

## **Agenda for 39<sup>th</sup> ISSMGE TC304 Meeting (Email meeting)**

**Date:** Sep 13-17 2021 (Mon-Fri)

**Time:** Meeting closes as of 5:00 pm (China Standard Time, GMT +8 hours), Sep 17 2021

### **1. Approval of the 38th TC304 minutes (online Zoom meeting)**

Minutes are approved.

### **2. Activities in the past six months (conferences, short courses, awards, keynotes, and special issue)**

- Are We Overdesigning? – A Survey of International Practice (A joint initiative by the CAPG, the YMPG, TC205 - Safety and Serviceability and TC304 - Risk)
  - Pile Group (Takayuki Shuku & Waldemar Hachich)
  - Retaining Wall Group (Takayuki Shuku, Zijun Cao, Timo Schweckendiek, Marco Redaelli & Guo-Hui Gao)
  - Footing group (Zhiyong Yang, Jianfeng Xue & Jianye Ching)
  - Slope group (Shui-Hua Jiang, Xian Liu & Jianye Ching)
  - Final report:  
<http://140.112.12.21/issmge/2020/TC304%20Report%20on%20overdesign%20survey%20problems.pdf>
  
- State-of-the-art review of inherent variability and uncertainty in geotechnical properties and models (J Ching & Timo Schweckendiek)  
[http://140.112.12.21/issmge/2021/SOA\\_Review\\_on\\_geotechnical\\_property\\_variability\\_and\\_model\\_uncertainty.pdf](http://140.112.12.21/issmge/2021/SOA_Review_on_geotechnical_property_variability_and_model_uncertainty.pdf)
  - Site-specific statistics for geotechnical properties (Zheng Guan, Yu-Chi Chang, Yu Wang (lead), Adeyemi Aladejare, Dongming Zhang, and Jianye Ching)
  - Site-specific correlations between soil/rock properties (Yelu Zhou, Dongming Zhang (lead), and Jianye Ching)
  - Summary of random field parameters of geotechnical properties (Armin W. Stuedlein (lead), Brigid Cami, Diego Di Curzio, Sina Javankhoshdel, Shin-ichi Nishimura, Wojciech Pula, Giovanna Vessia, Yu Wang, and Jianye Ching)
  - Statistics for geotechnical design model factors (Chong Tang (lead) and Richard Bathurst)
  - Statistics for transformation uncertainties (Jianye Ching (lead) and Ali Noorzad)
  - Determining characteristic values of geotechnical parameters and resistance: an overview (Zi-Jun Cao (lead), Jianye Ching, Guo-Hui Gao, Mikhail Kholmyansky, Ali Noorzad, Timo Schweckendiek, Johan Spross, Mohammad Tabarrok, Xiaohui Tan, Yu Wang, Tengyuan Zhao, and Yan-Guo Zhou)
  - Numerical evidences for worst-case scale of fluctuation (Giovanna Vessia (lead), Yan-Guo Zhou, Andy Leung, Wojciech Pula, Diego Di Curzio, Mohammad Tabarrok, and Jianye Ching)
  
- Special Collection of the ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems: Part A on “Bayesian Learning Methods for Geotechnical Data” (Kelvin Yuen, Jianye Ching & Kok-Kwang Phoon)
  - Seven contributions
  - [https://ascelibrary.org/ajrua6/bayesian\\_methods\\_geotechnical](https://ascelibrary.org/ajrua6/bayesian_methods_geotechnical)

- TC304 contribution to ISSMGE Time Capsule Project (J Ching)
  - <https://www.issmge.org/the-society/time-capsule/time-capsule>
  - Technical Committees are asked to succinctly document the development of their area, most conveniently by decades, focusing on major breakthroughs and why that came about, with collateral material (papers etc.) that support their story.
  - History of geotechnical reliability (Marcin Chwala, KK Phoon, Marco Uzielli, Limin Zhang & Jie Zhang)
  - Review on the mountain hazards risk assessment: concept, theory, and methodology (Yu Lei, Shengnan Wu & Yifei Cui)
  - Review on landslide quantitative risk assessment (Jinsong Huang)
  
- TC304 contributions to ISSMGE Virtual University
  - TC304 Young Group has set seven topics for short videos (about 15 min each) introducing different aspects of geotechnical risk and reliability. Target audience would be practicing engineers and students.
    - SV1: Overview and significance of geotechnical uncertainty (Waldemar Hachich)
    - SV2: How to characterize site/model uncertainty (Zijun Cao)
      - <http://virtualuniversity.issmge.org/courses/course-v1:ISSMGE+TC304-103+2020/course>
    - SV3: How to estimate characteristic values for design (Yu Wang)
      - <http://virtualuniversity.issmge.org/courses/course-v1:ISSMGE+TC304-101+2019/about>
      - Examples by Zijun (in preparation)
    - SV4: How does geotechnical uncertainty impact the system response (TBA)
    - SV5: How to perform reliability analyses on a spreadsheet (Lei Wang)
      - <http://virtualuniversity.issmge.org/courses/course-v1:ISSMGE+TC304-104+2021/about>
    - SV6: Insights from geotechnical reliability-based design (BK Low)
      - <http://virtualuniversity.issmge.org/courses/course-v1:ISSMGE+TC304-102+2020/about>
    - SV7: Case studies for reliability-based design and risk assessment (TBA)
  
- 1st TC304 Forum on Georisk Assessment and Management: liquefaction potential assessment, April 24 2021 (Jie Zhang & Yan-Guo Zhou)
  - 2 keynotes + 7 invited presentations
  - Videos of the forum are available at the TC304 website <http://140.112.12.21/issmge/tc304.htm?=11>
  
- 2nd TC304 Forum on Georisk Assessment and Management: Data-driven modeling for geotechnical spatial variability, July 3 2021 (Ikumasa Yoshida & Takayuki Shuku)
  - 1 keynote + 5 invited presentations
  - Videos of the forum are available at the TC304 website <http://140.112.12.21/issmge/tc304.htm?=11>
  
- The 6th National Symposium on Engineering Risk & Insurance Research (NSERIR6), August 14-15 2021, Chongqing University, Chongqing, China (Chairs: Hongwei Huang & Haijia Wen)
  - Hybrid conference with both in-person and remote online presentations
  - 4th TC304/TC309 Student Contest (Wenping Gong, Andy YF Leung, Zijun Cao, Lei Wang)

- First place award
    - Jian-tang Xian, Jin-zheng Hu & Yuan Sun (Tongji University)
  - Excellent Awards:
    - Jinhao Liu, Zhongwei Li & Xiaoyu Hou (Southeast University)
    - Jiaqi Chang, Lei Fu & Wen Cheng (Tongji University)
- Forum on innovation in teaching for civil engineering reliability courses (Jie Zhang & Jian Ji)
  - 7 presentations
- Forum on development of high-quality geotechnical and engineering geology journals (Shigang She & Jie Zhang)
  - Editors and representatives form 8 international geotechnical journals
- Keynote lectures
  - “Progress in data-centric geotechnics- Project DeepGeo” (KK Phoon)
  - “Recent developments on data-driven geotechnics” (J Ching)
  - “Risk assessment of quick clay landslides in Norway” (Zhongqiang Liu)
  - “Estimating reliability for internal stability of MSE Walls” (Richard Bathurst)
  - “Long-distance landslide disaster chain on Sichuan-Tibet Railway” (Limin Zhang)
- ASCE Engineering Mechanics Institute Conference/Probabilistic Mechanics and Reliability 2021, May 25-28, 2021, New York (hosted virtually),
  - Session on Advances in Probabilistic Assessment to Evaluate Robustness and Resiliency of Civil Infrastructure (MS 304) (Sara Khoshnevisan and Lei Wang), 7 papers presented.
- The 4th National Young Scholar Symposium on Engineering Risk Analysis & Management, June 18-20 2021, China University of Geosciences, Wuhan, China (Risk and Insurance Research Branch of China Civil Engineering Society, Chair: Hongwei Huang and Huiming Tang)
  - 5 keynote+29 invited presentations
- Symposium on Digital Geosciences and Geotechnology, Hong Kong, 16 September 2021, The Hong Kong Institution of Engineers
  - Hybrid conference with both in-person and remote online presentations
  - Keynote lectures
    - “Project DeepGeo – Data-driven 3D Subsurface Mapping” (K K Phoon)
    - “Long-term Deformation Monitoring and Analysis of Shield Tunnel by Smart Sensoring” (Hongwei Huang)
    - “Machine Learning and Landslide Studies” (Zhongqiang Liu)
- 2nd International Workshop on Numerical Simulation Methods for Large Deformation Problems in Geotechnical Engineering, Sep 18-19 2021, Tongji University, Shanghai, China (Chair: Hongwei Huang)
  - Hybrid conference with both in-person and remote online presentations

## 2.2 Keynotes

- Farrokh Nadim, opening keynote on “Risk Management for Hydro-Met Hazards: Emerging Challenges, New Paradigms and Pitfalls”, INTERPRAEVENT 2020 Conference: Natural hazards in a changing world, 31 May – 2 June 2021 (Virtual conference)
- Vaughan Griffiths, TH Wu Distinguished Lecture, Ohio State University, February 2021

- Vaughan Griffiths, short course on “Numerical Methods for Engineers” at the University Immersion Program (UIP) organized by Sichuan University in July 2021.
- Iason Papaioannou, keynote on “The cross-entropy method for model-based prediction and updating of rare events”, 13th International Workshop on Rare-Event Simulation (online presentation), May 19, 2021

### 2.3 Others

- Georisk received its first impact factor IF = 3.868

## 3. Future Activities

### 3.1 Conferences & workshops

- 18<sup>th</sup> International Probabilistic Workshop (IPW 2020), May 12-14 2021, University of Minho, Guimaraes, Portugal
  - <https://ipw2020.com/>
  - Session related to TC304: Reliability in Geotechnical Engineering (Timo Schweckendiek & Bram van den Eijnden) (~7 presentations)
- The 3th International Symposium on Testing and Monitoring of Tunnel and Underground Engineering, October 15-17 2021, Central South University, Changsha, China (Chairs: Hongwei Huang & Helin Fu)
  - Hybrid conference with both in-person and remote online presentations
- Machine Learning & Risk Assessment in GeoEngineering (MLRA 2021) - Joint International Symposium of Two Events: 3rd International Symposium on Machine Learning and Big Data in Geosciences (3ISMLG) & TC304 Workshop on Risk Assessment in Geoengineering (TCWW 2021)
  - <http://www.mlra2021.pwr.edu.pl>
  - Conference Chairs: Wojciech Pula, Isam Shahrour & Giovanna Vessia
  - Location: Wroclaw University of Science and Technology, Wroclaw, Poland
  - Date (tentative): 25 – 27 October 2021
  - Date : 25 – 27 October 2021
  - Important dates (tentative):
    - Deadline for extended abstracts (4 pages abstract) 15 September 2021
    - Extended abstract acceptance 20 September 2021
    - Proceedings Electronic Version October 2021
    - Host conference 24-27 October 2021
  - TC309/TC304 Contest (groundwater time-series forecasting) in MLRA2021, Oct 25-28 2021, Wroclaw, Poland
    - Kaggle competition webpage: <https://www.kaggle.com/t/70e822e45c1f4c23b93eff9059b43cc5>
    - Timelines
      - Oct 8 2021: deadline for Kaggle deliveries. Please also send a 2-page extended abstract to Tom ([tom.frode.hansen@ngi.no](mailto:tom.frode.hansen@ngi.no)).
      - Oct 2-16 2021: evaluating the deliveries
      - Oct 17 2021: the 3 best deliveries are announced, and invited to present their result at MLRA2021 on Oct 25 2021
    - Contact: Dr. Tom Frode Hansen ([tom.frode.hansen@ngi.no](mailto:tom.frode.hansen@ngi.no))

- 13th International Conference on Structural Safety & Reliability (ICOSSAR 2021), Jun 22-24 2022, Tongji University, Shanghai, China
  - <http://www.icossar2021.org/>
  - Important dates
    - Full paper due: Oct 31 2021
  - TC304 Sessions
    - Bayesian analysis of structural and geotechnical models (Iason Papaioannou, Costas Papadimitriou, Daniel Straub, Jie Zhang) (1 paper submitted)
    - Hazard and risk assessment of earthquake-induced landslides (Cong Xu & Qing Lü) (1 paper submitted)
    - Machine learning and data analytics in geotechnical site investigation (Yu Wang & Hui Wang) (5 papers submitted)
    - Multi-source and multi-methodological data fusion to improve the reliability of geo-engineering and environmental characterization, urban planning, and geotechnical designing (Di Curzio Diego, Castrignanò Annamaria, Pula Wojciech & Vessia Giovanna) (0 paper submitted)
    - Uncertainty characterization of the geological model and its influences (Wenping Gong & Lei Wang) (1 paper submitted)
  
- 20th International Conference on Soil Mechanics and Geotechnical Engineering (ICSMGE 2022), May 1-5 2022, Sydney, Australia
  - <https://icsmge2021.org/>
  - TC304/TC309 joint workshop on “From geotechnical databases to data analytics: challenges and perspectives” (J Ching & Zhongqiang Liu)
  
- 4<sup>th</sup> International Conference on Information Technology in Geo-engineering (4ICITG), July 2022, Singapore
  - TC304 Session
    - Data analytics in geotechnical and geological engineering (Y Wang, WG Zhang, XH Qi & J Ching)
    - 8 contributions
  
- ISGSR2022, Dec 14-16 2022, University of Newcastle, Newcastle, Australia (Jinsong Huang)
  - Call for session proposals: August 31, 2021(- 15 months)
  - Session proposals due: September 30, 2021 (- 14 months)
  - Call for abstracts: October 31, 2021 (- 13 months)
  - Abstracts due: November 30, 2021 (- 12 months)
  - Acceptance of abstracts: December 31, 2021 (-11 months)
  - Draft full paper due: February 28, 2022 (- 9 months)
  - Draft paper review comments due: March 31, 2022 (- 8 months)
  - Deadline for final papers: April 30, 2022 (- 7 months)
  - Publish final technical program: May 31, 2022 (- 6 months)
  - Submit material to publisher: August 31, 2022 (- 3 months)
  - Host conference: December 14-16, 2022
    - Dec 14 2022: Short course & registration
    - Dec 15-16 2022: conference
  
- 8th International Symposium on Reliability Engineering and Risk Management (ISRERM), Sep 4 - 7 2022, Leibniz University Hannover, Hannover, Germany (Michael Beer, Enrico Zio, Kok Kwang Phoon & Bilal M. Ayyub)
  - Important dates

- Abstract Submission: August 31, 2021
  - Notification of Acceptance: September 30, 2021
  - Full Paper Submission: December 31, 2021
- TC304 Geotechnical related session (Timo Schweckendiek & J Ching)
  - 16 submissions
- ASCE G-I Geo-congress 2022, Charlotte, NC, March 20 2022 – March 23 2022.
  - Session on Risk Assessment and Management (Hui Wang & Lei Wang)
    - 6 papers submitted and reviewed

### 3.2 Special issues

- TC304 Special issue in International Journal of Geoengineering Case histories (Andy Leung)
  - Examples of published papers: <https://www.geocasehistoriesjournal.org/pub>
  - Requires submission of the data from authors (in the form of an excel datasheet) which will be made available online to accompany the paper. The purpose is to facilitate the use of data and enhance impact of the paper.
  - 8 papers have been accepted
    - Bathurst and Allen, Reliability assessment of internal stability for two as-built geogrid reinforced soil walls
    - Stuedlein et al, Effect of Densification on Random Field Model Parameters of Liquefiable Soil and their Use in Estimating Liquefaction-induced Settlement
    - Shuku and Ching, Case Studies on 2D/3D subsurface modeling using Sparse Machine Learning
    - Di Curzio and Vessia, Multivariate geostatistical analysis of CPT readings for reliable 3D subsoil modeling of heterogeneous alluvial deposits in Padania Plain
    - Shibata et al., Case history of risk evaluation of earth-fill dams due to heavy rains
    - Huang et al., Settlement predictions of a trial embankment on Ballina clay
    - Tang et al., Application of Long Short-Term Memory Neural Network and Prophet Algorithm in Slope Displacement Prediction
    - Fraser and Theunissen, Three Dimensional Numerical Modelling of a Propped Cutter Soil mix retention System in Sand
- Special Collection of the ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems: Part A on “Benchmarking Data-Driven Site Characterization Methods” (KK Phoon & Takayuki Shuku)
  - Contact Takayuki ([shuku@cc.okayama-u.ac.jp](mailto:shuku@cc.okayama-u.ac.jp)) if you are keen to submit a paper
  - Timelines
    - 1 Sep 2021 Call for papers/Paper solicitation
    - 1 Nov 2021 Confirmation of corresponding authors and paper titles
    - 1 Apr 2022 Deadline of submission
    - 1 Aug 2022 Decision of all papers
- Special Issue of Gondwana Research on “Advances in Data-Driven Models in Geosciences” (WG Zhang)
  - 12 potential contributions
- Special Issue of Probabilistic Engineering Mechanics on “Data-Centric Foundation Engineering Using Statistics” (KK Phoon and Chong Tang)

- 10 – 14 contributions
- <https://www.journals.elsevier.com/probabilistic-engineering-mechanics/call-for-papers/special-issue-on-data-centric-foundation-engineering-using-statistics>
- Special issue on “Data analytics in geotechnical and geological engineering” in Georisk (Y Wang, WG Zhang, XH Qi & J Ching)
  - 7 accepted
  - 1 in revision
- Special Issue on “Geological Uncertainty and Its Impact on Geohazards and Water Resources Assessments and Infrastructure Design” in Engineering Geology (Chuen-Fa Ni, Chih-Chung Chung, Limin Zhang, Yu Wang, Jia-Jyun Dong)

### 3.3 Keynotes

- Mark Jaksa, keynote on site investigation optimisation that adopts machine learning at MLRA2021
- Armin W. Stuedlein, “Some Critical Observations regarding the Seismic Response of Rigid Inclusions,” 46th Annual Meeting of the Deep Foundations Institute, October 12-15, 2021, Las Vegas, Nevada
- Armin W. Stuedlein, “Driven Displacement Pile Ground Improvement for Liquefaction Mitigation,” Piling and Ground Improvement Conference 2022, February 23-25, 2022, Sydney, Australia, Deep Foundations Institute
- Armin W. Stuedlein, theme lecture on “On the In-Situ Seismic Response of Medium Dense Sand and Comparison to Cyclic Stress- and Strain-based Laboratory Behavior,” 4th International Conference on Performance-based Design in Earthquake. Geotechnical Engineering (PBD-IV), July 15 -17, 2022, Beijing, China
- Jinsong Huang, keynote on “Use of Probabilistic Methods in Geotechnical Engineering”, 2021 Australian Geomechanics Society Victorian Symposium, October 21, 2021.
- Vaughan Griffiths, a module on “Slope Stability Analysis” at the annual iRALL (International Research Association on Large Landslides) to be hosted by the SKLGP, Chengdu University of Technology, Chengdu (October 2021)
- Fredrik Johansson from KTH Royal Institute of Technology has been awarded the prestigious Franklin lecture 2020 by the ISRM and will give the keynote lecture online during EUROCK 2021 in Torino on “Managing uncertainties in sliding stability re-assessment of concrete dams founded on rock”

### 3.3 Short courses

- Vaughan Griffiths, short course on “Risk Assessment in Geotechnical Engineering” at the upcoming G-I Specialty Conference Geo-Extreme 2021 (November 2021)
- Iason Papaioannou, 4-day course on Structural Reliability, University of Kielce, Poland, October 5-8, 2021

### 3.4 Textbook & monographs& book chapters & design codes

- Textbook/Monograph: "Reliability-Based Design in Soil and Rock Engineering: Enhancing Partial Factor Design Approaches", by BK Low, CRC Press, published in 2021, 399 Pages, ISBN 9780367631390.
- Textbook “Geotechnical Reliability Analysis: theories, methods, and algorithms” by Jie Zhang et al., to appear in 2021 (Materials submitted to the publisher)
- Monograph “Model Uncertainties in Foundation Design” by Tang Chong and KK Phoon, CRC Press, published in 2021 (20% discount code available on request)
- Monograph “Big Data in Geotechnics” by KK Phoon, Chong Tang & J Ching, in preparation

- Textbook “Soil mechanics and foundation engineering” 2nd Edition (in Chinese), by Lulu Zhang et al., China Construction Industry Press, to appear in 2022
- Textbook “Reliability Theory in Geotechnical Engineering” 2nd Edition (in Chinese), Tongji University Press, by Lulu Zhang, Jie Zhang, and Xu Li
- Book chapter on "Limit State Design" that will be appearing in the next edition of the Canadian Foundation Engineering Manual (it was supposed to appear in 2021, but probably will appear in early 2022) by Gordon Fenton
- CHBDC (Canadian Highway Bridge Design Code) Section 6 Technical Subcommittee on "Foundations and Geotechnical Systems", Part of the ongoing work on the geotechnical design provisions to appear in the next edition of CHBDC (2025), Chaired by Gordon Fenton
- NBCC (National Building Code of Canada) Task Group on Geotechnical Design, Chaired by Gordon Fenton
- Greg Baecher and Bob Gilbert are involved with the development of a primer and direction-setting document on reliability-based methods for ASCE-7 (the structural code guidance by ASCE) under the sponsorship of Jean-Louis Briaud, who is now President of the overall ASCE organization. The target is to have a draft ready for review by the G-I by the end of the year.

### 3.5 Book review

- Marco Uzielli, as requested by the editors of Italian Geotechnical Journal, performed a Book review on “Model Uncertainties in Foundation Design” by Chong Tang and Kok-Kwang Phoon. The book review will be published in the 2021 September issue of Italian Geotechnical Journal

## 4. Honors & Awards

- Prof. Greg Baecher delivered the Terzaghi Lecturer on May 14 2021.
  - The video is available at: <https://www.youtube.com/watch?v=Y5w1p3uAe0I>
- Richard J. Bathurst and his co-authors have won the prestigious 2021 ASCE Geo-Institute Thomas A. Middlebrooks Award for the following paper:
  - Bathurst, R.J., Allen, T.M., Lin, P. and Bozorgzadeh, N. 2019. LRFD calibration of internal limit states for geogrid MSE walls. ASCE Journal of Geotechnical and Geoenvironmental Engineering 145(11):04019087.

## 5. Other businesses

- More TC304 contributions to ISSMGE Virtual University
  - 15-min short videos contributed by Iason Papaioannou, Wengang Zhang & Stephen Wu.
- 304dB database (<http://140.112.12.21/issmge/tc304.htm?=6>)
  - Expansion of 304dB
    - New database: Shanghai municipal clay database SH-CLAY/11/4051 (Dongming Zhang & Hongwei Huang)
      - 51 sites in Shanghai, China
    - Upcoming database: load tests (Tang Chong & KK Phoon)
- Review of ASTM standards on Geostatistics (Armin)

- OVERVIEW: Gerald Verbeek, Chair of ASTM Committee D18.01, Committee for Surface and Subsurface Characterization has engaged TC304 to assist with the review of standards related to geostatistics
- The four standards (available on request) to be reviewed include:
  - D5924 – 18: Selection of Simulation Approaches in Geostatistical Site Investigations
  - D5549 – 19: Contents of Geostatistical Site Investigation Report
  - D5922 – 18: Analysis, Interpretation, and Modeling of Spatial Variation in Geostatistical Site Investigations
  - D5923 – 18: Selection of Kriging Methods in Geostatistical Site Investigations
- The review period is planned to take about 12 months (this is somewhat flexible), and then delivered to D18.01 for discussion and consensus building prior to formal voting for updating and extension in the ASTM Standards
- TC304 Members who are interested in contributing to the review of these standards should express interest to Armin at [armin.stuedlein@oregonstate.edu](mailto:armin.stuedlein@oregonstate.edu)
- Planned approach
  - Recruit three TC304 members to form team for each of four standards:
    - Team members individually perform review and revision
    - Meet upon completion to discuss, combine, and propose consensus revisions to Armin
    - Armin to review consensus document, provide suggestions and feedback
    - Team incorporates revisions as necessary to draft finalize revised Standard
    - Armin to send to Gerald Verbeek as draft final product
  - Members can serve on more than one review team
  - Review Goals
    - Perform review of standard to identify gaps in and out-of-date methodology and procedures, propose new text in concise “standard” language format
    - Identify out-of-date references and propose new references to support revisions to standards
- TC250/SC7/TG-C3 Reliability-based methods (Timo)
  - guideline document for reliability-based verification of limit states in geotechnical design and assessment
  - to be published as JRC Technical Report (EU Joint Research Centre)
  - task group with 28 members from 14 European countries (TG leader: Timo Schweckendiek)
  - planning milestone: draft report ready by September 2022
  - Jianye Ching provides assistance from TC304 through feedback and suggestions