ISSMGE FOUNDATION
REPORT ON CONFERENCE ATTENDANCE

Your Name:	***Your Organization:***	***Date of report:***
LEI LI (Bruce Li)	New Zealand Geotechnical Society (NZGS)	16 June 2026
Conference Title:	***Location of Conference:***	***Dates of Conference:***
8th International Young Geotechnical Engineers Conference (8iYGEC)	*Graz, Austria* *Graz University of Technology*	11^{th} – $14t^{h}$ June

What you learned:

During the technical sessions, I learned how advanced machine learning algorithms like Random Forest and Deep Neural Networks (DNN) can be implemented to evaluate binary liquefaction susceptibility from global Standard Penetration Test (SPT) databases. This methodology bypasses traditional empirical corrections, offering a highly scalable decision-support framework. I discovered how this paradigm aligns with large-scale projects like the National Liquefaction Model (NLM) in New Zealand, which was developed using a similar computational approach to generate nationally consistent hazard data.

Beyond my research, I gained extensive knowledge from other presenters' cutting-edge work. Key highlights included the application of the Discrete Element Method (DEM) to model micro-mechanical contact behaviours and crushing in granular soils, demonstrating how grain-scale degradation governs macroscopic shear localization.

Additionally, I learned about state-of-the-art field monitoring techniques, particularly the integration of Distributed Fiber Optic Sensing (DFOS) to continuously monitor strain variations in active landslide zones and subterranean retaining walls, providing a robust physical baseline for early warning systems.

People you met:

- **Sergei Terzaghi** (Principal - Geotechnical, GHD)
- **Prof. Lidija Zdravkovic** (Imperial College London)
- **Prof. Kenichi Soga** (UC Berkeley)
- **Robert & Florian Thurner** (Keller)
- **Prof. Helmut F. Schweiger** (TU Graz)
- **Prof. Franz Tschuchnigg** (Head of Organising Committee, TU Graz)
- **Prof. Catherine O'Sullivan** (Imperial College London)
- **Tony O'Brien** (Global Geotechnical Director, Mott MacDonald)
- **Prof. Steven L. Kramer** (University of Washington)

Main features of conference:

The 8iYGEC served as an extraordinary precursor to the 21st ICSMGE in Vienna. Its defining features included:

- Global Early-Career Assembly: Brought together more than 80 of the brightest young geotechnical researchers and engineers representing dozens of national societies

worldwide to exchange findings and methodologies.

- World-Class Keynotes: Featured highly authoritative lectures on cutting-edge topics, including numerical modelling of complex structures, distributed fibre-optic infrastructure monitoring, and advanced constitutive modelling for deep excavations.
- Interactive Workshops: Interactive technical sessions utilizing advanced computational modelling software, promoting open and collaborative discussions regarding soil-structure interactions.
- Professional Networking: Dedicated platforms that established long-term research connections and professional friendships across borders.

Your comments on the conference:

The 8iYGEC was an exceptional and flawlessly organized event. It served as a vital intellectual bridge, connecting early-career practitioners with globally recognized academic and industry leaders.

I am profoundly grateful for the crucial travel support provided by the ISSMGE Foundation. This generous backing allowed me to proudly represent the New Zealand Geotechnical Society on the world stage. It is my sincere wish to engage in further developments and initiatives that continue to expand and strengthen the outreach and global influence of ISSMGE.

Please attach short report (maximum 400 words) suitable for publication in the ISSMGE Bulletin:

The 8th International Young Geotechnical Engineers Conference (8iYGEC), held at the Graz University of Technology, Austria, from June 11–14, 2026, brought together young geotechnical professionals from across the globe. Representing the New Zealand Geotechnical Society (NZGS), I had the distinct privilege of presenting my research on "Machine Learning-Based Liquefaction Classification: A Comparative Study of Random Forest and Deep Neural Networks."

The presentation focused on utilizing data-driven classifiers to evaluate binary liquefaction occurrence, bypassing hand-crafted empirical correction factors. It was incredibly encouraging to discuss these findings alongside New Zealand's National Liquefaction Model (NLM), which was developed using a similar computational approach to bridge regional hazard data gaps, demonstrating the scalability of automated statistical modelling.

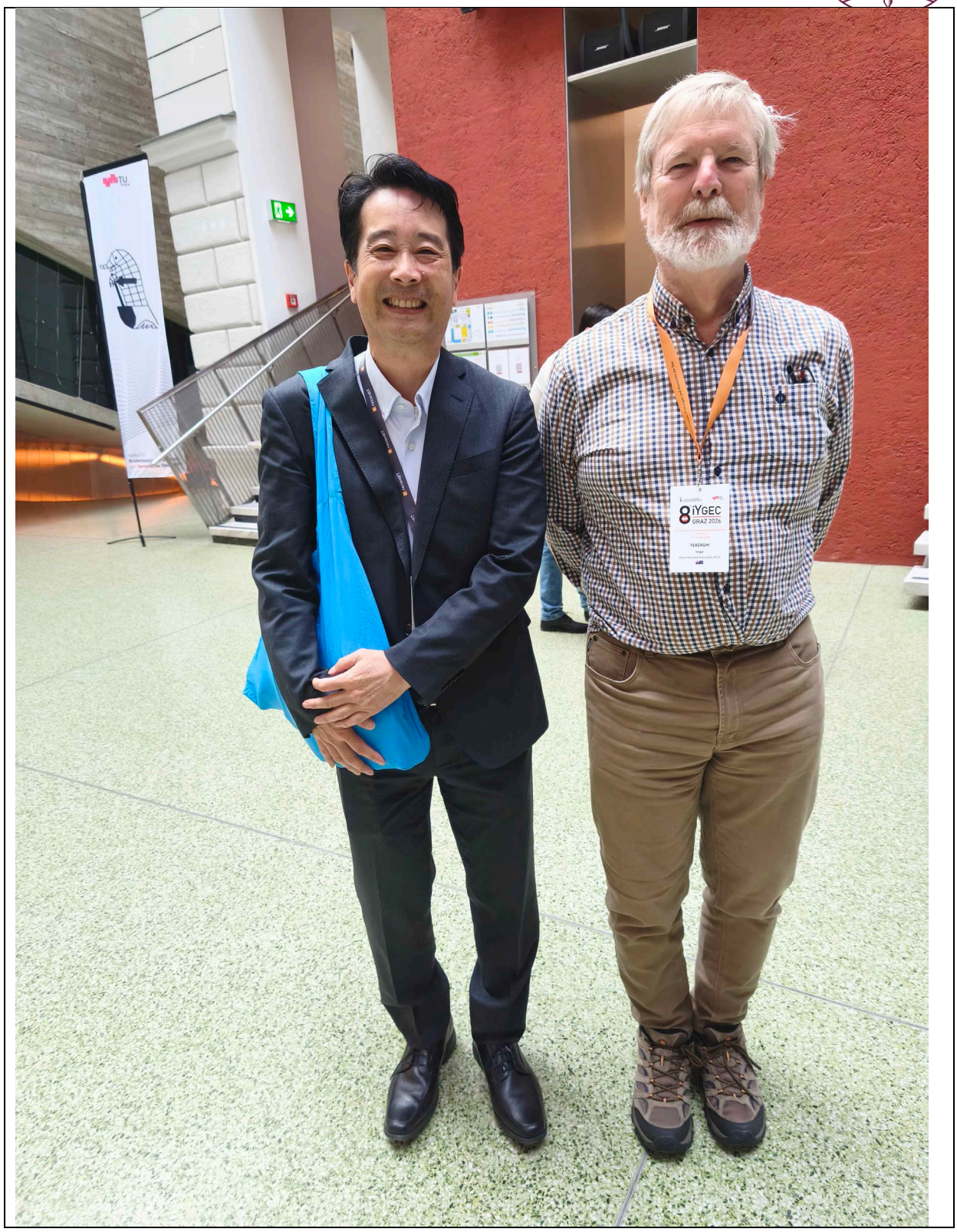
The technical program at 8iYGEC offered an incredibly rich learning experience. Highly authoritative keynote addresses by leading experts—such as Professor Kenichi Soga on digital underground infrastructure and Professor Lidija Zdravkovic on state-of-the-art numerical analysis—provided masterclasses on integrating field research with industrial design. Technical sessions showcased diverse and groundbreaking work from fellow young presenters. Notably, I gained valuable insights into Discrete Element Method (DEM) applications for granular particle degradation and contact mechanics, alongside state-of-the-art field monitoring techniques employing Distributed Fiber Optic Sensing (DFOS) for real-time landslide warning.

The conference fostered a highly collaborative atmosphere, enabling productive technical discussions with world-renowned figures like Sergei Terzaghi and Steven L. Kramer, alongside peers from various national societies. These exchanges opened exciting avenues for international research partnerships.

I would like to express my sincere gratitude and appreciation to the ISSMGE Foundation for their support, which facilitated my travel and attendance. This experience has profoundly shaped my professional outlook. I look forward to taking these advanced technical insights back to New Zealand, contributing actively to further developments, and playing my part in expanding the global footprint and influence of ISSMGE.

Photographs from Conference:


8iYGEC
GRAZ 2026


8iYGEC
GRAZ 2026
TERZAGHI

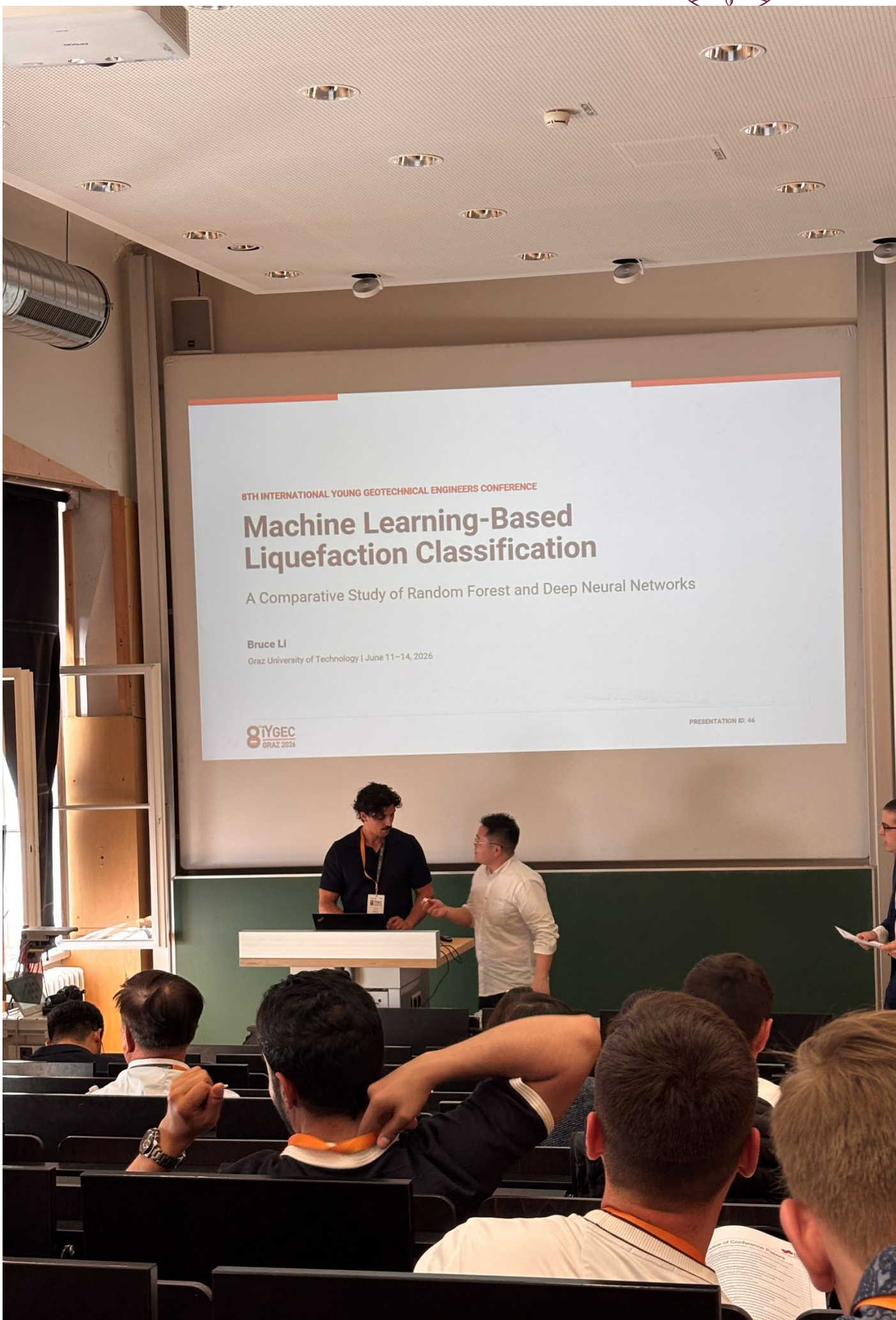

DB
Insta360 X5

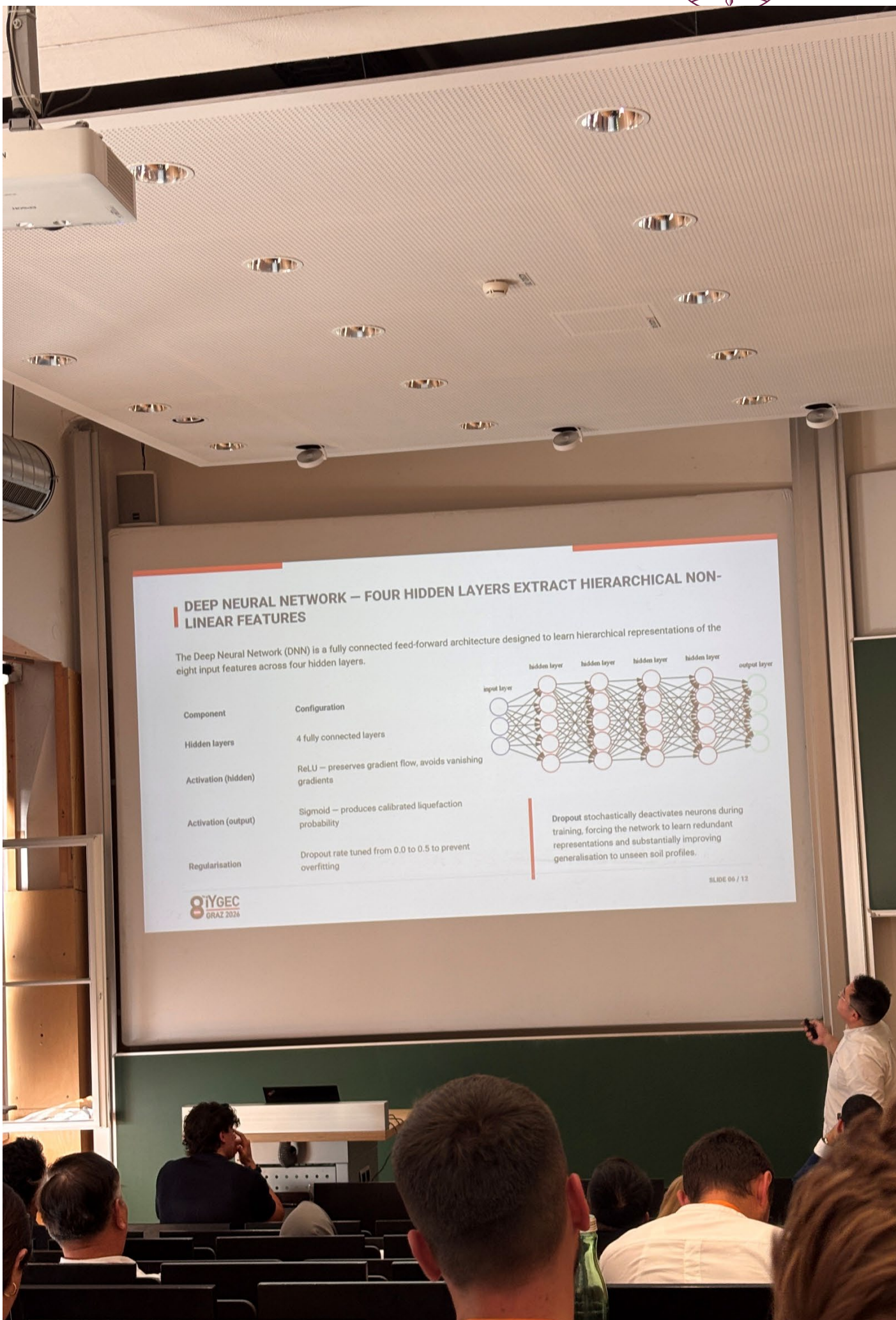

992
Achtung!
Vor dem Lösen der Schrauben Querhaupt gegen Herunterfallen sichern.
Schrauben mit einem Drehmoment von 245 Nm anziehen.
Attention!
Do not untighten screws without supporting the cross beam.
Tighten the screws with torque 245 Nm.
STRASSENTEST
Baustoff-Prüfsysteme
Triax-Presse
(STRASSENTEST BAUSTOFF-PRÜFSYSTEME, Aschaffenburg (Deutschland), 1992)
Die Triax-Presse (Modell 824) verfügt über einen Schrittmotor, dessen Vorschubgeschwindigkeit von 0,001 bis 9,999 mm/min eingestellt werden kann. Die maximal mögliche Kraft beträgt 100 kN.
Die Presse besteht aus dem Maschinengestell und dem Steuerschrank. Das Maschinengestell beinhaltet den Belastungsrahmen mit der oberen Traverse und der unteren Traverse (im Gehäuse) sowie den Antrieb (Kugelumlaufspindel, Schrittmotor und Getriebe). Im Schaltschrank befindet sich eine Anlage zur Herstellung von entlüftetem Wasser, die Elektronik sowie Anzeigen und Bedienungselemente. Bei Triaxialversuchen kann damit sowohl der Seitendruck (Zelldruck) als auch ein Porenwassergegendruck (Backpressure) gesteuert werden.
Die Anschaffungskosten für die komplette Anlage mit Zubehör betrug ca. 100.000 DM (Deutsche Mark).
Triaxial compression test machine
(STRASSENTEST BAUSTOFF-PRÜFSYSTEME, Aschaffenburg (Germany), 1992)
The triaxial compression test machine (model 824) has a stepper motor whose feed speed can be set from 0.001 to 9.999 mm/min. The maximum possible force is 100 kN.
The press consists of the machine frame and the control unit. The machine frame contains the load frame with the upper cross beam and the lower cross beam (in the housing) as well as the drive (ball screw, stepper motor and gearbox). The control unit contains a system for producing deaerated water, the electronics as well as displays and operating elements. In triaxial tests, both the cell pressure and a pore water back pressure can be controlled.
The acquisition costs for the complete system with accessories amounted to approx. DM 100,000 (German marks).
speed selector
Auf up
Ab down
Eilgang rapid travel
HALT
Halt stop
Rechner EIN
Rechner AUS
9 0 4 4
×0,01
×0,10
×1,00
mm / min
Multiplikator multiplier

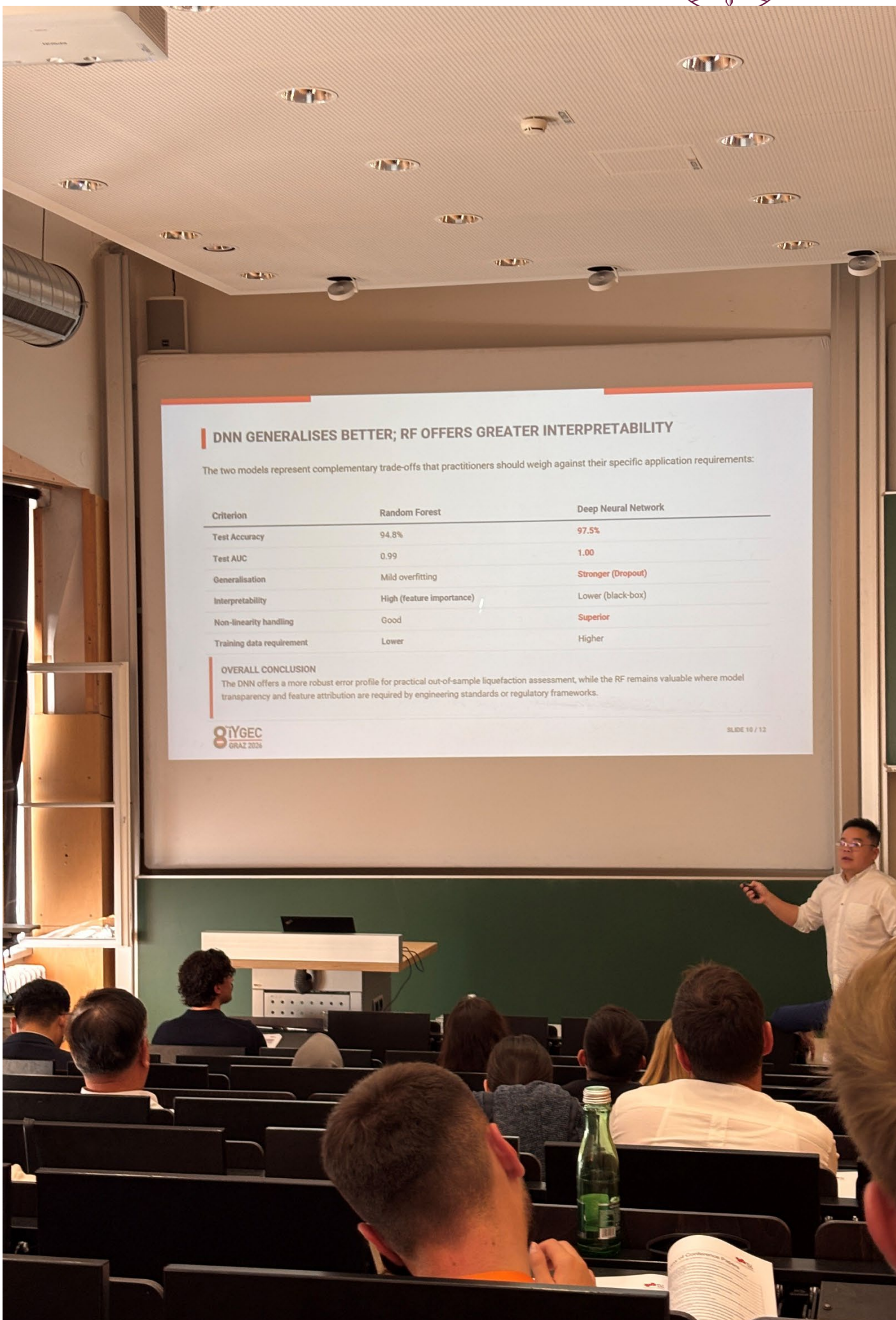



Donnerstag
17 Uhr 11.06.2026
From Sandpit to AI:
Forty years as a practising
Geotechnical Engineer
Serge Terzaghi (A.O.Sullivan & Associates LTD)
Graz University of Technology
Lecture Hall I, Rechbauerstraße 12
Subsequently
The 8thiYGEC is supported by:
KELLER
ÖGG
8TH iYGEC
GRAZ 2026
Icebreaker Event


Als Zeichen
des Dankes und der
Verbundenheit
mit der
Technischen Universität
Graz,
8iYGEC
GRAZ 2026


8TH INTERNATIONAL YOUNG GEOTECHNICAL ENGINEERS CONFERENCE
Machine Learning-Based Liquefaction Classification
A Comparative Study of Random Forest and Deep Neural Networks
Bruce Li
Graz University of Technology | June 11–14, 2026
8IYGEC GRAZ 2026
PRESENTATION ID: 46


DEEP NEURAL NETWORK — FOUR HIDDEN LAYERS EXTRACT HIERARCHICAL NON-LINEAR FEATURES
The Deep Neural Network (DNN) is a fully connected feed-forward architecture designed to learn hierarchical representations of the eight input features across four hidden layers.
Component
Configuration
Hidden layers
4 fully connected layers
Activation (hidden)
ReLU — preserves gradient flow, avoids vanishing gradients
Activation (output)
Sigmoid — produces calibrated liquefaction probability
Regularisation
Dropout rate tuned from 0.0 to 0.5 to prevent overfitting
input layer
hidden layer
hidden layer
hidden layer
hidden layer
output layer
Dropout stochastically deactivates neurons during training, forcing the network to learn redundant representations and substantially improving generalisation to unseen soil profiles.
SLIDE 06 / 12
GRAZ 2026


DNN GENERALISES BETTER; RF OFFERS GREATER INTERPRETABILITY
The two models represent complementary trade-offs that practitioners should weigh against their specific application requirements:
Criterion
Random Forest
Deep Neural Network
Test Accuracy
94.8%
97.5%
Test AUC
0.99
1.00
Generalisation
Mild overfitting
Stronger (Dropout)
Interpretability
High (feature importance)
Lower (black-box)
Non-linearity handling
Good
Superior
Training data requirement
Lower
Higher
OVERALL CONCLUSION
The DNN offers a more robust error profile for practical out-of-sample liquefaction assessment, while the RF remains valuable where model transparency and feature attribution are required by engineering standards or regulatory frameworks.
GIYGEC
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SLIDE 10 / 12


TU
Graz
GAM
Geotechnik


8iYGEC
GRAZ 2026


39. CHRISTIAN VEDER KOLLOQUIUM


Development of the Triaxial Test Devices
1983
WYKEHAM FARRANCE test machine
Description of the components
1958
FARNELL triaxial compression test
machine in the Soil Mechanics
Laboratory
1955
LEONARD FARNELL

Karl von Terzaghi



Karl TERZAGHI in 1926. [1]

Note: since the 1919 law abolishing the nobility, his name was no longer Karl von Terzaghi according to the law.

Born: October 2, 1883 in Prague (then Austria-Hungary)

Died: October 25, 1963 in Winchester, Massachusetts (USA)

Childhood, teenage years, and education

- TERZAGHI came from an old Austrian noble family with a long military tradition; his father, Anton von TERZAGHI, Edler von Pontenuovo, was a lieutenant colonel in the Imperial Army.
- The family moved from Prague to Graz (Austria) and when TERZAGHI's father died, his grandfather became his guardian. His grandfather had studied engineering and was a role model for TERZAGHI.
- 1893: From the age of 10, TERZAGHI attended various military-oriented secondary schools in Hungary, Moravia, Vienna, and Graz.
- 1900: High school graduation in Graz, followed by mechanical engineering studies at the 'Technische Hochschule Graz' (now TU Graz), which he completed in 1904. During this time, he also turned his attention to civil engineering and geology, attending seminars with hydraulic engineer Professor FORCHHEIMER, among others.
- 1905: During his one-year military service, he translated GEIKIES' work 'Outlines of Field-Geology', which was published in 1906 as „Anleitung zu Geologischen Aufnahmen" ('Guide to Geological Surveys'). This was **TERZAGHI's first publication**.

Professional career

- 1906–1912: TERZAGHI worked as a mechanical engineer in Graz, but realized that he would "*find no satisfaction*" in this field. He then went on to work as a project engineer at the company ADOLF BARON PITTEL in Vienna (now PITTEL+BRAUSEWETTER). After three years, he took up positions in Croatia and Russia. During projects at home and abroad, unexpected ground settlement or difficulties with foundation work sometimes arose, leading TERZAGHI to decide to focus his efforts on researching the border area between geology and civil engineering. In retrospect, this was **the birth of modern soil mechanics ...**
- 1912: TERZAGHI received his doctorate from the 'Technische Hochschule Graz' (now TU Graz) for his dissertation entitled „Beitrag zur statischen Untersuchung zylindrischer Wasserbehälter" ('Contribution to the static investigation of cylindrical water tanks').
- 1914–1916: During World War I, TERZAGHI led a pioneer company in Serbia as a first lieutenant. He later worked on the expansion of the Aspern military airfield in Austria.
- 1916–1918: Professor in Turkey at the Royal Ottoman University in Constantinople (now TU Istanbul). TERZAGHI conducted his first soil mechanics research there; a paper on earth pressure on retaining walls was translated into English in 1919.
- 1918–1925: After the war ended, he continued his work at Robert College (an American high school founded in Constantinople in 1863) and conducted laboratory experiments with the most basic equipment: *"The inventory of my laboratory consisted solely of empty cigar boxes, the college's kitchen scales, an old apothecary's scales that I had bought in the bazaar in Istanbul, and a few steel bands."* [5]

- 1925: TERZAGHI published his groundbreaking findin including the consolidation of cohesive soils with his th stresses – in his **fundamental book „Erdbaumechanik a kalischer Grundlage"** ('Soil mechanics based on soil ph
- 1925–1929: Professor in the USA (at M.I.T. Massachus Technology). TERZAGHI summed up this period as follows *problems of soil mechanics has been aroused throughou professional world through word of mouth and in writing have been set up in Washington D.C., Cambridge, M Boston, San Francisco, and the Sandwich Islands, where tinues even after my departure from the United States."* [
- 1929–1938: Professor in Austria at the 'Technische Hoc (now TU Wien). TERZAGHI began setting up a soil mechan in the basement of the university. Due to his mechanica studies, he was able to build the necessary equipment him with his colleagues who came from Austria and abroad TERZAGHI. A. CASAGRANDE, a close colleague of TERZAG **these years in Vienna to be the most important**: *"There is that during the nine years from 1929 to 1938, Vienna rapid into the world's leading center for soil mechanics."* [4]
- TERZAGHI's new theses and theories led to a scientific disp Viennese colleague FILLUNGER (professor of elasticity and materials at the 'Technische Hochschule Wien' (now TU W was played out in public in a series of sometimes polemical p FILLUNGER criticized TERZAGHI's consolidation theory an TERZAGHI personally. A commission of inquiry set up by the re mately ruled in TERZAGHI's favor in 1937; however, FILLUNGE so much to heart that he and his wife subsequently committ
- 1938–1953: TERZAGHI left Vienna and became a professor at Harvard University, where he taught soil mechanics and s numerous construction projects both nationally and internati
- 1953: TERZAGHI retired, but continued to give guest lectures continued to work as a consulting engineer.
- 1963: On October 25, 1963, TERZAGHI died in Winchester, Massa shortly after his 80th birthday. Until his death, he was marri American geologist Ruth D. TERZAGHI.

Legacy

- TERZAGHI is considered the **'father of modern soil mecha** was the first to study soils not only empirically, but also on the physical principles (e.g., development of consolidation theory principle of effective stresses). He laid the foundations of geot engineering, thereby changing civil engineering forever. His id methods are taught and applied worldwide – he remains a ke in the history of engineering. He received the Norman Medal f ASCE (American Society of Civil Engineers) four times, nine h doctorates, and authored over 200 publications. Thanks to the of BJERRUM, a large part of his estate is now housed in the TEF Library in Oslo at the Norwegian Geotechnical Institute.

Literature:

[1] BJERRUM, L., CASAGRANDE, A., PECK, R. B., SKEMPTON, A. W. (1960): From Theory to Practice; J. Wiley & Son

[2] BRANDL, H. (1983, 1984): 100 Jahre Prof. Dr. Dr. h. c. mult. Karl v. Terzaghi. Institutsmitteilungen, Heft 2, TU W

[3] BRANDL, H. (1996): Prof. Dr. mult. Karl v. Terzaghi - Bodenmechanik und Geotechnik; Österreichische Ingenieur- Architekten-Zeitschrift (ÖIAZ), 141. Jg., Heft 7-8; Wien.

[4] HOFMANN, T. (2024): Karl von Terzaghi: Kontinentenpendler und Begründer der modernen Bodenmechanik; „Der Vienna.

[5] TERZAGHI, K. (1932): Mein Lebensweg und meine Ziele. Autobiographie anläßlich der Aufnahme in die Akademie Wissenschaften; Wien.

