetings (up to 25 k€) were obtained from various sources, including the Humboldt Foundation, TÜV Süd Foundation, Likar Foundation, German Academic Exchange Service (DAAD), Bayhost.

Reviewer

Journals: ASCE Journal of Bridge Engineering, ASCE Journal of Computing in Civil Engineering, ASCE Journal of Engineering Mechanics, ASCE Journal of Geotechnical and Geoenvironmental Engineering, ASCE Journal of Infrastructure Engineering, ASCE Journal of Structural Engineering, Bauingenieur, Bulletin of the Seismological Society of America, Canadian Geotechnical Journal, Civil Engineering and Environmental Systems, Cold Regions Science and Technology, Computer Methods in Applied Mechanics and Engineering, Computer-Aided Civil and Infrastructure Engineering, Corrosion Science, Earthquake Engineering and Structural Dynamics, Engineering Structures, European Journal of Operational Research, Georisk, Geotechnik, International Journal of Approximate Reasoning, International Journal of Production Research, International Journal of Systems Science, Journal of Computational Physics, Journal of Hazardous Materials, Materials and Structures, Marine Structures, Mechanical Systems and Signal Processing, Natural Hazards, Natural Hazards and Earth System Science, Nature Communications, Nature Computational Sciences, Ocean Engineering, Probabilistic Engineering Mechanics, Proceedings of the Royal Society, Reliability Engineering & System Safety, Risk Analysis, SIAM Journal of Scientific Computing, Structural Engineering International, Structural Safety, Structure and Infrastructure Engineering, Structural Health Monitoring, Water Resources Research.

Review of research proposals for: German Science Foundation (DFG), European Research Council (ERC), Alexander von Humboldt Foundation, Swiss National Science Foundation (SNF), National Science and Engineering Research Council (NSERC) Canada, Research Foundation Flanders (FWO), Austrian Science Fund (FWF), TUM International Graduate School of Science and Engineering, TU Delft, ETH Zürich.

Tenure reviews for universities in US, UK, Greece, Singapore, India and China.

Organization of workshops and exhibitions

- 2023 Workshop on Deep reinforcement learning for infrastructure maintenance planning: Trends, opportunities and challenges. 1-day workshop at TUM, Main organizer.
- 2021 TUM-IAS Online Series on “Frontiers in monitoring-supported decision making for structures and infrastructures”. Organizer, together with Prof. Eleni Chatzi (ETH)
- 2020 SIAM UQ, Munich, Local organizer. (Event cancelled because of Covid-19)
- 2014, 2015, 2016, 2017, 2018 Annual DVM-Workshop „Zuverlässigkeit und Probabilistik“, München. Main organizer together with Prof. Klemens Rother.
- 2017 FrontUQ, frontuq2017.de, Munich, Co-organizer.
- 2016 IFIP 7.5 Working conference on Reliability and Optimization of Structural Systems, Carnegie Mellon University, Pittsburgh, Co-organizer.
- 2012 TUM-IAS Workshop on Structural Reliability, Risk Assessment and Decision-Making: Past, Present, Future. Main organizer together with Prof. Der Kiureghian.

- 2011 ICASP 11, ETH Zürich, member of the Organizing Committee.
- 2011 ISGSR 3, TUM, member of the Organizing Committee.
- 2011 Workshop on Statistical Methods and Models, TUM IAS, member Organizing Committee.
- 2010 IFIP 7.5 Working conference on Reliability and Optimization of Structural Systems, TUM, conference chair and main organizer.
- 2005 "Welten des Wissens" public exhibition project at ETH Zürich (220'000 visitors), member of the scientific advisory committee and organizer of natural hazard theme.
- 2005 "Natural Hazards in an Alpine Valley", PhD workshop in Saas Grund, Valais, main organizer.
- 2003 "Natural Hazards in an Alpine Valley", PhD workshop at ETH, main organizer.

Selected keynotes and invited lectures

- "Towards a better understanding of risk in structures and construction". Invited lecture, *MunichRe Infrastructure Expert Forum*, Starnberg, July 10, 2024
- "Uncertainty quantification for optimal decision support". Distinguished Lecture, *1st Int. Conference CEACM Central European Association of Computational Mechanics*, Czech Technical University in Prague, June 20, 2024
- "What is the probability of failure?" Invited lecture, *Structural Safety – Past Advancements and Future Challenges, Workshop dedicated to the 50th anniversary of the JCSS*, Prague, May 23, 2024
- "Decision-oriented sensitivity analysis". Semi-plenary lecture, *3rd International Conference on Uncertainty Quantification in Computational Sciences and Engineering UNCECOMP*, Athens, June 13, 2023.
- "Sensitivity analysis for engineering decision making". Keynote lecture, *EMI 2023, Conference of the ASCE Engineering Mechanics Institute*, GeorgiaTech, June 8, 2023
- "Risk-informed approaches for optimizing inspection and maintenance planning of structures and infrastructure systems". Invited lecture, *JCSS Webinar Series on Risk, resilience, and sustainability informed integrity management of infrastructure systems*, November 15, 2022
- "Safe structures under uncertainty: The balance between simplicity and efficiency". Keynote lecture, *International Conference on Building Structures Design*, Kielce, Poland, July 14, 2022.
- "Assessing and demonstrating the value of structural health monitoring: Concepts and detailed application". Keynote lecture, *3rd International Conference on Health Monitoring of Civil & Maritime Structures*, June 8, 2022.
- "Decision-oriented sensitivity analysis for engineering projects and assessments". Invited lecture, *Delft Reliability Exchange (DRE)*, March 28, 2022
- "Decision-theoretic global sensitivity analysis". Semi-plenary lecture, *COBEM2021 – 26th International Conference on Mechanical Engineering*, November 24, 2021.
- "Decision-theoretic sensitivity measures for reliability assessment of engineering systems". Keynote lecture, *1st Sino-German Workshop on Reliability of Complex Systems*, November 5, 2021.

“Understanding and quantifying the effectiveness of warning systems”, Invited talk and panel discussion, UCL Institute for Risk and Disaster Reduction, 11th annual conference, June 23, 2021

“Uncertainty in engineering decision making”, Invited talk, Virtual Conference on Epistemic Uncertainty in Engineering (ViCE), March 3, 2021

“Aleatory or epistemic – why it matters”. Semi-plenary lecture, *3rd International Conference on Uncertainty Quantification in Computational Sciences and Engineering UNCECOMP*, Crete, June 25, 2019.

“Reliability, Decisions, Information, Decisions!” Keynote lecture, *International Conference on Application of Statistics and Probability in Engineering, ICASP12*, Seoul, Korea, May 27, 2019.

“Reliability assessment of deteriorating structures: Challenges and (some) solutions”. Keynote, *IALCCE 2018*, Ghent University, October 29, 2018

“Design criteria for wind-loaded structures beyond Eurocode”. Keynote, *5th Workshop on Structural Analysis of Lightweight Structures*, Innsbruck, October 18, 2018

“Monitoring-based risk analysis of tunnel construction”. Keynote, *3rd Workshop on Resiliency of Urban Tunnels and Pipelines*, Leibniz University Hannover, October 1, 2018

“Reliability and risk management of smart systems”. Invited lecture, University of Stuttgart, Jan. 29, 2018

“Risk management in construction”. Discussion panel, Oskar von Miller Forum, Munich, Nov. 16, 2017.

“Reliability of smart systems”. Keynote lecture, *ESREL 2017*, Portorož, Slovenia, June 21, 2017.

“Holistic optimization of inspections and monitoring in structures”. Invited lecture, *Workshop on Support structure optimization – science or art?* Hanse-Wissenschaftskolleg Institute of Advanced Study, Hamburg, May 20, 2017.

“Optimizing adaptable systems for future uncertainty”. Keynote, *14th International Probabilistic Workshop*, Ghent, Belgium, Dec. 6, 2016.

“Conditional independence in risk analysis of engineered systems”. Invited lecture, *Conference on Conditional Independence Structures and Extremes*, TUM, Oct. 13, 2016.

„Probabilistische Bemessung: Von der unsicheren Sicherheit zur sicheren Unsicherheit“. Invited lecture, *DVM-Workshop Zuverlässigkeit und Probabilistik*, Hochschule München, Nov. 26, 2015.

“Managing hazards and risks in engineering systems by monitoring“, Invited lecture, Seoul National University, August 25, 2015.

“Wie viel (Un-)Sicherheit erreichen wir durch kompliziertere Normen und Nachweisformate?”, Invited lecture, Jahrestagung der Prüfeningenieure Baden-Württembergs, Baden-Baden, June 29, 2015.

“Bayesian Analysis of Rare Events”, Invited lecture, TUM Institute of Advanced Studies Symposium on Big Data and Predictive Modelling, May 20, 2015.

“The Role of Information in Risk Management of Engineering Systems”, Invited lecture, ETH Risk Center, Zürich, May 5, 2015.

“Value of information: How, and how much, do monitoring strategies reduce risk?” Seminar in Computing and Mathematical Science, Caltech, Pasadena, Jan. 6, 2015.

“How effective are warning and alarm systems for natural hazards? A probabilistic attempt at quantifying and optimizing their reliability and effectiveness”, Invited lecture, US Geological Survey, Golden, Dec. 10, 2014.

“Risk Assessment for Structures and Infrastructures using Graphical Models”, Structural Engineering and Structural Mechanics Seminar Series, University of Colorado, Boulder, Nov. 22, 2014.

“Reliability of monitored engineering systems: Novel Bayesian strategies for improved risk management”, Seminar on Uncertainty Quantification, Verification, and Validation, Sandia National Laboratories, Albuquerque, Nov. 7, 2014.

“Risk assessments – learning, understanding and deciding”, Keynote, GAPHAZ: International Workshop on Glacier, Permafrost and High-Mountain Hazards and Risks, University of Torino Sept. 14, 2014

“Choose certainty: Die Schwierigkeiten des Ingenieurs im Umgang mit Unsicherheit und Fehlern”, Invited lecture, Workshop on Taming MICE with Knowledge-based Trust Regimes, Munich Center for Technology in Society, Jan. 31, 2014.

“Managing uncertainty: theory and engineering practice”, Invited lecture, Det Norske Veritas, Oslo, Nov. 28, 2013.

“The Bayesian World of Engineering Risk Analysis”, Invited lecture, Institute for Risk and Uncertainty, University of Liverpool, Nov. 8, 2013.

“Zuverlässigkeit von Konstruktionen mit Inspektionen und Monitoring: Theorie und Anwendung auf Bauwerke, Schienenfahrzeuge und Flugzeuge.“ Invited lecture, *DVM-Workshop Zuverlässigkeit und Probabilistik*, Universität Stuttgart, Nov. 7, 2013.

“Learning, understanding and deciding: How probabilistic methods can support the management of natural hazards.” Invited lecture, Swiss Institute for Snow and Avalanche Research, Davos, Sept. 30, 2013.

„Optimal Integrity Management of Marine Structures: What Marine Engineers can Learn from Google“, Invited plenary lecture, *Marine 2013 – 5th ECCOMAS Specialty Conference on Computational Methods in Marine Engineering*, Hamburg, May 2013.

“Reliability and Risk Assessment for Infrastructure Management”, Invited lecture, Structural Engineering, Mechanics and Materials Seminar, UC Berkeley, April 1, 2013.

“Wie kann der Wert von zerstörungsfreier Prüfung quantifiziert werden?“ Invited lecture, Deutsche Gesellschaft für Zerstörungsfreie Prüfung, München, May 20, 2010 & Stuttgart, April 26, 2012 & Zwickau, January 22, 2013

“Bayesian analysis applied to stochastic mechanics and reliability: Making the most of your data and observations”, Keynote, *9th Optimization and Stochastic Days*, Dynardo, Weimar, November 30, 2012.

„Entscheidungen unter Unsicherheit: Wie AI die Ingenieure bei der Risikoanalyse unterstützen kann“, Invited lecture, *Workshop on Artificial Intelligence in Geodesy*, International Association of Geodesy, München, September 11, 2012.

“Bayesian Updating in Structural Reliability”, Keynote, APSSRA’12, National University of Singapore, May 2012.

“Life Quality Index for Assessing Risk Acceptance in Geotechnical Engineering”, Keynote, ISGSR 3, TUM, June 3, 2011.

“Optimal decision making with incomplete information or What’s the point of modeling uncertainty in engineering?” Keynote, ISUME 2011, Technical University Prague, May 2, 2011.

„Optimales Management alternder Bauwerke mittels Zuverlässigkeits- und Risikoanalyse“, VDI Kolloquium, München April 18, 2011.

“Why and how civil engineers must manage uncertainty and risk”, Invited lecture, Structural Engineering, Mechanics and Materials Seminar, UC Berkeley, March 28, 2011.

“Zuverlässigkeit, Risiken und Robustheit – Vom Umgang des Ingenieurs mit Extremereignissen“, Invited lecture at the Symposium: Lassen sich Extremereignisse beherrschen?, Deutsches Museum, München, Nov. 18, 2010.

“Bayesian Networks for Modeling and Managing Risks of Natural Hazards”, National Telford Institute and Scottish Informatics & Computer Science Alliance (SICSA), Univ. Glasgow, Sept. 9, 2010.

“Information updating in engineering risk analysis: Opportunities, challenges and recent developments”, Keynote, ASRANET 2010, Edinburgh, UK, June 14, 2010.

“Bayesian Approaches to Engineering Risk Analysis”, TUM IAS Workshop, Munich, Jan. 10, 2010.

“Probabilistic modeling and reliability of deteriorating RC structures”, DFG FOR 537 Workshop, TUM, Nov. 6, 2009

“Near-Real-Time Decision Support for Infrastructure Subject to Earthquake Hazard”, Performance Based Earthquake Engineering Workshop, Università Napoli, July 4, 2009

“Engineering Risk Analysis – From Theory to Practice”, Universidad Nacional Autonoma de Mexico (UNAM), July 31, 2008.

“Information Updating in Infrastructure Systems Subject to Multiple Hazards”, Structures Seminar, University of Washington, Seattle, Apr. 10, 2008.

“Bayesian Approaches to Engineering Risk Analysis”, University of Illinois, Urbana, Mar. 4, 2008

“Risk Analysis in Engineering Practice”, Structural Engineering and Geomechanics Seminar, Stanford University, Jan. 16, 2008.

“From Structural Reliability to Risk Analysis: Applications of Probabilistic Methods in Engineering Practice”, Structural Engineering, Mechanics and Materials Seminar, UC Berkeley, Oct. 8, 2007

“The potential of Bayesian networks for assessing catastrophe risks”, Risk Management Solutions RMS, Newark, CA, May 18, 2007

“Uncertainty in seismic fragility models and its effects on infrastructure system reliability”, IBK Seminar, ETH Zürich, Apr. 13, 2007.

„Der Wert von zerstörungsfreier Prüfung“, SGZP Kolloquium, Fachhochschule Aarau, Nov. 10, 2005

“Inspektionsstrategien für den optimalen Unterhalt von Bauwerken”, IBK Kolloquium, ETH Zürich May 3, 2005

“Computational Aspects of Generic Risk Based Inspection Planning“, Keynote lecture, ASRANet Colloquium, Barcelona, July 2004.

Selected industrial projects (consulting, software development and expert reviews)

I have been and am involved in various consulting and software development projects through Matrisk and Eracons, for a multitude of clients. Some key projects are listed here.

Reviews of reliability analyses, risk assessments, design basis, computer codes and novel guidelines for structures and infrastructure systems. Clients include: Nagra, Rijkswaterstaat, Deutsche Bahn, Norwegian Public Road Administration, TNO, TransnetBW, since 2012.

Probabilistic assessment and sensitivity analysis of geological risks for nuclear waste deposits. Client: Nagra, Switzerland, 2021-23

Predictive maintenance for gas networks. Client: NetzeBW, Stuttgart, 2020.

Reliability verification concepts for environment perception in autonomous vehicles. Client: ZF Group, Germany, 2018-20.

Reliability analysis of submerged floating bridges. Client Olav Olsen S.A., Oslo, Norway, 2016-17.

Conceptual development of reliability-based design provisions for retractable structures. Client: SL Rasch, Germany, 2013-15.

Design loads from fluid-structure interaction simulations. Client: SL Rasch, Germany, 2011–12.

Risk analysis for computer facilities of the European Patent Office, Client: TNO, Netherlands, 2010.

Verification of methodology and software for reliability assessment of overhead line towers. Client: Amprion, Germany, 2010.

Reliability-based inspection planning for fixed offshore structures. Client; Pemex, Mexico, 2003-2010.

Risk analysis and reliability-based calibration of design criteria for FPSOs. Client: IMP Mexico, 2007.

Development of a methodology and IT implementation for risk based prioritization of repair actions on offshore structures and systems. Clients: Pemex and IMP Mexico, 2006.

Risk-based inspection planning for process equipment offshore. Client: COMIMSA, Mexico, 2005-06

Reliability assessment and RBI study for critical joints in an offshore steel platform. Client: DNV, 2005.

Consultant for the development of commercial RBI applications. Client Bureau Veritas, Paris, 2001-05

Integral inspection planning for offshore platforms using Bayesian network. Client: IMP Mexico, 2004-05.

Development and implementation of a strategy for the risk based asset integrity management of concrete surfaces subject to corrosion. Client: COWI & Danish Road Directory, 2004-05.

Reliability-based inspection planning software (iPlan), Client: Client; Pemex, Mexico, 2002–03.

Risk-based inspection planning software (iPlan), Client: Maersk Oil & Gas, Denmark, 2002–03.

Scientific publications

H-Index (Google Scholar): 52

In total 134 articles in peer-reviewed journals and another 140 articles in peer-reviewed conference proceedings. I also authored a total of over 1000 pages of lecture notes for multiple courses at TUM.

A full list of publications: https://www.cee.ed.tum.de/fileadmin/w00cbe/era/CVs/Publications_DS.pdf

Google scholar profile: <https://scholar.google.com/citations?user=0cza6-cAAAAJ&hl=en>