



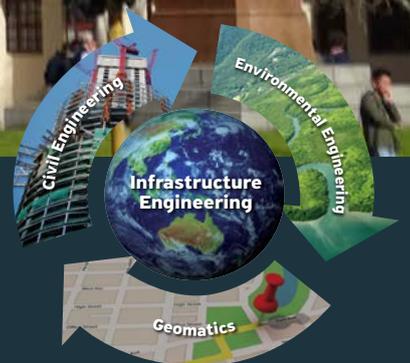
2018

ANNUAL REPORT

DEPARTMENT OF
INFRASTRUCTURE ENGINEERING



SCHOOL OF ELECTRICAL, MECHANICAL
AND INFRASTRUCTURE ENGINEERING





THE DEPARTMENT OF INFRASTRUCTURE ENGINEERING brings together THE Civil, Environmental and Geomatic Disciplines, WITH our major research themes



- GEOTECHNICAL AND RESERVOIR
- STRUCTURES AND MATERIALS
- PROJECT MANAGEMENT
- TRANSPORT ENGINEERING
- OCEAN ENGINEERING
- BUILDING ENERGY
- SPATIAL SCIENCE
- SPATIAL DATA INFRASTRUCTURE AND LAND ADMINISTRATION
- HYDROLOGICAL AND WATER RESOURCES
- ENVIRONMENTAL SENSING AND MODELLING
- DISASTER MANAGEMENT
- SMART CITIES

CIVIL

Civil engineering deals with the design, construction, and maintenance of the physical and naturally built environment, including works like roads, bridges, canals, dams, and buildings.

ENVIRONMENTAL

Environmental engineering is concerned with the application of scientific and engineering principles for protection of human populations from the effects of adverse environmental factors; protection of environments, both local and global, from the potentially deleterious effects of natural and human activities; and improvement of environmental quality. It also addresses issues of energy preservation and control of waste from human and animal activities.

GEOMATIC

Geomatic engineering is a discipline that focuses on spatial information (i.e. information that has a location). The location is the primary factor used to integrate a very wide range of data for spatial analysis and visualization. Geomatics engineers apply engineering principles to spatial information and implement relational data structures involving measurement sciences. They also manage local, regional national and global spatial data infrastructures. Geomatics also involves aspects of Computer Engineering, Software Engineering and Civil Engineering.



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PROF ABBAS RAJABIFARD
HEAD OF DEPARTMENT

I am very pleased to share with you our Department of Infrastructure Engineering 2018 Annual Report.

As an integral part of the School of Electrical, Mechanical and Infrastructure Engineering (EMI) our focus is on quality teaching and research, engagement and partnerships, and impact and improved infrastructures to strengthen the School's structure growth, research education plans, focus on engagement and improving student experience and our impact and international standing. In turn, we play a major role in supporting the MSE2025 strategic plan across the Green Industry Digital Innovation and Data and Society platforms. IE leads three of the twelve programs (Transport, Water & Environment, and Resilient Infrastructure), and is making a major contribution to four more: Energy Technologies, Advanced Manufacturing, Defence Technologies, and Data and Society.

With these three IE-led innovation platforms and several large-scale initiatives including the AIMES and iMOVE CRC in connected transport systems, the CRC-P in construction technology and ocean engineering; the Centre of Excellence for Innovative Construction Technologies (CEICT), and advanced urban land administration and ePlan project, the Department is well placed to lead nationally and internationally.

In 2018 we welcomed eight new staff members into the Department: Prof. Mark Cassidy, who is Dean of the Melbourne School of Engineering with research in the domain of Geotechnical Engineering; Dr Patricia Lavieri and Dr Neema Nassir in Transport; Dr Xuemei Liu, Dr Wenyan Wu and Dr Huu-Tai Thai in Structural Engineering; Dr Amir Khodabandeh in Satellite Positioning and Geodesy; and Dr Conrad Wasko as McKenzie Fellow working in the impact of climate change on stochastic hydrology.

HEAD'S Report



Seven of our staff were promoted and we congratulate: Prof. Lu Aye, A/Prof. Lihai Zhang, A/Prof. Angus Webb; Senior Lecturers Dr Kourosh Khoshelham, Dr Martin Tomko; and Lecturers Dr Rackel San Nicolas and Dr Avril Horne.

Our Industry Advisory Group continued to provide valuable insights on our strategic planning and teaching and research programs. Representing a broad spectrum of industries, each member is a vital link to the external stakeholders who comprise their field of expertise. We welcomed two new members to the group in 2018: Dr Collette Burke and Ms Emma Woodhouse.



Two of our longest serving staff, teaching specialists Cliff Ogleby and Graham Moore, retired in 2018 and we wish them the very best. Cliff and Graham have been tireless in their support and advocacy for students and teaching over the years and they are remembered with gratitude by engineers around the world and will be much missed in the Department.

The Department has had a very successful year in our grants and funding, with (see page 50).



Internationally in 2018, the Department was again very active in seeking international research collaboration with visits to and from colleagues in academia, industry and government.

IE staff received several prestigious awards. Dr Ali Kashani (pictured left with The Hon Linda Dessau AC, Governor of Victoria) was one of the recipients of the prestigious Churchill Fellowship Award. Dr Conrad Wasko was honoured with the Lorenz G. Straub award in Minnesota on October 22. Dr Mohsen Kalantari received the Education Development Award at the Spatial Excellence Awards in December. Dr Mukta Sapkota (now a Research Assistant in the Department) was the winner of the AWA Student Water Award 2018. Dr Alice Kesminas was the recipient of the 2018 Thornton Smith-Award.



Other honors include: Prof. John Langford (left) being elected to the Water Engineering Hall of Fame at the 2018 Hydrology & Water Resources Symposium and Prof. Majid Sarvi becoming the first academic to be appointed to the ITS Australia Board of Directors.



Ms Chinchu Mohan (left) was a grand finalist in the 2018 3-Minute Thesis Competition and was awarded the People's Choice Award for her presentation: "How much are we eating up our water resources?"

Our research students also received several awards in 2018. Three MSE/IE students won Australian Spatial Information Education and Research Association (ASIERA) young author awards for their papers at 2018's national spatial industry event, GeoSmart Asia/Locate Conference 2018 in Adelaide: Debaditya Acharya, David Amores and Ehsan Hamzei.

Dr Marie Truelove was named Postgraduate of the Year at the Spatial Excellence Awards held in December. (Other student awards can be found in pages 64, 66-67).

I thank everyone in the Department for their hard work, support and kindness to each other in 2018, and wish you all a wonderful year in 2019

I thank all of our academic and professional colleagues for their work throughout the year: teaching, supervising, demonstrating, arranging field trips and being generous with their time, expertise and guidance to our students and colleagues. In particular, I thank Prof. Colin Duffield (Deputy Head Academic) and Prof. Majid Sarvi (Deputy Head Research) and our Discipline Leaders for their leadership and hard work: Prof. Stephan Matthai and Prof. Nelson Lam for Civil Engineering; Prof. Stephan Winter for Geomatics; and Prof. Mike Stewardson for Environmental Hydrology and Water Resources.

I thank our students, not only for their work on their own research but also for their contributions in many other ways, helping their fellow students and taking an active part in the life of the Department. Special thanks to the Graduate Infrastructure Engineering Students (GIES) team.

I also take this opportunity to thank our Industry Advisory Group members and all our industry partners for their support and expertise. Particularly, I would like to thank Mr Mark Allan, the Chair of the IAG, for his outstanding leadership.

Thanks also to Ms Eileen Doufas-Shea and Ms Pauline Woolcock for their outstanding administration and executive support, and Ms Emma Michelle, Ms Jemma Brewster and Ms Jenny Smith for their professional support.

Special thanks to all colleagues and senior executives across the University for their ongoing operational support and contribution to the life of the Department. In particular, I would like to thank Prof. Mark Cassidy, Dean of the Melbourne School of Engineering, and Prof. Joe Klewicki, Head of School of EMI (Electrical, Mechanical and Infrastructure Engineering).

On a sadder note, we lost three devoted colleagues and friends of long standing in 2018. Emeritus Professor Len Stevens AM, Dr Justin Costelloe and Mr Lloyd Macey are much missed. Their energy, wisdom and kindness in different spheres remains a major part of our Department's success, and an example we are proud to have.

Prof. Abbas Rajabifard
Head of Department



Academic & Professional Staff

ACADEMIC STAFF (T&R AND RESEARCH)

Civil Discipline

Prof. Mark Cassidy, Dean of Engineering
 Prof. Stephan Matthai
 Prof. Ian Young
 Prof. Nelson Lam
 Prof. Alexander Babanin
 Prof. Colin Duffield
 Prof. Priyan Mendis
 Prof. Anne Steinemann
 Prof. Majid Sarvi
 Prof. Ian Young
 Prof. Nelson Lam
 Prof. Tuan Ngo
 Prof. Lu Aye

Assoc. Prof. Guillermo Narsilio (Future Fellow)
 Assoc. Prof. Alessandro Toffoli
 Assoc. Prof. Russell Thompson

Dr Felix Kin Peng Hui (Snr. Lecturer)
 Dr Lihai Zhang (Snr. Lecturer)
 Dr Tai Thai, (Snr. Lecturer)
 Dr Xuemei Liu (Snr. Lecturer)
 Dr Mahdi Miri Disfani (Snr. Lecturer)

Dr Rackel San Nicolas (Lecturer)
 Dr Neema Nassir (Lecturer)
 Dr Behzad Rismanchi (Lecturer)
 Dr Samintha Perera (Lecturer)
 Dr Elisa Lumantarna (Teaching Specialist/Lecturer)

Environmental Hydrology & Water Resources Discipline

Prof. Michael Stewardson
 Prof. Andrew Western
 Prof. Pablo Zarco-Tejada
 Prof. Q.J. Wang
 Assoc. Prof. Graham Moore (Teaching Specialist - Retired)
 Assoc. Prof. Rory Nathan
 Assoc. Prof. Dongryeol Ryu
 Assoc. Prof. Angus Webb

Dr Meenakshi Arora (Snr. Lecturer)
 Dr Marco Ghisalberti (Snr. Lecturer to October)
 Dr Murray Peel (Draveyan Lecturer)
 Dr Avril Horne (Lecturer/DECRA Research Fellow)

Research Fellows

Dr Behnam Atazadeh
 Dr Shanaka Kristombu Baduge
 Dr Benny (Yiqun) Chen
 Dr Philip Christopher
 Dr Keirnan Fowler
 Dr Thraka Gunawardena
 Dr Nilupa Herath
 Dr Ali Kashani
 Dr Junde Li
 Dr Qingxiang Liu
 Dr Mahyar Madadi
 Dr Amir Hassan Mehdizadeh
 Dr Felippo Nelli
 Dr Kate Nguyen
 Dr Katie Potts
 Dr Tim Peterson
 Dr Soheil Sabri
 Dr Margarita Saft
 Dr Madhu Rupasinghe
 Dr Massoud Sofi (DECRA)

Geomatics Discipline

Prof. Stephan Winter
 Prof. Abbas Rajabifard (Head of Department)

Mr Clifford Ogleby (Snr. Lecturer and Teaching Specialist - Retired)

Dr Mohsen Kalantari Soltanieh (Snr. Lecturer)
 Dr Kourosh Khoshellham (Snr. Lecturer)
 Dr Martin Tomko (Snr. Lecturer)

Dr Amir Khodabandeh (Lecturer)
 Dr Maria Vasardani (Lecturer to October)

ENTERPRISE PROFESSORS & FELLOWS

Prof. Greg Foliente
 Prof. Gary Liddle
 Prof. Rob Vertessy
 Prof. Peter Sweatman
 Ms Sharon Davis

PROFESSIONAL STAFF

Ms Eileen Doufas-Shea, Department Administrator and Executive Assistant to the Head of Department
 Ms Pauline Woolcock, Department Administrator

Ms Meg Belmonte, Centre Manager, CAMP.H (Centre for Advanced Manufacturing of Prefabricated Housing)

Ms Hai Do, Academic Support Coordinator
 Ms Jen Ri, Academic Support Coordinator

Ms Emma Michelle, Administration Assistant
 Ms Jenny Smith, Administration Assistant
 Ms Jemma Brewster, Administration Assistant



Department of Infrastructure Engineering



DEPARTMENT LEADERSHIP

Head of Department



Prof Abbas Rajabifard

Deputy Heads of Department



Prof Colin Duffield (Academic)



Prof Majid Sarvi (Research)

Discipline Leaders



Prof Stephan Winter Geomatics



Prof Michael Stewardson Environmental Hydrology & Water Resources



Prof Stephan Matthai Civil

PROFESSIONAL STAFF

Department Administrators



Ms Eileen Doufas-Shea EA to Head of Department



Ms Pauline Woolcock



Ms Jenny Smith



Ms Jemma Brewster



Ms Meg Belmonte Centre Manager **CAMP.H

Academic Program Coordinators



Ms Hai Do



Ms Jen Ri

Technical Officers



Mr Rodger Young



Mr George Fox

PROFESSORS



Prof Lu Aye



Prof Alex Babanin



Prof Mark Cassidy Dean of Engineering



Prof Nelson Lam



Prof Priyan Mendis



Prof Tuan Ngo



Prof Anne Steinemann



Prof Pablo Zarco-Tejada



Prof Q.J. Wang



Prof Andrew Western



Kernot Prof Ian Young

EMERITUS PROFESSORS



Prof Tom McMahon



Prof Ian Williamson

ENTERPRISE PROFESSORS & FELLOWS



Prof Greg Foliente



Prof Gary Liddle



Prof Rob Vertessy



Prof Peter Sweatman



Ms Sharon Davis Enterprise Fellow

PROFESSIONAL FELLOWS



Prof Ian Bishop



Prof Clive Fraser



Prof Graham Hutchinson



Prof Ian Johnston



Prof Werner Kuhn



Prof John Langford



Prof Hector Malano

ASSOCIATE PROFESSORS



Assoc Prof Rory Nathan



Assoc Prof Guillermo Narsilio



Assoc Prof Dongryeol Ryu



Assoc Prof Russell Thompson



Assoc Prof Alessandro Toffoli



Dr Angus Webb



Assoc Prof Lihai Zhang

SENIOR LECTURERS



Dr Meenakshi Arora



Dr Mahdi Miri Disfani



Dr Felix Kin Peng Hui Academic Specialist



Dr Mohsen Kalantari



Dr Kourosh Khoshellham



Dr Xuemei Liu



Dr Murray Peel



Dr Martin Tomko



Dr Huu-Thai Tai

LECTURERS



Dr Avril Horne (DECRA)



Dr Amir Khodabandeh



Dr Patricia Lavieri



Dr Elisa Lumantarna Academic Specialist



Dr Neema Nassir



Dr Samintha Perera



Dr Behzad Rismanchi



Dr Rackel San Nicolas



Dr Wenyuan Wu

SENIOR TUTORS



Dr Saeed Miramini



Mr Amir Orangi



Mr Kenny Qi Jing Tan



Dr David Wilson

RESEARCH FELLOWS



Dr Behnam Atazadeh



Dr Shanaka Kristombu Baduge



Dr Benny (Yiqun) Chen



Dr Philip Christopher



Dr Keirnan Fowler



Dr Tharaka Gunawardena



Dr Nilupa Herath



Dr Ali Kashani



Dr Junde Li



Dr Qingxiang Liu



Dr Mahyar Madadi



Dr Amir Hassan Mehdizadeh



Dr Felippo Nelli



Dr Katie Potts



Dr Tim Peterson



Dr Soheil Sabri



Dr Margarita Saft



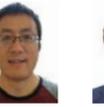
Dr Madhu Rupasinghe



Dr Massoud Sofi (DECRA)



Dr Qichun Yang



Dr Conrad Wasko

The strength of the team is each individual member. The strength of each member is the team. – Phil Jackson



Head of Department



**Deputy Head of Department
(Academic)**



**Deputy Head of Department
(Research)**



**Discipline Leader
(Civil)**



**Discipline Leader
(Geomatics)**



**Discipline Leader
(Environmental Hydrology &
Water Resources)**

Prof. ABBAS RAJABIFARD is Head of Department. He is Chair of the UN Global Geospatial Information Management-Academic Network (UN-GGIM). Prof. Rajabifard is Director of the Centre for SDIs and Land Administration. He is also Director of the Centre for Disaster Management and Public Safety, The University of Melbourne.

Prof. Rajabifard's research interests lie in the areas of spatial data infrastructure, disaster management, land administration, and 3D land and property for Smart Cities. He is also Director of the Centre for Disaster Management and Public Safety, The University of Melbourne.

Prof. COLIN DUFFIELD is Deputy Head of Department (Academic). He is Prof. of Engineering Project Management and Civil Engineering. He is also a Board Member of Infrastructure Australia and a Fellow of the Law School (where he delivers a master level unit in infrastructure procurement).

Prof. Duffield is a recognised international thought leader in the efficient procurement of public infrastructure and the incorporation of private finance as a mechanism for achieving value for money outcomes.

Prof. MAJID SARVI is Deputy Head of Department (Research). Majid is Prof. in Transport for Smart Cities. He holds a M.Eng and B.Eng degrees in Civil Engineering.

Prof. Sarvi has over 20 years of professional, academic and research experience in the areas of traffic and transport engineering. His researchers are multidisciplinary with international outlook and both theoretically oriented and applied in nature.

His fields of research cover a range of topics, including: crowd dynamic modelling and simulation, large-scale multimodal transport network modelling, vulnerability and optimization, as well as traffic flow theory and operations.

Prof. STEPHAN MATTHAI is Discipline Leader Civil Engineering.

Prof. Matthai's research interest focuses on: Enhanced oil recovery (EOR WAG wettability alteration); geological storage and immobilisation of carbon dioxide (CCS); geological storage of hydrogen as an energy carrier (hydrogen economy); naturally fractured hydrocarbon reservoirs (NFR fracture porous media); nuclear waste repositories (radionuclide transport in fractured rock); numeric method and simulation software development (FEM FVM hybrid methods THMC); numeric simulation of multiphase fluid flow (fractured porous media); recovery of unconventional hydrocarbon resources (fracking CBM ECBM stimulation); and simulation of (enhanced)

Prof. STEPHAN WINTER is Discipline Leader for Geomatics.

Prof. Winter's research interests are in disaster management, emergency response, evacuation, human orientation, wayfinding and navigation, intelligent transportation systems (ITS) and computational transportation science, mapping (crowd sourcing, volunteered geographic information), mobile geosensor networks; Smart Cities (smart transport, urban analytics); spatial cognitive engineering; spatial cognition; spatial data mining and geographic information retrieval.

Prof. MICHAEL STEWARDSON is Discipline Leader for Environmental Hydrology & Water Resources.

Over the last 24 years, Prof. Michael Stewardson's research has focused on interactions between hydrology, geomorphology and ecology in rivers (findanexpert.unimelb.edu.au/display/person14829). This has included physical habitat modelling, flow-ecology science, and innovation in environmental water practice. Prof. Stewardson has participated in Australia's water reforms through advisory roles at all levels of government. More recently his research has focused on the physical, chemical and biological processes in streambed sediments and their close interactions in regulating stream ecosystem services. He leads the Environmental Hydrology and Water Resources Group in Infrastructure Engineering (ie.unimelb.edu.au/research/water/) and also the MSE's Water Environment and Agriculture Program (eng.unimelb.edu.au/industry/water).



Prof. Pablo Zarco-Tejada

PROFESSOR OF REMOTE SENSING & PRECISION AGRICULTURE

With an Engineering background from Spain and teaching and research experience in Canada, the USA, and Europe, Pablo joined us in September to lead the hyperspectral and thermal remote sensing activities focused in Precision Agriculture and Biosecurity.



Dr Conrad Wasko

MCKENZIE FELLOW

Prior to joining the University of Melbourne, Conrad was a Research Fellow at the University of New South Wales. Conrad's research primarily focuses on the impact of climate change on stochastic hydrology. As part of his tenure for the McKenzie Fellowship Conrad hopes to improve the understanding of changing soil moisture conditions for designing flood estimation in Australia.



Assoc. Prof. Lu Aye to Professor



Dr Angus Webb to Assoc. Professor



Dr Lihai Zhang to Assoc. Professor



Dr Wenyan Wu

SENIOR LECTURER IN STRUCTURAL ENGINEERING

Originally from the University of Adelaide, Wenyan joined us in January and teaches Systems Modelling and Design. She is also involved in teaching Reshaping Environments.



Dr Huu-Tai Thai

SENIOR LECTURER IN STRUCTURAL ENGINEERING

His research interests have been in the areas of steel and composite steel-concrete structures; laminated composites and functionally graded materials; advanced analysis and design; and structural reliability. Tai received his PhD in Structural Engineering from Sejong University in 2010.



Dr Kourosh Khoshelham to Snr. Lecturer



Dr Martin Tomko to Snr. Lecturer



Dr Neema Nassir

LECTURER IN TRANSPORT

Neema joined University of Melbourne as a Lecturer in Transport Engineering in October. Neema's research is focused on new methods to simulate, model, design and manage public transport, shared-mobility, and connected multimodal systems. He

earned his PhD in Transportation Systems from University of Arizona (2013), and his BSc. and MSc. in Civil-Transportation Engineering from Sharif University of Technology, Tehran, Iran. Prior to joining University of Melbourne, Neema was a senior researcher at Massachusetts Institute of Technology, and closely collaborated with transport authorities in the USA, Europe, Asia and Australia.



Dr Patricia Lavieri

LECTURER IN TRANSPORT

Patricia conducts research in the field of urban transport demand analysis and forecasting with an emphasis on travel behavior modeling. She earned her PhD in Civil Engineering from the University of Texas at Austin, US, and her main interests are in understanding the impacts of information and communication technologies (ICTs) and new transportation technologies (such as e-hailing and automated vehicles) on people's lives and travel choices.



Dr Rackel San Nicolas to Lecturer



Dr Avril Horne to Lecturer



Dr Amir Khodabandeh

LECTURER IN SATELLITE POSITIONING & GEODESY

Dr Amir Khodabandeh commenced with us in October. He did his PhD at Curtin, and was a Post-Doctoral Fellow at UNSW. His research interests include estimation theory, GNSS precise positioning, and GNSS quality control.



Dr Xuemei Liu

SENIOR LECTURER IN STRUCTURAL ENGINEERING

Xuemei's research interests include lightweight concrete, creep and shrinkage, durability of concrete, impact resistance of runway pavement, and steel-concrete composite columns. She obtained her PhD in structural engineering from National University of Singapore. Prior to joining the University of Melbourne she was a Lecturer at Queensland University of Technology.



A/Prof. Graham Moore



Mr Cliff Ogleby Retired



Dr Marco Ghisalberti



Dr Maria Vasardani



Dr Ryan Hoult

DEPARTURES & Retirements

A key element of the Department's strategic plan is to develop and strengthen engagement with industry

The Department of Infrastructure Engineering has an active Industry Advisory Group (IAG) which:

- provides input in connection with strategic planning and long-term direction
- helps generate internship opportunities and student placements
- provides feedback on subjects and programs
- facilitates guest lectures and other industry contact between students and their future employers
- advises on teaching and research programs
- develops research project ideas for students



2018 Membership

INDUSTRY & GOVERNMENT



Mr Mark Allan (Chair)
Program Manager,
Planning and Design
City of Melbourne



Dr Collette Burke
Chief Engineer of Victoria
Victorian State
Government



Mr Glenn Cockerton
Managing Director
Spatial Vision



Ms Catherine Eymyn
Director,
Technical Services
Public Transport Victoria



Mr Graham Hawke
Chief Strategy Officer
Bureau of Meteorology



Mr Ian Ireson
Executive Director, Land
Use Victoria
DELWP



Mr Tony Hedley
Program Director
Level Crossing Removal
Authority



Ms Karen Janiszewski
Director
Urbanxchange



Mr Dean McIntyre
Operating Centre
Manager, Victorian
GHD



Ms Finola Reid
Principal
Arup



Ms Emma Woodhouse
Project Director, Carlton
Lendlease



Mrs Alice Kesminas,
Solutions Manager – Com-
munity Energy for AusNet
Services' Energy Solutions
(to April 2018)



Mr Peter Ryan
Managing Director
WBHO



Mr Geoff Wake
Offtake Coordination
Manager
Woodside Energy



UNIVERSITY OF MELBOURNE MEMBERS

- **Prof. Abbas Rajabifard**, Head of Department
- **Prof. Colin Duffield**, Deputy Head of Department (Academic)
- **Prof. Majid Sarvi**, Deputy Head of Department (Research)
- **Enterprise Prof. Greg Foliente**
- **Prof. Stephan Matthai**, Discipline Leader, Civil
- **Prof. Stephan Winter**, Discipline Leader, Geomatic
- **Prof. Michael Stewardson**, Discipline Leader, Environmental Hydrology & Water Resources
- **Mr Chin Fung (Philip) Tsang**, President of the Graduate Infrastructure Engineering Society (GIES)

Throughout the year we sought to deepen our industry engagement, as well as our engagement with honorary staff, students, and industry friends, and to deliver activities that would benefit and acknowledge the research undertaken by all and, in particular, RHDs and early career researchers in the department.

The events in Department News are the highlights of our activities in 2018



RNSA Conference

The Hon. Julie Bishop is greeted by Conference Chairs, Prof. Priyan Mendis and Mr. Jason Brown of Thales Australia. Ms Bishop opened the 15th Safeguarding Australia conference in Canberra on the 9th of May 2018. Prof. Mendis is the Chair of the Research Network for a Secure Australia (RNSA). RNSA was initially funded through the ARC Research network scheme. RNSA has been involved from the beginning of this annual conference, which brings industry, government and academics interested in Security Technology together.



PORT COMPETITIVENESS & FINANCING WORKSHOP

Led by Dr Felix Hui and Prof. Colin Duffield, the Department of Infrastructure Engineering at The University of Melbourne recently held a three day Port Competitiveness and Financing Workshop in Melbourne, from the 4th April to the 6th April 2018, at The Woodward Conference Centre.

The workshop presented research that has been undertaken by the University Of Melbourne Department Of Infrastructure Engineering together with our university partners from The Universitas Indonesia and the Universitas Gadjah Mada as part of the Australian Indonesia Centre Infrastructure Cluster Research Group investigation of policy and finance, and disaster management of major port infrastructure. The workshop was delivered to visiting executives from the Indonesian Government, Port Agencies, senior executives from leading industry organisations in Indonesia and our

Indonesian University partners. Specialist lectures by Dr Felix Hui and Prof. Colin Duffield were complimented by presentations from industry specialists including Mr Mark Switkowski, Executive Director, Department of Economic Development, Jobs, Transport and Resources, Victoria; Mr Stan Roche, Senior Trade Advisor with Austrade, Mr Venket Naidu, Director of Ports and Marine, AECOM and Mr Michael Tuckfield, Tuckfield Infrastructure; Dr Kim Hassell, Transport Economist and Mr Don Forsdyke, Trade Facilitation Manager, Trade Development, Port of Melbourne.

During this event, on behalf of the Australia-Indonesia Centre (AIC)

Strategic Research Project SRP 3 team, the University of Melbourne facilitated a networking dinner for senior Indonesian Government Ministry representatives, Industry participants from Indonesia and our Indonesian University partners who attended the conference in Melbourne.



HEPEX Workshop

The HEPEX Biannual International Workshop (hepex.irstea.fr/2018-hepex-workshop/) was successfully held at the University of Melbourne on 6-8 February 2018. HEPEX grew from a Hydrological Ensemble Prediction Experiment and has become the international peak community of research and practice to advance hydrological ensemble prediction.

This workshop was hosted by the University of Melbourne (Prof. QJ Wang, Department of Infrastructure Engineering, Co-chair of HEPEX), CSIRO and the Bureau of Meteorology. It was attended by 120 people, including most of the world's top experts in this field.



Prefabricated Housing ARC Centre

The ARC Centre for Advanced Manufacturing of Prefabricated Housing in association with CSR and Inhabit held the Symposium of Facade and Cladding Technology on February 16, with more than 100 participants from academia and industry attending.

The symposium aimed to update the industry and research community about recent advancements in facade design and engineering, providing a forum for discussion.

The CRC-P team also introduced a state-of-the-art modern prefabricated unitised facade system together with their industry partner CSR-Inclose.



Speakers included Dr Trevor Pisciotta (Director of Buildings, Victorian Cladding Task Force), Professor Tuan Ngo (Infrastructure Engineering), Dr Kate Nguyen (Infrastructure Engineering), Dr Tharaka Gunawardena (Infrastructure Engineering), Rob Ferrari (Manager of Unitised Rain screen Facades, CSR Limited), Clare Parry and Zamaneh Khoshdel (Faade Engineers at Inhabit Group).



Most cited authors on Wikipedia

world. Their studies required learning about rainfall, and collecting data on general climate patterns across different regions, in order to make comparisons. Over time, the academics noticed they had amassed an enormous amount of data about climate across Earth—enough to re-draw the map

Köppen had developed a century earlier. So they decided to create and publish an updated version.

A climate map of the world paper published by Murray Peel (Infrastructure), Tom McMahon (Infrastructure) and Brian Finlayson (Geography) (pictured left to right) is Wikipedia's most-cited source.

A single academic paper, published by three Australian researchers in 2007, has been cited by Wikipedia editors over 2.8 million times—the next most popular work only shows up a little more than 21,000.

Around 2005, Tom McMahon, Brian Finlayson and Murray Peel, were researching how streams flowed in different parts of the

Commonwealth Government Enquiry

Prof. Mike Stewardson, Assoc. Prof. Angus Webb and Dr. Avril Horne appeared as invited witnesses before the Commonwealth Government's enquiry into the role of the Commonwealth Environmental Water Holder. At a public session held in Albury in April, Mike, Angus and Avril appeared along with other academics from Victorian and NSW Universities to provide testimony as to the critical role being played by the CEWH. The resulting report was favourable in its assessment of this key role for managing the environment of the Murray-Darling Basin.

CILTA Port Planning Workshop

The Chartered Institute of Logistics and Transport Australia (CILTA) conducted an informal research seminar into "Port Planning Research in Indonesia, Japan and Australia" on the 16th of February 2018 hosted by the Department of Infrastructure Engineering at the University of Melbourne. Dr Felix Hui (from the Department of Infrastructure Engineering) and Dr Kim Hassall (National Chairman of CILTA) welcomed participants. Don Forsdyke, Trade Facilitation Manager, Trade Development, from the Port of Melbourne gave an absorbing lecture on the port and its supply chain. Dr Hanna Grzbowska, Research Associate in Transport Engineering, School of Civil and Environmental Engineering from the UNSW and Associate Professor Naoya Akita, Division of Maritime Logistics Sciences, Graduate School of Maritime Sciences, Kobe University, gave key



presentations. Approximately 40 participants took part in the seminar. Shane Royle, General Manager-Trade and Property from GeelongPort, Dr Victor Gekara from RMIT University and Chris Yankos, former supply chain manager from Mattel and logistics manager at Denso Australia, were amongst presenters.



Autonomous Mini Shuttle Bus Launch

The University of Melbourne launched its own autonomous mini shuttle bus and it is assisting in research to improve integrated transport solutions and make our transport safer.

The autonomous vehicle is designed for low-speed urban environments and is part of a three-year partnership with French company EasyMile, specialists in autonomous vehicle technology.

Representatives from the University, industry and the Victorian Government had the opportunity to experience riding the new vehicle along Masson Road on the Parkville campus.

University of Melbourne Vice Chancellor Glyn Davis said the vehicle will provide researchers unprecedented access to autonomous technology, putting students at the forefront of research and development.

University of Melbourne Professor in Transport for Smart Cities and AIMEs Director Professor Majid Sarvi said industry and research partnerships play an important role in transport's future. "By partnering with EasyMile through projects such as the University's Australian Integrated Multimodal EcoSystem (AIMEs) – a world-first



living laboratory based in the streets of Melbourne – we are able to test highly integrated transport technology that make a real difference to people's lives," he said.

At the event, Professor Sarvi said the team was very pleased to have this partnership. "Our students and researchers will have access to the best technology available in the world, and enhancing it through collaboration between industry and government is an enormous opportunity for us."

Open Day 2018

Open Day was another successful event for our Department with good attendance and visitors to our various areas, information sessions and our lab tours. Special thanks to our Open Day Coordinators: Dr Samintha Perera, Dr Wenyan Wu and Mr Kenny Tan for their outstanding efforts, as well as our sessions' presenters: Dr Marco Ghisalberti, Prof. Stephan Winter and Prof. Stephan Matthai.



Wars, Disasters & Political

In May, CDMPS hosted Bob Jensen and Mark Pfeifle who presented their talk: Wars, Disasters and Political Intrigue: Communicating During Crisis.

Bob Jensen and Mark Pfeifle shared lessons, learned and provided stories from their experiences in war zones, disaster zones and at the White House. Senior roles they have held include: Mark was Deputy National Security Advisor to President George W. Bush and Bob served as a spokesman for both the National Security Council and the US Embassy in Baghdad.

SSSI Tasmania Conference

Professor Abbas Rajabifard delivered an opening keynote talk at the Tasmanian Surveying and Spatial Conference (TSSC) on 14 September. His presentation reported on CSDILA's ARC Linkage Project: '3D Property Ownership Map Base for Smart Urban Land Administration'. In his speech, Prof. Rajabifard presented solutions for accommodating 3D data derived from regulatory urban subdivision processes into the current 2D property ownership map base. Prof. Rajabifard highlighted the importance of transforming 2D property maps into a 3D digital information environment. The theme of TSSC was 'Positioning Property People Now', which drove conversation towards the new positioning paradigm, in particular the opportunities presented by the NPI announcements, and the convergence with the modernisation of digital cadastres and the consequences of this moving forward.



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Locate 2018 Adelaide

The Locate-GeoSmart Asia 2018 Conference was held in Adelaide over four days from 8-11 April 2018 at the Adelaide Convention Centre. (Second from right above: Prof. Stephan Winter and below right Mr Brian Marwick).





(Image: back row L-R: VicRoads and AIMES Program Manager, Daniel Hoyne, ITS Australia CEO, Susan Harris, ITS Australia President, Dean Zabrieszach, Peter Sweatman, Gary Liddle and Majid Sarvi of the University of Melbourne, Department of Infrastructure, Regional Development and Cities, Roland Pittar, US State of Michigan – Automotive Advisor, Kevin Kerrigan. Front row L-R: Michigan Department of Transportation Director, Kirk Steudle and Assistant Minister to the Deputy Prime Minister of Australia, Andrew Broad.)

Summit on Transport Safety in the Era of Digital Mobility

Held on October 1st, the Summit on Transport Safety in the Era of Digital Mobility, hosted by Australian Integrated Multimodal EcoSystem (AIMES) was a high-level symposium featuring internationally renowned keynote speakers from government, industry and academia, leading safety practitioners, and those involved in development and deployment of digital mobility.

At the summit a MOU was signed between Australia and the USA State of Michigan. The Australian Government is posi-

tioning the nation for safer roads through collaboration on high-tech vehicle and road systems. The University of Melbourne has played a central role in advancing the transport technology agreement between the governments of Australia and Michigan, primarily through AIMES (Australian Integrated Multimodal EcoSystem), of which ITS (Intelligent Transport Systems) Australia is an active supporter.

Society for Freshwater Science Meeting 2021

A/Prof. Angus Webb played a key role in the decision to conduct the annual meeting of the US-based Society for Freshwater Science outside of North America for the first time ever. The meeting will be held in Brisbane in 2021. In his role as International Delegate on the SFS Board of

Directors, and in collaboration with Professor Stuart Bunn (Griffith University) and Past-Present Professor Colden Baxter (Idaho State University), Angus was able to lobby successfully for this major step in the society's drive to become more international.

Australia-Indonesia Business Council (AIBC)

Prof. Colin Duffield and Dr Felix Hui attended the Australia-Indonesia Business Council Conference (AIBC) held in Surfers Paradise, Queensland on 11-13 November.

The conference focused on opportunities and partnership for mutual prosperity for Australia and Indonesia in view of the very soon to be signed Indonesia-Australia Comprehensive Economic Partnership Agreement (IA-CEPA).

Prof. Colin Duffield was a panel member on the session "Financing for Growth".

During the conference Prof. Duffield and Dr Hui met privately with the Minister of National Development Planning/Head of BAPPENAS, Prof. Dr Bambang P.S. Brodjonegoro and his officials from BAPPENAS where discussions were held on PPP capacity building and implementation in Indonesia.



3rd UAS4RS Conference

A/Prof. Dongryeol Ryu, Dr Lola Suarez, and Prof. Pablo Zarco-Tejada hosted the 3rd UAS4RS Conference in the Parkville campus of The University of Melbourne on 5-6 December 2018. The aim of UAS4RS was to bring together the UAS community in Australia, and to present and discuss UAS technology for remote sensing applications and information extraction. The conference attracted more than 100 national and international participants in various areas that include sensor development, calibration/validation, and the state-of-the-art UAS-based sensing applied to agriculture, forestry, ecosystem sciences, etc. Some of the leading international remote sensing equipment, software systems, and survey service companies also participated as industry sponsors. The conference organisers thank the generous support of the Department of Infrastructure Engineering.



InterPore (International Society for Porous Media) Conference

This year the Department of Infrastructure Engineering hosted the biannual conference of the Australian chapter of InterPore (International Society for Porous Media), bringing together Australian and international specialists from academia and industry working in areas related to porous media, and the modelling and simulation of natural and industrial porous media systems. Thirty eight delegates attended the 3-day event at the Woodward conference center, and – although the turnout from UoM was small – the conference raised an awareness of how many researchers from our university are studying this important subject. Main session topics were 1) porous media characterisation, 2) modelling of flow through and the deformation of porous media, 3) carbon geo-sequestration, 4) and complex system simulation and upscaling. Each session started with a keynote presentation by an internationally renowned expert: Mark Knackstedt (ANU, Canberra), Antoinette Tordessilas (UoM), Pierre Adler (UPMC, Paris, France) and Victor Calo (Curtin University, Perth). Keynote speakers also assumed the role of discussion leader for their sessions, and were asked to highlight contradictions, knowledge gaps, and-or open questions in their field. Since porous media research spans so many disciplines, ranging from material science to 3D printing, speakers were requested to provide context and explain the terminology

used in their presentation; this ensured effective communication. Generous time for discussion was included into the programme. Fostered by a poster session, this format promoted a richness and diversity of contributions by both speakers and the general conference participants. PhD students, in particular, welcomed provision of more more subject context and the ample opportunity for discussion. They felt empowered, motivated, and inspired after the conference. With regard to the future of porous media research, a consensus was reached about how important it is to combine physical experiments with numeric simulations in order to disentangle complex behaviour in terms of cause and effect chains. Furthermore, it became clear that, regarding the upscaling of the often counter-intuitive behaviour of heterogeneous porous media, current research still is in its infancy, and many opportunities exist to greatly enhance our understanding, paving the way for ground-breaking innovations and industrial applications.

As experienced by so many visitors, Melbourne was welcomed as an excellent conference location, and the conference venue and catering were much appreciated by all participants. Both the icebreaker at University House and the conference dinner at Red Spice Thai in Melbourne's CBD were also a great success.



The chair of the 2018 Australian InterPore conference, Prof. Stephan Matthai, Chair of Reservoir Engineering (UoM), presents Dr. Anita Singh (UNSW), with the best-poster award.

Our researchers and academics were regularly asked for their expert opinions by the media

Professor Majid Sarvi was interviewed for a feature story in the Herald Sun about the future of road transport. If you've ever driven to the city only to struggle to find a park, you may be interested in this: a new app that helps drivers find vacant parking spots. Prof. Sarvi, director of AIMES (Australian Integrated Multimodal EcoSystem - the world's first and largest "urban laboratory" for transport technologies), explained in the Sydney Morning Herald how this app will have a positive impact on traffic congestion.

smh.com.au/national/victoria/apps-direct-drivers-to-city-car-spots-and-could-soon-cut-congestion-20180521-p4zgjk.html?csp=c57149893cfb2401169abda4d692a599

Using smart sensors, the six-square-kilometre space on the city's fringe aims to test technology to improve safety and efficiency for all road users: motorists, freight, public transport, pedestrians and cyclists.

Professor Sarvi says the benefits of current parking apps extend beyond convenience.

He expects the apps to also reduce the amount of illegal parking and the number of accidents and near misses, often caused by drivers scouting for parks.

Professor Sarvi foresees a future where one app will be used to pay for all transport

needs, from parking to public transport and rental bikes.

"Transport technology is on the verge of a revolution. We are now ready for big, big things coming."

Professor Sarvi joined a panel of experts on Jon Faine's Conversation Hour on ABC Radio in early July to discuss the latest technologies in autonomous and electric vehicles and their likely impact on Melbourne.

In July the AIMES team, led by Professor Sarvi, conducted a world-first connected transport trial at the intersection of Drummond and Faraday Streets in Carlton.

The trial was run in conjunction with a range of public and private sector partners including Cisco, Vicroads, and Cohda Wireless.

Professor Sarvi explained that this trial aimed to demonstrate "real life use cases including speed management to alert a driver of excessive speed based on environmental conditions; intersection collision avoidance to alert a driver of an impending high risk situation; and vulnerable road user protection to alert a driver and pedestrian of an impending collision."



The Federal Minister for Urban Infrastructure and Cities Paul Fletcher was in attendance, and noted the importance of this project, stating that "programs and trials such as these will be paramount to realising the many benefits that connected infrastructure and automated vehicles offer."

"Transport technology is on the verge of a revolution."



Enterprise Professor Greg Foliente and Dr Benny Chen from CSDILA (Centre for SDIs and Land Administration)



& CMDPS (Centre for Disaster Management and Public Safety) received a lot of attention for their work on modelling how to survive a zombie outbreak in Australia as part of a project linked to the launch of Xbox One game 'State of Decay', with appearances in a wide range of media

including Ten Daily, Pedestrian, Gizmodo, and the Herald Sun.

Professor Foliente's research about retrofitting houses for energy efficiency was reported in Domain, Sustainability Matters, and was featured in Pursuit.

Professor Foliente was also in Pursuit about the vast majority of Melbourne's housing stock is wasting energy and money; new research reveals how long it will take homeowners to pay off an efficiency retrofit.

Speaking on an issue that hits close to home for many Australians, Professor Foliente explained to news.com.au how Australian homes contribute to rising energy bills and offered some tips on fixing the problem.



Professor Anne Steinemann's (Infrastructure Engineering) research about chemical exposure was reported in ABC News.

Professor Steinemann and her postgraduate Neda Nematollahi were interviewed in a documentary on The Feed covering Anne's

research into MCS.

Dr Angus Webb was in Pursuit talking about how after more than 100 years of degradation, a plan limiting and returning water to Australia's Murray-Darling Basin is seeing positive results.

Dr Angus Webb and Prof. Michael Stewardson contributed to a piece in The Conversation looking at the signs of positive progress three and a half years into the Murray-Darling Basin Plan.

Dr Lihai Zhang appeared on ABC's 'Blueprint for Living' discussing the health of our transport infrastructure in the wake of the Ponte Morandi collapse in Genoa.



Dr Zhang also represented Melbourne University at a range of other interviews on his research work in life-cycle performance of engineering structures.

ABC news: "Designing bridges: where safety and beauty intersect" on life-cycle performance assessment of bridges and bio-inspired bridge construction materials (self-healing and high impact resistant materials learned from cartilage and bone fracture healing).

Laos dam collapse (Agence France-Presse, Paris, France), Digital Journal (Canadian), Daily Mail (Australia), Yahoo News, The Citizen (South Africa), AT&T WorldNet, The Indian Express, Channel NewsAsia (Singapore), Voice of Asia, France 24, NDTV (India), Brinkwire (UK), BREITBART (USA), 7 News (Melbourne, Australia).

Writing in Pursuit, Dr Lihai Zhang discussed the technologies that assess and monitor the structural condition of bridges such as the iconic Eltham Rail Bridge.

Professor Stephan Winters' piece on giving driverless vehicles the human touch, which originally appeared in Pursuit, was republished by OpenForum.

AWARDS & HONOURS

CHURCHILL FELLOWSHIP

Dr Ali Kashani (right with The Hon Linda Dessau AC, Governor of Victoria) from Infrastructure Engineering is one of the recipients of the prestigious Churchill Fellowship Award in 2018. The ceremony was held in Victorian Government House on 16th November where he and the other 20 Victorian Fellows received the awards from the Hon Governor of Victoria. The AV Jennings Churchill Fellowship will allow Dr Kashani to travel to seven countries and visit a large number of institutions and industries. Dr Kashani's aim is to gather insights and knowledge about a revolutionary construction method: '3D Printing of Houses'.



LORENZ G. STRAUB AWARD

Infrastructure Engineering's Dr Conrad Wasko was honoured with the Lorenz G. Straub award in Minnesota on October 22.

Celebrating its 50th year, the Lorenz G. Straub award was established by friends, family, and colleagues of the University of Minnesota's St. Anthony Falls Laboratory founder and first director Lorenz Straub. With nominations accepted globally, the award looks to identify the most meritorious thesis of a calendar year in hydraulic engineering, ecohydrology, geophysical fluid dynamics, or related fields.

Dr Wasko received the award for his 2016 PhD on "Continuous Rainfall Simulation in a Warmer Climate".

His research included investigating the effects of warmer temperatures on design rainfall patterns, finding that temporal and spatial patterns of rainfall intensifies with higher temperatures. This leads to increased flooding in urban environments, but surprisingly, not necessarily rural catchments.



Dr Mohsen Kalantari

Received the Educational Development Award 2018 at the Spatial Excellence Awards held in December.



Dr Mukta Sapkota

Was the winner of the AWA Student Water Award 2018. Mukta recently completed her PhD on 'Impacts of Hybrid Water Supply Systems on Water Resources and Infrastructure.' (Pictured above with Dr Meenakshi Arora and Prof. Hector Malano).



Prof. John Langford

Was elected to the Water Engineering Hall of Fame at the HWRS 2018 Conference (Hydrology and Water Resources Symposium).



Prof. Majid Sarvi

AIMES Director Professor Majid Sarvi became the first academic to be appointed to ITS Australia Board of Directors.

THORNTON SMITH Medal

The medal is presented every year to a graduate of the Geomatics Discipline who is considered to have made an outstanding contribution to the engineering profession in the field of Geomatics

In 2018 the medal was awarded to:

Dr Alice Kesminas



Following her undergraduate degrees in Geomatic Engineering and Computer Science at the University of Melbourne, Dr Kesminas undertook a graduate position at Geoscience Australia in Canberra. Here she was involved in a variety of land use and earthquake risk modelling projects. It was also here that she experienced one of the highlights of her early career which was an opportunity to work in Antarctica for the CRC for Antarctic and the Southern Ocean.

Alice then received a scholarship to undertake a PhD with the CRC for Spatial Information (CRC-SI) at the University of Melbourne. Alice's PhD thesis: "Automatic Virtual Environments from Spatial Information and Models" involved generating 3D landscape models from GIS and spatial databases. Her research focused on generation and use of interactive, collaborative 3D environments of existing and modelled landscapes. Alice's research broke new ground in linking advanced visualisation systems with spatial information.

Following her PhD Alice worked for Geomatic Technologies (GT) as a business analyst and project manager, specialising in spatial information solutions for a number of years prior to her appointment as Solutions Manager – Community Energy for AusNet Services.

The medal was presented at a Department function on Friday, 14th December



INTERNATIONAL News



Prof. Abbas Rajabifard was a plenary speaker at the FIG Congress 2018 in Istanbul, Turkey. Prof. Rajabifard's session was on Spatially Enabled Societies and Smart Communities.

FIG Congress brings together the international community of surveying and spatial professionals. Scientists, experts, policy and decision-makers, students, and stakeholders are invited to join the discussions on issues affecting the international surveying and spatial community today and in the future. The theme this year was Enhancing our smart world where the continents connect: enhancing the geospatial maturity of societies.



China

The annual Melbourne University - Tsinghua University Australia China International River Basin Field Trip was held in the Yellow River Basin and included 14 ME students and a total of 40 participants including Tsinghua University masters students and guests: Brendan Cossens (Goulburn Murray Water) and Jong Lee (MDBA).



Istanbul

Prof. Abbas Rajabifard presented a peer-reviewed paper on the topic of 3D Digital Cadastre at the XXVI FIG International Congress & General Assembly 2018 in Istanbul, Turkey.

This work was part of CSDILA's ARC Linkage Project '3D Property Ownership Map Base for Smart Urban Land Administration'. This project is supported by Land Use Victoria, Intergovernmental Committee on Surveying and Mapping (ICSM), and City of Melbourne.



Macau

Prof. Nelson Lam was a speaker, with Prof. Bill Wong and Prof. Ben Young, at the Professional Course on Structural Design to Eurocodes 1, 2 3 and 8 for events of Fire, Impact and Earthquakes. The photo was taken at the University of Macau, in front of the statute of the Asian tycoon Dr Stanley Ho, and at the base of the Macau's version of the Eiffel Tower.

The course was organised by Macau Society of Metal Structures, Department of Civil and Environmental Engineering in the Faculty of Science and Technology at the University of Macau.

UNWGIC and visit to Wuhan University, China

On the 21st of November, Professor Abbas Rajabifard chaired and concluded a successful session at the first United Nations World Geospatial Information Congress (UNWGIC) in China on the theme of 'A Sustainable and Resilient World: Capacity Building and Geospatial Research for Implementing the SDGs'. This session was organised by the UN-GGIM Academic Network, which is chaired by Prof. Rajabifard. During the session, Prof. Rajabifard shared CSDILA's work 'A Blueprint for Disaster Management RD&D Supporting the SDGs as a framework that establishes the detailed relationships between disaster management and the SDGs to guide future research, policy, and innovation for sustainable development and disaster risk reduction'.

Following the UNWGIC, Prof. Rajabifard will visit the State Key Laboratory of Information in Surveying, Mapping and Remote Sensing (LIESMARS) at Wuhan University on the 24th of November to give a talk on 'Enabling Business and Community - Resilience, 3D Land and Property, Urban Analytics'.



World Bank Conference, Washington D.C.

We are delighted to collaborate with the World Bank on the project: 'Improving Resilience and Resilience Impact of National Land and Geospatial Systems'. In March our joint research team led an international expert meeting and a plenary panel on this topic at the World Bank Annual Land and Poverty conference in Washington.

The meetings focused on the scope and initial findings of our collaborative project with the World Bank, on the same topic. The event offered the opportunity for us to present our inception report outlining relevant literature and a best practices analysis. We also interacted with the country consultants engaged on the project, including India, Nicaragua, Nigeria, Norway and Turkey, who provided their preliminary findings and insight from their country contexts. The event provided a chance to carry out an in-depth discussion with many key international organisations.



World Bank Disaster Management and Land Resilience, Jakarta, Indonesia

Professor Abbas Rajabifard and Dr Elisa Lumantarna conducted a workshop in Jakarta, Indonesia, on the topic of Disaster Management and Resilience and Resilience Impact of Land and Geospatial Information. The workshop was part of the collaboration with the World Bank on the project: Improving Resilience and Resilience Impact of National Land and Geospatial Systems.



Island of Spitsbergen, Arctic

Professor Alex Babanin undertook a reconnaissance mission to the Island of Spitsbergen in the Arctic (78 degrees North), where a field experiment is planned for April 2019.



U.N. Meeting - Eighth Session of the Committee of Experts on UN-GGIM - New York

Prof. Abbas Rajabifard attended The United Nations – Global Geospatial Information Management (UN-GGIM) Academic Network Forum that was held in the week from 1-3 August as part of the Eighth Session of the Committee of Experts on GGIM at UN Headquarters, New York. In his opening remarks, Prof. Rajabifard, as Chair of the UN-GGIM Academic Network, addressed the theme of the event, particularly in the areas of sustainability, resilience, and connectivity for urban communities and settlements

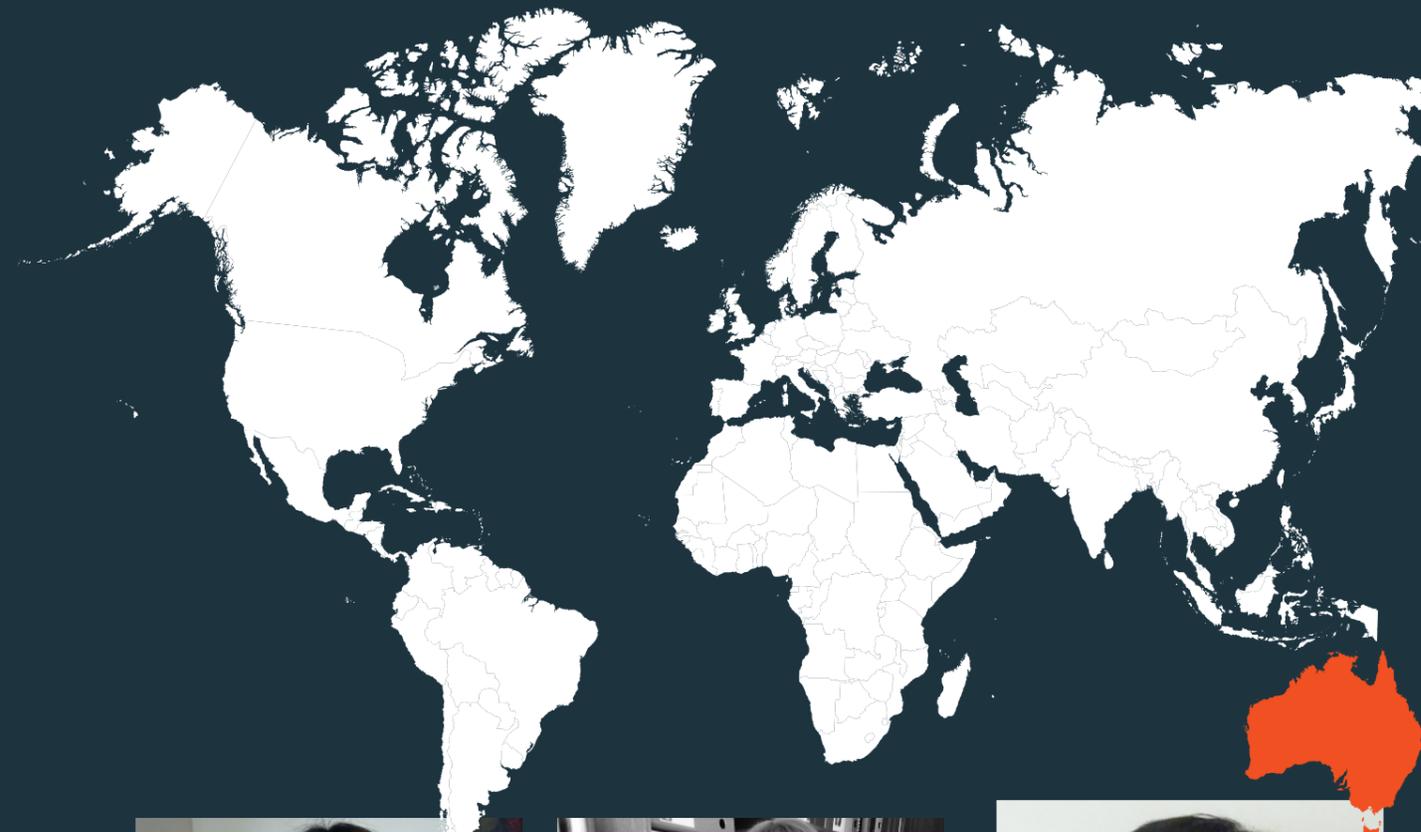
The theme of the event was The SDGs Connectivity Dilemma: Urban Settlements, Resilience, and Sustainability, and brought together over 100 delegates and geospatial experts and academics from over 50 Member States, academic institutions, and the private sector.

Other international visits of interest

- Prof. Stephan Winter visited the University of Ghent on an Erasmus Scholarship in January.
- Prof. Abbas Rajabifard chaired and presented a session at the inaugural United Nations World Geospatial Information Congress (UNWGIC), as the Chair of the Academic Network for the UN Committee of Experts on Global Geospatial Information Management in Deqing, Zhejiang Province, China. He chaired a session on the theme of 'A Sustainable and Resilient World: Capacity Building and Geospatial Research for Implementing the SDGs.'

VISITORS

In 2018, we were privileged to welcome visitors from all over the world



Elisa Mackowiak and Ramdane Bessaïd from ESTP Paris, France



Dr Hye Jung Ho, S. Korea



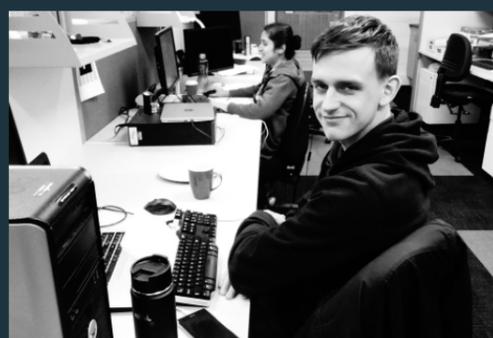
Ms Laura Knoth, Austria



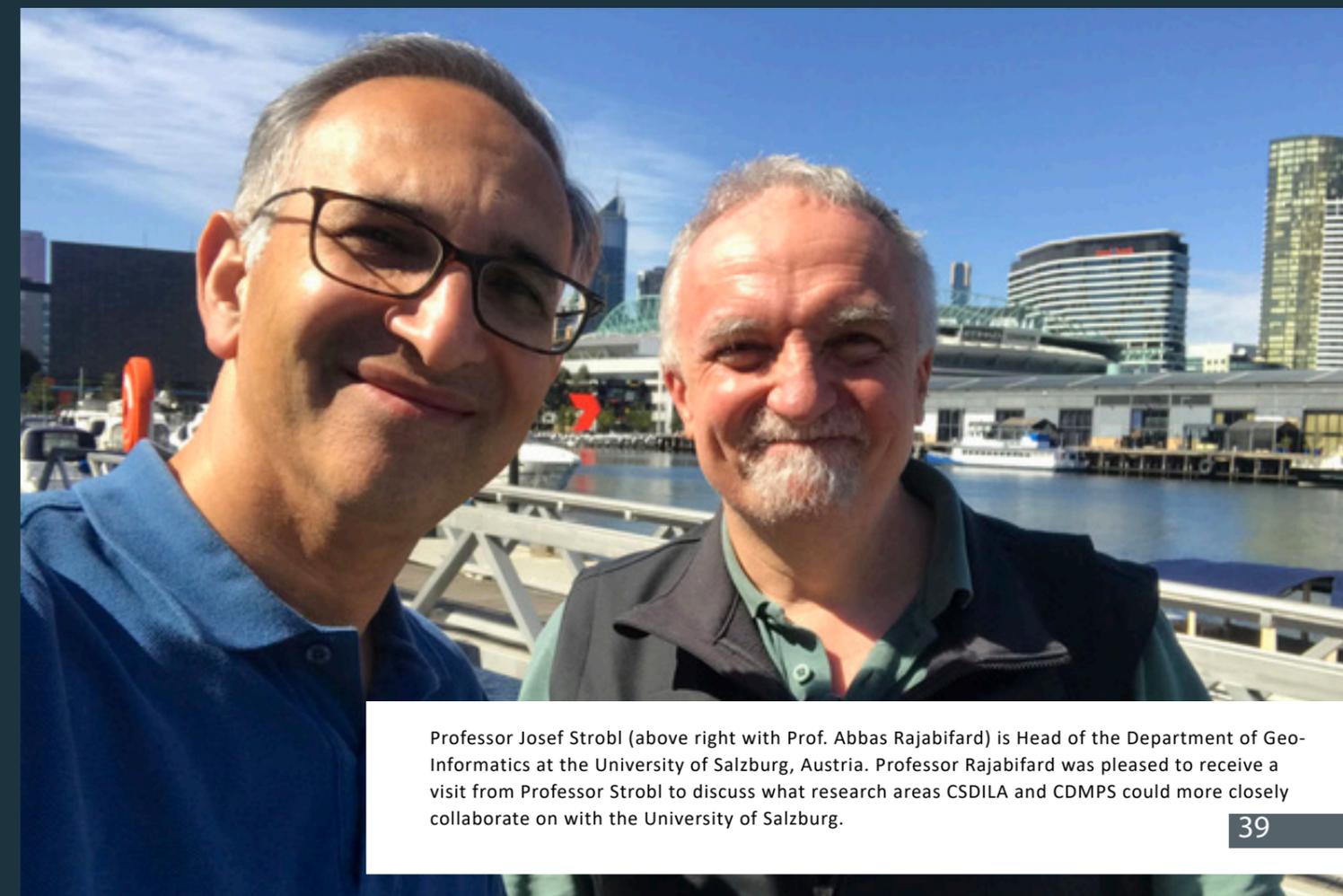
Dr Wenhua Zhao, P.R. China



Dr Daichi Yanagisawa, the University of Tokyo, Japan



Alex Levering, Netherlands



Professor Josef Strobl (above right with Prof. Abbas Rajabifard) is Head of the Department of Geo-Informatics at the University of Salzburg, Austria. Professor Rajabifard was pleased to receive a visit from Professor Strobl to discuss what research areas CSDILA and CDMPs could more closely collaborate on with the University of Salzburg.



Professor Priyan Mendis (left) and Professor Abbas Rajabifard (right) with Professor Venkatesh Kodur, Head of Department of Civil & Environmental Engineering (CEE), Michigan State University in USA, and a well-known structural fire engineering expert.

- Mr Wouter Knoben, PhD researcher for Water Informatics: Science and Engineering Centre for Doctoral Training, University of Bristol (UK)
- Ms Linn Linn Sundström, M.Sc., Environmental Engineering and Sustainable Infrastructure, Royal Institute of Technology, Stockholm, Sweden
- Mr Paul Branson, University of Western Australia
- Mr Alex Levering, Masters student in Geo-Information Sciences at Wageningen UR, Wageningen, NL
- Distinguished Prof. Debes Bhattacharyya, University of Auckland, NZ
- Assoc. Prof. Xianhai Meng, School of Computer Science and Engineering, Beihang University(BUAA)
- Ms Suchang Zhao, Northeast University, P.R. China
- Mr Chee Hoe Chuan, Universiti Malaysia Sabah
- Mr Sebastian Mooser, Switzerland
- Prof. Werner Kuhn, UCSB, visited us August-September for collaboration on an ARC Discovery Project
- Prof. Nico van de Weghe, Ghent University, visited us in August for collaboration on place-related research
- Prof. Monika Sester, University of Hannover, visited us in August for collaboration on mobility-related research
- Dr Hongyu Ma, Key Lab of Marine Science and Numerical Modeling, State Oceanic Administration (SOA), First Institute of Oceanography (FIO), State Oceanic Administration (SOA), P.R.China
- Prof. Dr Susanne Bleisch, Geovisualisierung und Visual Analytic, Fachhochschule Nordwestschweiz FHNW Hochschule für Architektur, Bau und Geomatik Institut Geomatik, Muttenz, Switzerland
- A/Prof. Guenther Retscher, TU Vienna, Austria
- Dr Hye Jung Oh, Chungnam Institute, S. Korea
- Dr Daichi Yanagiwawa, The University of Tokyo, Japan
- Ms Laura Knoth, Vienna, Austraias
- Dr Wenhua Zhao, Shanghai Jiao Tong, Senior Research Fellow, Faculty of Engineering and Mathematical Sciences, Oceans Graduate School
- Senior Research Fellow, Faculty of Engineering and Mathematical Sciences, Oceans Graduate School
- Ms Elisa Mackowiak, Mr Ramdane Bessaïd and Mr Xiaoxi Cui, ESTP, Paris



Mr Chee Hoe Chuan, Malaysia



Mr Wouter Knoben, UK



Yuan Li (Left) Dr Danlu Guo and Suchang Zhao, P.R. China



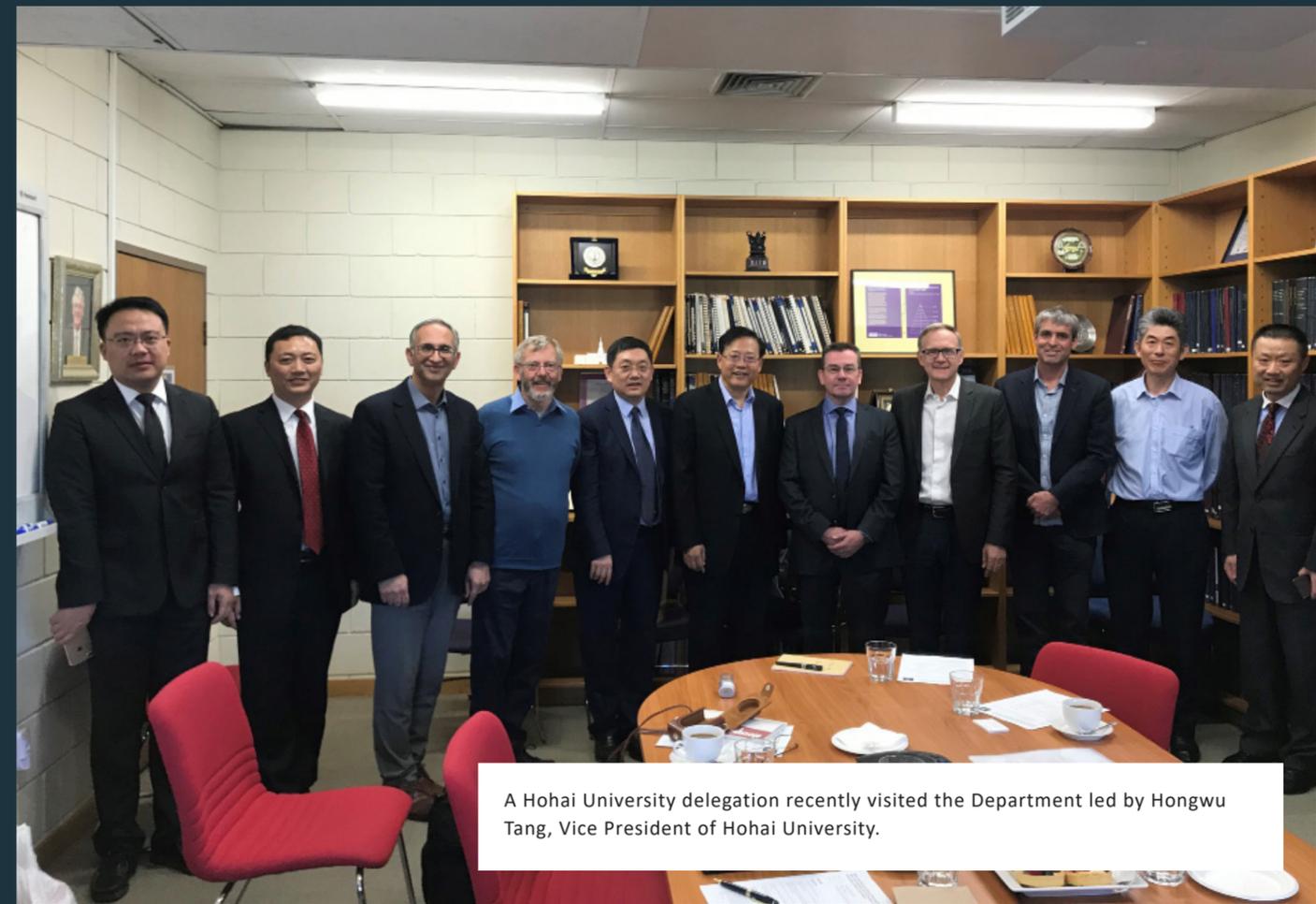
Ms Linn Sundström, Sweden



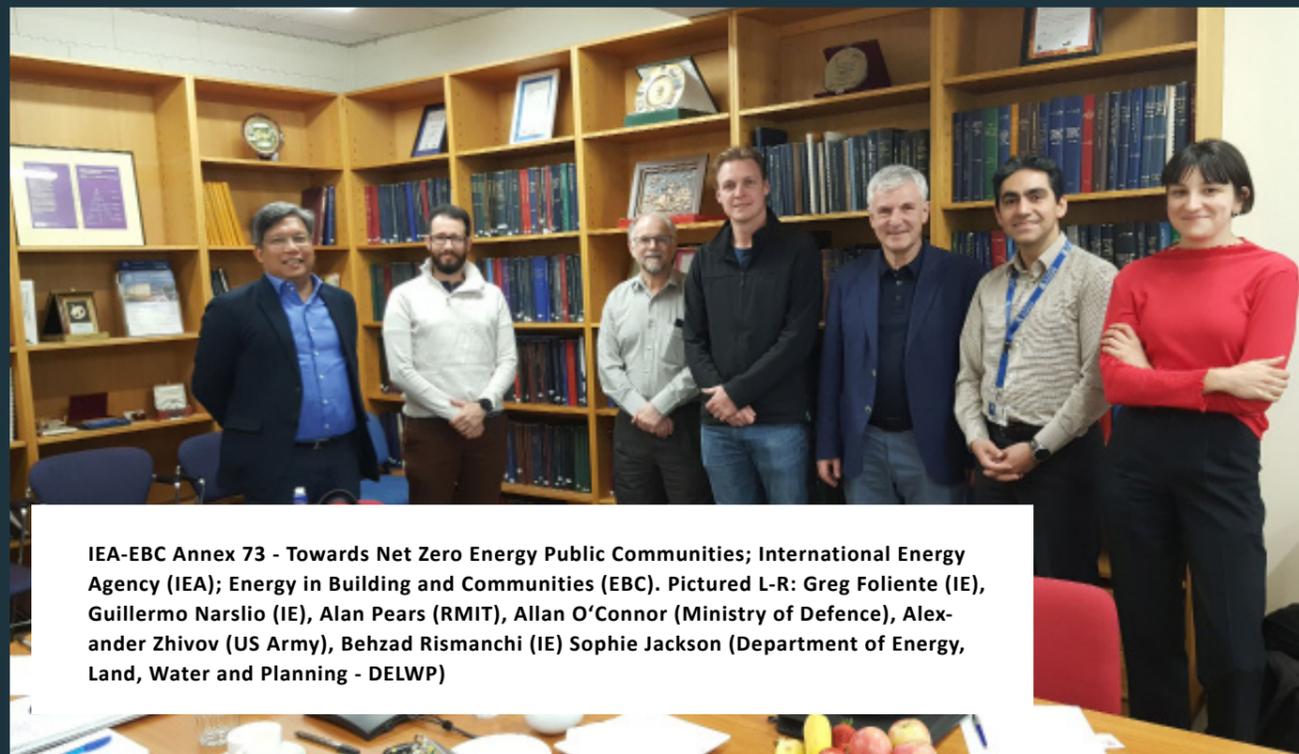
Prof. Ing. Susanne Bleisch, Switzerland (centre) with one of her PhD students, and (L-R) Dr Soheil Sabri, Prof. Abbas Rajabifard and Dr Benny Chen



IE meeting with the Construction Management Research Team from the University of Stuttgart in Germany.



A Hohai University delegation recently visited the Department led by Hongwu Tang, Vice President of Hohai University.



IEA-EBC Annex 73 - Towards Net Zero Energy Public Communities; International Energy Agency (IEA); Energy in Building and Communities (EBC). Pictured L-R: Greg Foliente (IE), Guillermo Narslio (IE), Alan Pears (RMIT), Allan O'Connor (Ministry of Defence), Alexander Zhivov (US Army), Behzad Rismanchi (IE) Sophie Jackson (Department of Energy, Land, Water and Planning - DELWP)



Professor Jantien Stoter visited from the Delft University of Technology to discuss potential areas for research collaboration in 3D spatial information domain. Jantien Stoter is a full professor in Spatial Data Infrastructure at the Faculty of Architecture and The Built Environment, Delft University of Technology, and she is leading the 3D GeoInformation group at the Department of Urbanism.



We were pleased to welcome Dr Dozi Ezigbalike, former UN Economic Commission Africa, who visited in October to discuss potential areas for collaboration.



We were delighted to host a High Level delegation from Government of Indonesia Ministry of Agrarian Affairs and Spatial Planning and National Land Agency, in our Centre for SDIs and Land Administration, the University of Melbourne. This is the second group of delegates that visited us as part of modernisation of land administration system.

2018 REVIEW



Prof. Colin Duffield
Deputy Head (Teaching)

In 2018 the total enrolments in our Department-owned subjects were just over 8,800. IE enrolments were the second highest across five Departments within MSE. In addition to the normal teaching activities of lectures, tutorials, workshops, and practical classes, some subjects continue providing student camps, excursions and fieldworks which always receive great feedbacks from students. There has been a large increase in subjects offering hands on experiences with a constant growth in active learning tasks in subjects like CVEN90044 Engineering Site Characterisation. Enhancements have been made to capstone projects and a new specialisation in Ocean and Marine engineering introduced. Other recent additions to the curriculum, like CVEN90062 Building Information Modelling, have proven to be particularly popular with 2018 enrolments, topping 200 students.

In 2018 our streams (civil, civil with business, structural, environmental, and spatial) in the Master of Engineering were reviewed by Engineers Australia and granted continuing accreditation under the Washington Accord. We also have current accreditation from the European professional engineering label called EUR-ACE which enables our graduates immediate recognition of their engineering skills in one of the largest career markets in the world.

As part of the MSE 2025 growth strategy, the Department has commenced initiatives in preparation for our new facilities at Melbourne Connect and also Fishermans Bend. Both new facilities have laboratory initiatives for students with the Fab Lab being a major attraction in Melbourne Connect and large scale testing facilities proposed for Fishermans Bend. We have participated as a whole in a MSE initiative to revamp our first year engineering subjects and we are working to align capstone subjects across the whole of EMI thus creating greater opportunity for multi-disciplinary design and research projects.

Strategic teaching appointments continued throughout 2018 with two new transport academics, three new structures appointments, a new fractional appointment in water and some replacement staff in geomatics. Our new Dean, Mark Cassidy, started mid-year and his strength of research in Offshore Foundation Systems has already led to further enhancements to our geotechnical team.

The Department is actively working with the Bachelor of Design and is developing a transport specialisation within this degree.

TEACHING IN THE FIELD



Dr Angus Webb
Assoc. Prof.

Monitoring Environmental Impacts

In mid-September, 83 students and eight staff from the Masters-level course, "Monitoring Environmental Impacts" spent five days at Dookie campus on the annual field camp.

Students implemented the monitoring projects that they had been developing in class for the previous eight weeks, with many quickly learning the golden rules of fieldwork:

- 1) That things go wrong in ways that you couldn't possibly have foreseen
- 2) That quick thinking is necessary to get your research back on track
- 3) That you can never have too many cable ties and duct tape for responding to rules 1 and 2

Monitoring endpoints ranged from nutrients in soils and water, to vegetation and macroinvertebrate diversity, to soil compaction and composition, with a wide range of hypotheses being tested in and around the Dookie campus, research dairy and along the Broken River.

All students gave oral presentations during the camp, often on data they had collected only that day. We were also lucky to have a presentation from Jo Deretic from the Goulburn Broken Management Authority, who took us through her pioneering efforts to bring acoustic monitoring into environmental water monitoring and evaluation in Victoria. Students also had to prepare a report for submission before arriving back in Melbourne, learning the importance of deadlines and working under time pressure.

The camp went off with barely a hitch, save for a certain subject coordinator who outdid himself by managing to bog the bus during the driest spring in recent memory, and the lack of bar staff for the Saturday night BBQ, which required teaching staff to revive their memories of working in pubs from decades earlier.



As always, we're indebted to the staff at Dookie campus who always go above and beyond the call to make the camp a success.



RESEARCH



The Department continues to drive major research themes across a range of interests from infrastructure designs and protection to urban sustainability, water productivity to disaster management and urban sustainability and urban connectedness, transport design and management, and renewal of energy and Ocean Engineering.



Indoor Air Quality, Product Emissions & Health Effects

Professor Steinemann's research group on indoor air quality, consumer product emissions, and health effects has received widespread media coverage this year. Together with her PhD students, their research has been featured in more than 1,000 newspapers, magazines, radio and television programs, and web-based media outlets, spanning six continents, and reaching an audience of over 200 million people. She has conducted interviews with national and international outlets including SBS Television, Herald Sun, Daily Mail UK, Sydney Morning Herald, ABC Radio Sydney, ABC Radio Tasmania, 3AW Radio, Yahoo News, MSN News, Web MD, and New Scientist. Professor Steinemann has

launched a tropical engineering research collaboration with industry, government, and organisational partners in northern Queensland. The focus is on developing a tropical sustainable community, featuring a prototype "tropical tiny healthy house". This prototype house seeks to meet the criteria of being healthy (good indoor air quality, safe and low/no offgassing materials, mould resistant), in addition to being energy efficient, water efficient, disaster resilient (to cyclones and extreme weather events), affordable, climate sensitive (passive design), replicable and adaptable, transportable, self-sustaining (portable electrical and water systems), and suitable for tropical environments.

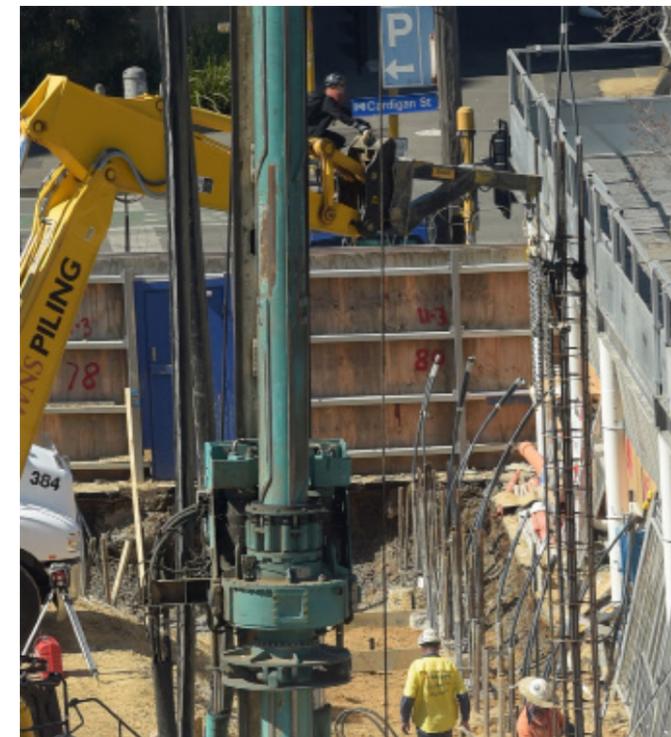
Target applications including disaster preparedness and relief, affordable housing, temporary worker accommodation, health recovery (sick building and asthma sufferers), eco-retreat, and collaborations for Indigenous housing. Her collaborators include Townsville City Council, CSIRO, James Cook University, Queensland Government, Ratcliffe International, Flanagan Consultants, Finlay Homes, as well as engagement activities with Indigenous communities.

Geothermal Energy Walls being built at Melbourne Connect

The Melbourne Connect precinct offers a significant opportunity for transformational inner city renewal and to demonstrate and showcase iconic eco-technologies, particularly shallow geothermal technology of which the university is leader, to potential stakeholders, students and domestic and international visitors.

The use of energy foundations instead of boreholes is instrumental to the upcoming ARC Centre of Excellence application – called CG3 (\$35m over seven years), which involves A/Prof. Narsilio's group, internationally recognised for geothermal R&D and commercialisation, and Prof. Mark Cassidy, newly appointed Dean of Engineering.

The proposed geothermally activated soldier pile wall at the CCI site (24 soldier piles) would be the first of its kind in Australia and worldwide, placing the University of Melbourne and its stakeholders at the forefront of R&D for this emerging renewable energy technology. A smaller pilot trial carried out by John Holland Pty Ltd and the University involves only three soldier piles at the CBD North station of the Melbourne Metro project and is underway, but this system is very small and not under UoM's control. UoM has limited access and the trial will terminate as the Melbourne Metro works advance.



Melbourne Connect building and energy geostructures (energy walls, energy piles, energy slabs) in collaboration with LendLease.



Assoc.Prof. Guillermo Narsilio, a member of the College of Experts of the Australian Research Council (2018-2021), and his team at the CBD North Melbourne Metro shaft where a mini-trial on energy soldier pile retaining walls is taking place in collaboration with John Holland.

Shallow geothermal energy uses the ground to depths of a few tens of metres as a heat source in winter and a heat sink in summer for efficiently heating and cooling buildings. The technology uses ground loops, where water is circulated through pipes embedded into building foundations or specifically drilled boreholes, shown schematically to the right (soldier piles form a retaining wall in building basements). In winter, heat contained in the circulating water is extracted by a ground source heat pump (GSHP) and used to heat the building. The cooled water is reinjected into the ground loops to heat up again to complete the cycle. In summer, the system is reversed with heat taken out of the building and rejected to the ground.



LEARNING & TEACHING INITIATIVES 2018

- Dr Wenyan Wu, \$26,000 for project online learning module and design project development for systems modelling and design

DECRA: DE19

- Dr Thuy (Kate) Nguyen, Department Infrastructure Engineering, was awarded ARC DECRA to the sum of \$408,000 on 'Façade fire failures in building: a robust nanocomposite solution'

OTHER GRANTS

- Stewardson, Nathan, Peel, Webb, Horne, "Vulnerabilities for environmental water outcomes in a changing climate", ARC Linkage, \$404K Category 1, \$285K Category 3
- Stewardson & Webb, "Long-Term Water Resource Assessment – expert review panel", Nolan Consulting and the Victorian EPA, \$59K Non-category
- A/Prof. Angus Webb, "Monitoring the effects of winter flows on the lower Goulburn River", Commonwealth Environmental Water Office, \$240K Category 3
- A/Prof. Angus Webb, "Monitoring, evaluation and research on the effects of Commonwealth Environmental Water in the lower Goulburn River 2019-2022", Commonwealth Environmental Water Office, \$3.03M Category 3
- A/Prof. Webb, "Evaluating the effect of Inter-Valley Transfers (IVTs) on ecological condition of the lower Goulburn River", Goulburn Broken Catchment Management Authority, \$15K Category 3
- APRAH - \$210k was awarded to Prof. Tuan Ngo for the Asia- Pacific Research Network for Resilient Affordable Housing project under the Regional Collaboration Programme of the Australian Academy of Science
- CRCP - Schiavello – UoM will receive \$1,350,000 for 3 years which is half of the amount that the Commonwealth's funding under the grant agreement. Schiavello the lead participant will receive the other half. The project is entitled 'Advanced Manufacturing and Construction of Smart Building Modules led by Prof. Tuan Ngo
- DMTC - \$68,374 for 6 months was awarded to Prof. Tuan Ngo for the Defence Materials Tech Centre project on Blast System Light Weighting
- DP180100643 - \$90,000 for 3 years was awarded to Prof. Priyan Mendis as non-lead for project entitled 'Developing Innovative Concrete Composites by upscaling material properties'





Established in 2001, the Centre for Spatial Data Infrastructures and Land Administration provides a focus for research in spatial data infrastructures (SDIs), spatial enablement and land administration by building on ongoing research relationships and creating new links through extended collaboration at both national and international levels



Prof. Abbas Rajabifard
Director

2018 in Review

The Centre for Spatial Data Infrastructures and Land Administration (CSDILA) has had another successful year. The activities of the centre are based on a three-pillared approach: the development of a research program; a focused postgraduate training program; and facilitated knowledge transfer, including our visitor program.

Advisory Board

CSDILA's Advisory Board comprises distinguished Australian and overseas leaders in spatial science and related technologies from academia and industry. Advisory Board members are kept informed of the centre's activities and they also encourage the promotion of networking linkages and research opportunities between centre researchers and their own institutions and contact networks.

CSDILA members' activities

World Bank collaboration

We are delighted to collaborate with the World Bank on the project 'Improving Resilience and the Resilience Impact of National Land and Geospatial Systems'. In March, our joint research team led an international expert meeting and a plenary panel on this topic at the World Bank Annual Land and Poverty conference in Washington.

Malaysian 3D Cadastre Project

The Department of Survey and Mapping Malaysia (JUPEM) invited CSDILA to facilitate a 3D cadastre and LADM workshop. The workshop was

attended by representatives of JUPEM and their stakeholders. A number of representatives from governmental departments also participated to provide their input into CSDILA's 3D cadastre and land administration projects. These governmental departments included the Department of Land and Mine, the Department of Planning, the Planning Department of City Council in Kuala Lumpur, the Department of Valuation, as well as the Property Services and Land Titling offices. During this visit CSDILA had the opportunity to discuss technical arrangements for the delivery of the new model for 3D cadastre in Malaysia. This workshop was led by Dr Mohsen Kalantari and Mr Mohsen Anaraki.

As part of the 3D cadastre project for Malaysia, CSDILA presented a paper titled 'An LADM-based approach to developing and implementing national 3D cadastre: A case study of Malaysia' at 'LADM2018: The 7th Land Administration Domain Model Workshop' in Zagreb, Croatia on 12th of April.

In May Professor Abbas Rajabifard presented CSDILA's peer-reviewed paper on the topic of '3D Digital Cadastre' at the 'XXVI FIG International Congress & General Assembly 2018' in Istanbul, Turkey.

This work was part of CSDILA's ARC Linkage Project '3D Property Ownership Map Base for Smart Urban Land Administration'. This project is supported by Land Use Victoria, the Intergovernmental Committee on Surveying and Mapping (ICSM), and City of Melbourne.

From May 30-31 the Department hosted representatives from the Department of Survey and Mapping Malaysia (JUPEM) and ENVIRO Land Services to discuss our progress on developing prototype tools for 3D cadastre in Malaysia.

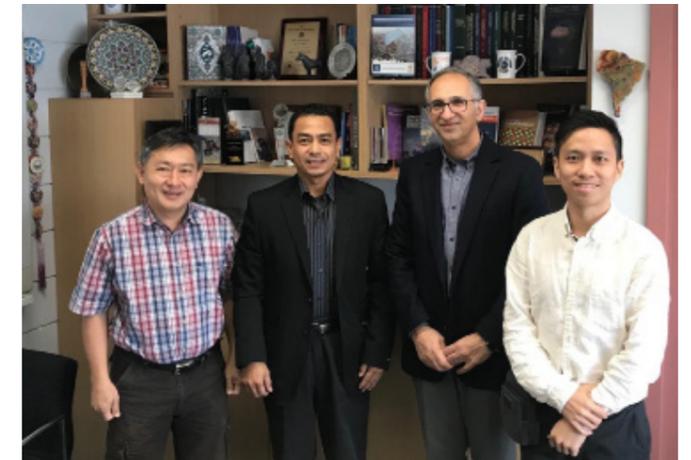
Currently, legal information about land – known as a cadastre – is largely stored in 2D databases, but as our cities grow in all directions there is a need for frameworks to encompass air space and the underground. This project included a study of requirements and developing new tools to support this transition, as we migrate 2D data into an open source database and build applications to create a 3D cadastral system. Our client JUPEM came to see our work in person and discuss our design for a prototype, which includes a series of applications including server, database and desktop application, to implement the 3D cadastre – putting theory into practice.

Victorian 3D Digital Cadastre Roadmap

In August, CSDILA was delighted to host Land Use Victoria and Professor Jantien Stoter from Delft University of Technology for a workshop about the Victorian 3D Digital Cadastre Roadmap. Land Use Victoria is currently working towards a 3D Digital Cadastre for the State, and we are proud to be consultative partner for this project. We had a rich discussion about the project's vision: how to align with ICSM Cadastre 2034, and the importance of transitioning to a 3D digital cadastre to enable the 3D built environment. Outcomes from the meeting were as follows: a plan for transitioning from the current 2D cadastre to a 3D digital cadastre; identification of critical relationships between the data lifecycle, regulations and stakeholders; and indicators of progress for a change strategy.

2018 Surveying Expo

Our collaborator, the Institution of Surveyors Victoria (ISV), held their 2018 Surveying Expo in Melbourne, Victoria. This event welcomed about 200 delegates from Australian universities and the surveying industry.



CSDILA's Deputy Director, Dr Mohsen Kalantari, attended the event and was also invited to be a member of a panel for a discussion on smart cities. The main message gained from this discussion was that surveyors need to expand their frontiers further than 'cadastral' in order to secure their businesses. A noteworthy quote from the event was the Singapore motto 'Limited land, Unlimited space'.

2018 United Nations World Geospatial Information Congress (UNWGIC)

Our Director, Professor Abbas Rajabifard, chaired a session on 'A Sustainable and Resilient World: Capacity Building and Geospatial Research for Implementing the SDGs' at the inaugural United Nations World Geospatial Information Congress (UNWGIC), as the Chair of the Academic Network for the UN Committee of Experts on Global Geospatial Information Management (UN-GGIM). The UNWGIC as held in Dequing, Zhejiang Province, China from 19-21 November 2018.

International Symposium - A Smart Sustainable Future for All: Enhancing Resilience in a Changing Landscape



The Symposium hosted over 150 national and international speakers, including a variety of experts and representatives from academia, government and industry. It created an ideal environment for informed discussion and for promoting a collaborative effort towards a smart sustainable future for all.

As part of the event we were pleased to host two workshops, the first was led by CSDILA, with speakers from the Centre and Land Use Victoria, on 'Smart Land and Urban Data Management'. The second was presented by Bob Jensen, an expert in disaster management from the USA and Senior Managing Director of Strat3 on 'Leadership During Crisis and Developing Next Generation Emergency Management Teams'. Both workshops were well received and we are grateful to those who contributed to ensuring their success.

In addition, we hosted a free ePlan workshop in collaboration with Land Use Victoria (LUV) and the Department of Environment, Land, Water and Planning (DELWP) on the current and future developments of ePlan in Victoria. CSDILA are currently partnered with LUV to modernise the land subdivision process as part of the ePlan initiative. We welcomed presenters from LUV, including Mark Briffa, Manager of Electronic Subdivisions Unit; Dr Hamed Olfat, ePlan Coordinator; and Craig Sandy, Surveyor General. We also welcomed Tom Champion, Associate Director of Reeds Consulting, and members from the surveying industry. This was an excellent workshop that received a lot of positive feedback. Thank you to LUV for their support and contributions to this event.



Blueprint Launch at SSF2018

In collaboration with our sister institute, the Centre for Disaster Management and Public Safety (CDMPS), we successfully launched 'A Blueprint for Disaster Management RD&D Supporting the Sustainable Development Goals' at the International Symposium 'A Smart Sustainable Future for All', at The University of Melbourne on the 25th of September, the third anniversary of the United Nations Sustainable Development Goals.

The Blueprint provides analysis and a research framework to support policymakers, first responders, industry stakeholders, and community members in strengthening our resilience to future disasters. The path to a sustainable and resilient future is paved by the decisions we make today, and our work seeks to support positive evidence-based action.

Senior executives from major government and international organisations attended the launch and commented on the significance of the research, including: Anna Wellenstein, Director of Strategy and Operations, the World Bank; Mark Croweller, National Resilience Taskforce, Department of Home Affairs, Australian Government; and Assistant Commissioner Debra Abbott, Victoria Police.

About the blueprint, Anna Wellenstein said, "I was really excited to learn about the blueprint. I think unless we really know what progress we're making, and we have targets – it's hard for us to learn

from each other – one country to the next – about what's a really effective policy and program and what's not, and it's really hard to see if we're on the right track or not... It's quite an accomplishment that the team here at the University of Melbourne was able to put together a plan and I look forward to its discussions with a lot of the countries and international agencies."



(From left to right) Prof Greg Foliente (Deputy Director, CDMPS), Anna Wellenstein (Director, Strategy and Operations, the World Bank), Hon. Gary Nairn (Former Spatial Minister, Australia), Mark Croweller AFSM (Head, National Resilience Taskforce, Australian Government Department of Home Affairs), Assistant Commissioner Debra Abbott (Victoria Police), Prof. Abbas Rajabifard (Director, CDMPS and CSDILA, University of Melbourne), Maryam Rabiee (Research Associate, CDMPS and CSDILA).



Undertaking world-class research and translating it into innovative solutions and tools that address the real-world challenges facing government and industry professionals in the disaster management and public safety environment

CDMPS has had a significant 2018, with the implementation of various elements of the strategic plan that was developed in late 2017. The International Advisory Board's membership and role are being clarified and we have commenced the process of improving our governance, including the welcoming of our new MSE Dean and International Advisory Board Co-Chair, Prof. Mark Cassidy.

Our 2018 highlights include:

- The completion, publication and release of the Disaster Management (DM) and Sustainable Development Goals (SDGs) research blueprint: unimelb.edu.au/cdmops/sdg-blueprint
- The successful organisation of the 2018 Smart and Sustainable Futures (SSF) international symposium
- Effective engagement across a diverse range of stakeholders, including the 3GPP information event and the series of workshops we run for the Victorian government (via the Victorian Managed Insurance Agency).



Prof. Abbas Rajabifard
Director



Prof. Greg Foliente,
Assistant Director

The following is a summary outline of our Strategical Pathways and highlights:

High Impact inter-disciplinary and transdisciplinary RD&D

A priority research agenda was developed and promoted worldwide through the DN-SDG research agenda blueprint, released publicly in September 2018.

We continued numerous discussions to develop Cat 2-4 funding proposals, including with Victorian Police, VicTrack, VMIA, Nokia, BEC, LEI and Virtacom, among others. This will continue into 2019 with some real prospects.

With VMIA, we reviewed the 2017 VAG report on ICT disaster resilience and run a series of workshops to develop an improved whole-government disaster resilience plan, introduced cyber-security issues and paved the path for closer collaboration into 2019 and beyond.



VMIA whole-of-Vic government workshops

Engagement and communication

Our communication and marketing plans are continually being improved. Our social media presence had its strongest year in 2018. We actively promoted the 3GPP event, SSF symposium and the DM-SDG research agenda blueprint across different media. The SSF symposium was very successful in providing an interdisciplinary forum for this global challenge, engaging broad stakeholder contributions (especially, and most importantly, the World Bank, the UN and country-delegates, particularly Indonesia) and positioning a leadership role for CDMPS and CSDILA in SDG and disaster resilience links. The SSF Proceedings is being distributed.

Education and training programs

Our education and recruitment programs are still being developed. We had a number of PhD completions (who have found employment) and are in the process of recruiting new ones, especially in the SDG fields. We are exploring with Melbourne's Research Innovation and Commercialisation (RIC) team our role and participation in the CFA leadership training program (together with the Melbourne Business School).



CDMPS hosted a seminar with Bob Jensen and Mark Pfeifle and Prof. Greg Foliente conducted an interview: [linkedin.com/pulse/effective-leadership-communication-crisis-disasters-greg-foliente/](https://www.linkedin.com/pulse/effective-leadership-communication-crisis-disasters-greg-foliente/)



Unlocking the potential growth of Australia's prefabricated building industry



Prof. Priyan Mendis
Director



Prof. Tuan Ngo
Research Director

CAMP.H has a high profile within the Australian prefab industry. There has been a lot of interest in the Centre's activities which resulted in new partners joining the ARC training centre, namely Fleetwood and Bondor, and new projects and initiatives such as the CRCP with Schiavello, new projects with DMTC and the Australian Academy of Science. 2018 has been another successful year for the CAMP.H team with lots of new projects and initiatives.

Throughout the year, the CAMP.H team actively engaged with industry partners. CIs, Research Fellows, PhD students and Research Assistants continued to work closely with our partners on various projects. The partners appreciate the value that the team brings to their projects and business development

Research Centre Activities and highlights

2018 has been another successful year for the team with the following highlights:

The annual forum held in September which brought together all the members of the centre to share the successes, goals, capabilities and ongoing opportunities within CAMP.H and the prefabrication industry.



Committees & Meetings

Governance Committee – The governance committee for the prefab group led by Prof. Abbas Rajabifard was formed to assist in setting the directions and goals for the prefab group and monitor progress of the projects.

Industry Advisory committee – The Centre is fortunate to have members of the committee from various areas of the construction industry. They bring in different expertise which is beneficial to planning and managing the activities of the centre. The committee met twice in 2018 and these meetings helped develop the operational planning of the centre and aided in identifying new strategic areas to ensure that CAMP.H is on track in achieving its goals.

Research and Training committee meetings – The R&T committee met twice in 2018 to discuss the research direction of the research programs, outreach and the implementation of the training centre

Fortnightly Technical meetings – Every fortnight the technical meeting facilitates the collaboration between all the members of the centre by inviting guest speakers from industry and UoM academic and professional staff, PhD students and Research Fellows to share their projects. such as Neil Despotellis, an inventor of Surefoot Footings, who provided a presentation to the centre on his involvement in Surefoot, including inventing, patenting, running and selling Surefoot, and Prof. Jamie Evans also presented on 'Strategies to progress in academia.'

camp.h.eng.unimelb.edu.au/#news-events

Built Offsite – Published a number of articles in the new industry publication Built Offsite:

builtoffsite.com.au/issue/

Presentation to ARC Staff – Prof. Priyan Mendis and Prof. Tuan Ngo was invited to present to staff members of ARC, including the ARC CEO Sue Thomas, on general prefab solutions for housing and prefab as a solution for future affordable housing. This shows the government's interest in Australia's growing prefabrication industry.

International Conferences attended and presented:

- Prof. Tuan Ngo gave a keynote at the Modular Integrated Construction (MIC) International Conference organised by the Hong Kong Government's Development Bureau and Construction Industry Council in HongKong in April 2018
- Prof. Tuan Ngo presented at the 2nd Annual Modular Construction and Pre-Fabrication ANZ in Sydney and Melbourne in March 2018
- Prof. Priyan Mendis and Prof. Tuan Ngo were invited in May 2018 to present in every major city in Australia on Modular Construction by Concrete Institute of Australia
- PrefabAus North America Study Tour
- ZEMCH Japan – Dr. Kasun Shanaka participated in the 2018 Japan Mission
- SIF18 Belfast – Prof. Priyan Mendis attended the 10th International conference on Structures in Fire at Belfast City Hall on 6-8 June 2018. The conference was the first of its kind in the UK and Ireland, with over 240 delegates participated from all 36 countries.

CAMP.H Pursuit Articles

- The future is prefabricated – pursuit.unimelb.edu.au/articles/the-future-is-prefabricated
- Building the prefab schools of the future – pursuit.unimelb.edu.au/articles/building-the-prefab-schools-of-the-future
- The particles making building cladding fire-safe – pursuit.unimelb.edu.au/articles/the-particles-making-building-cladding-fire-safe

Awards Received

- Dr Kate Nguyen was awarded ARC DECRA to the sum of \$408,000 on 'Façade fire failures in building: a robust nanocomposite solution'
- Dr. Ali Kashani was awarded the Churchill Fellowship, received on 16th of November 2018 from the Governor of Victoria on '3D Printing of Houses'
- Prof. Lu Aye was promoted to full Professor

Visitors

- Prof. Rafat Suddique – Senior Professor of Civil Engineering, Thapar Institute of Engineering & Technology, Patiala (Punjab) 147004, India. He visited the Centre for two weeks in Jun-Jul 2018. His contribution in the various aspects of design and development in cement-based construction materials was helpful in some of the projects in the Centre.
- Distinguished Prof. Debes Bhattacharyya – Centre for Advanced Composite Materials, Department of Mechanical Engineering, The University of Auckland. He visited the centre between 10th March and 9th June 2018.

Grants & Contract Funding received in 2018

- APRAH – \$210k was awarded to Prof. Tuan Ngo for the Asia-Pacific Research Network for Resilient Affordable Housing project under the Regional Collaboration Programme of the Australian Academy of Science.
- CRCP – Schiavello will receive \$1,350,000 for three years which is half of the amount that the Commonwealth is funding under the grant agreement. Schiavello, the lead participant, will receive the other half. The project is entitled 'Advanced Manufacturing and Construction of Smart Building Modules', led by Prof. Tuan Ngo
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POSTGRADUATES

Postgraduate Conference

International Food Day

Awards

Other activities

GRADUATIONS



In 2018 the Department again celebrated its cultural diversity with an International Food Day

Guests were invited to share the history, traditions, music and food of the many countries that make up the Infrastructure Engineering Department.

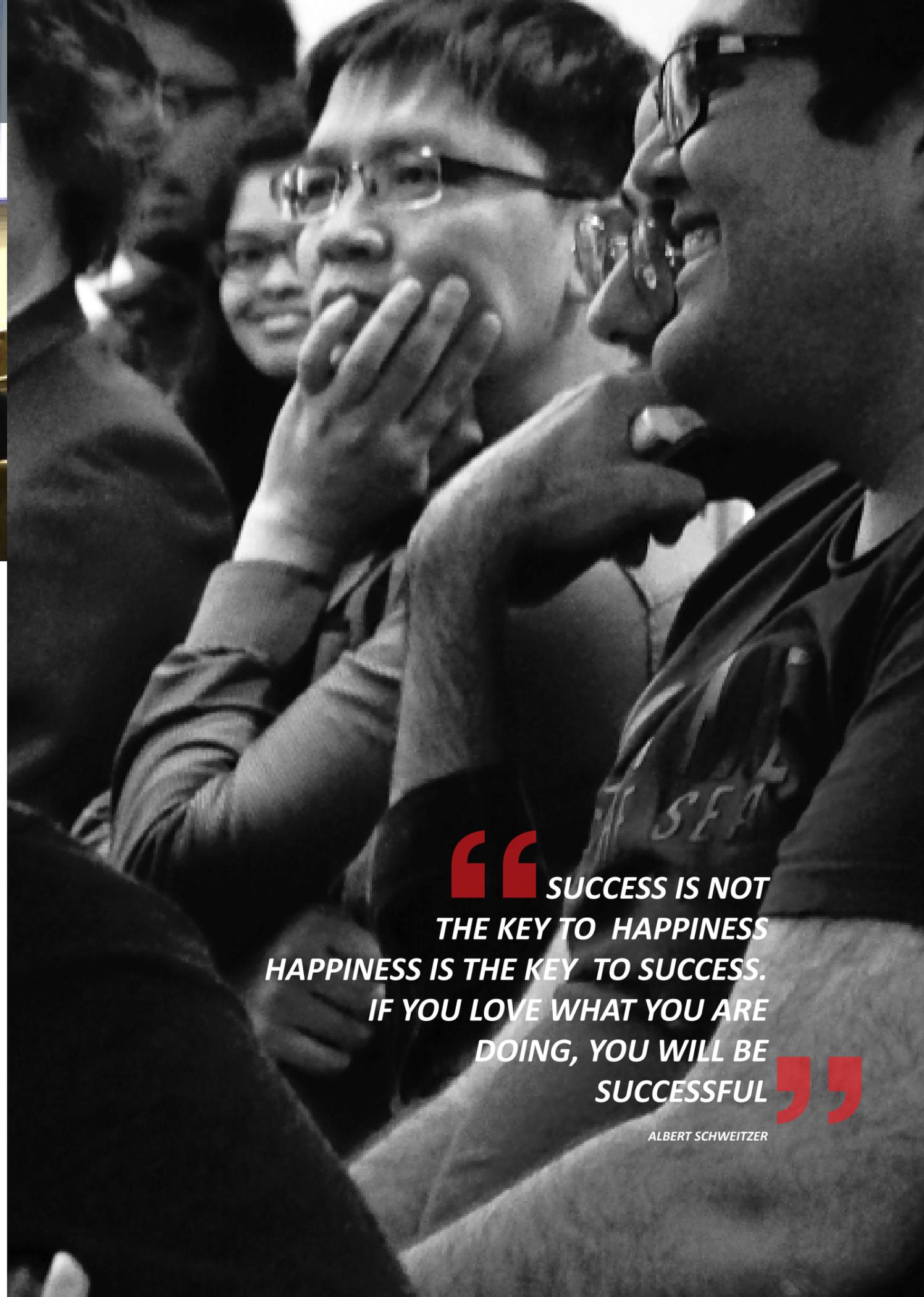
Everyone was invited to bring a popular or traditional food of their country of origin.

Represented were: Iran, India, Sri Lanka, China, Nepal, Bangladesh, Australia, Mexico, Turkey, Greece



“Strength lies in differences, not in similarities.” - Stephen Covey

Postgraduate Conference



Philip Tsang

President of Graduate Infrastructure Engineering Students' Society (GIES)



Held at the end of each year, the Postgraduate Conference is an important component of our department's research and training strategy for Research Higher Degree (RHD) students. The conference's aims are in line with our university goals of research excellence and quality research training.

This year the Infrastructure Engineering Postgraduate Conference 2018 (IEPC 18) was held on 8th November 2018 at Graduate House, Carlton. The conference showcased works of 109 students within the Department, including civil, environmental and geomatics, as well as ocean engineering.

A theme was assigned to each of the nine sessions based on various research fields within the Department, which include:

1. Sustainable Urban Infrastructure;
2. Sustainable Infrastructure and Resources;
3. Sustainable Water Resource System;
4. Disaster Management and Public Safety I & II;
5. Smart City and Urban Management;
6. Water Resources Infrastructure and Management;
7. Machine Learning and Numerical Modelling; and
8. Spatial Modelling and Climate Study

The theme of this year's IEPC was "Future of Engineering", with a focal point of discussing the future

trend of infrastructure engineering. The conference was opened by Mr Philip Tsang, President of GIES, and was followed by a warm welcome address by Prof. Abbas Rajabifard, Head of Department. In the morning plenary, Dr Collette Burke, Victoria's Chief Engineer, was invited to give a keynote speech on this year's theme, providing insights and foresights to help RHDs to navigate their future career. She said that, "the engineering profession has a critical role in delivering a more liveable, cleaner, advanced and efficient Victoria, creating a positive legacy for future generations."

There were 72 presentations delivered by second year or above RHDs, with first year RHDs' introductory video played in each session. In the afternoon plenary, the key messages from the morning plenary were revisited with a wide-ranging panel discussion on the same theme of the "Future of Engineering". Moderated by Prof. Greg Foliente, a gender and age- diverse panel with different fields of specialities were invited, including Mr Chris McRae, Ms Jenny Carbery, Dr Gil Tidhar and Dr Hosna Tashakkori.

The conference was closed with an award ceremony. Awards were given to the best journal papers in the three streams of IE Department, as well as three best presenters in the conference day.

“ SUCCESS IS NOT THE KEY TO HAPPINESS. HAPPINESS IS THE KEY TO SUCCESS. IF YOU LOVE WHAT YOU ARE DOING, YOU WILL BE SUCCESSFUL ”

ALBERT SCHWEITZER

At the Postgraduate conference

Best Presentation Prizes were awarded to:

1. Jude Shalitha Perera: Design of rockfall protection barrier with gabion cushion cover
2. Azadeh Emami: Network control for connected vehicles
3. Cagil Kirezci: Modelling of Rogue Events in Unidirectional and Directional sea states with JONSWAP spectrum



Best Paper Prizes were awarded to:

1. Chinchu Mohan, Environmental, for her paper: "Predicting groundwater recharge for varying land cover and climate conditions - a global meta-study", published in HESS
2. Mahil Tharindu Pathirana, Civil, for his paper: "Probabilistic modelling of Hertzian fracture of glass by flying objects impact in bad weather", published in International Journal of Impact Engineering
3. Fuqiang Gu, Geomatics, for his paper, Civil, for his paper: "Accurate Step Length Estimation for Pedestrian Dead Reckoning Localization Using Stacked Autoencoders", published in IEEE Transactions on Instrumentation and Measurement

Thank you to all postgraduates and staff who participated in and contributed to the 2018 Postgraduate Conference



Graduate Infrastructure Engineering Students (GIES)

GIES AGM and new elected committee

The Graduate Infrastructure Engineering Students' Society (GIES) represents the graduate students of the Department of Infrastructure Engineering. The society organises regular events, providing social cohesion amongst the graduate student group and opportunities to network with industry.

In June the GIES Annual General Meeting was held to elect the new committee for 2018-2019.

The elected members are:

- Chin Fung (Philip) Tsang, President
- Yu (Jake) Zu, Vice President
- Tian (Tori) Tang, Secretary
- Rajesh Chittor Sundaram, Treasurer
- Chen Dong, Media & Communications Officer
- Seema Karki Student Advocacy Officer



We thank the 2017-2018 Committee for their valued contribution, organisation and commitment



Postgraduate awards



L-R: Debaditya Acharya, David Amores, Ehsan Hamzei

GeoSmart Asia/Locate 2018

Three MSE/IE students won Australian Spatial Information Education and Research Association (ASIERA) young author awards for their papers at this year’s national spatial industry event, GeoSmart Asia / Locate Conference 2018 in Adelaide.

- **Debaditya Acharya**, for the paper ‘Real-time image-based parking occupancy detection using deep learning’ by Debaditya Acharya, Weilin Yan and Kourosh Khoshelham
- **David Amores**, for the paper ‘Movement pattern analysis using Voronoi Diagrams’ by David Amores and Maria Vasardani

- **Ehsan Hamzei**, for the paper ‘Deriving place graphs from spatial databases’ by Ehsan Hamzei, Hao Chen, Hua Hua, Maria Vasardani, Martin Tomko and Stephan Winter

The awards, launched at this year’s event, were presented to young authors (under 35) of papers with the highest review scores.

2018 Three Minute Thesis: Grand Finalist

This annual event is hosted by Melbourne Centre for the Study of Higher Education and LH Martin Institute. This year there were two outstanding MSE PhD candidates competing in a pool of 20 from a range of schools and faculties across the University.

Ms Chinchu Mohan (Infrastructure Engineering) was a grand finalist in the TMT competition and was awarded the People’s Choice Award for her presentation: “How much are we eating up our water resources?”

Chinchu had to distil a highly technical topic into an easily digestible presentation, with her thesis investigating modelling groundwater depletion around the world and finding ways to prevent the overexploitation of our water supplies, particularly for food production.



Dr Marie Truelove

Was named Postgraduate of the Year at the Spatial Excellence Awards held in December 2018.



Steven Linforth & Khuong Bui

Steven and Khuong with Prof. Tuan Ngo attended the '7th International Conference on Protection of Structures Against Hazards' in Hanoi, Vietnam. Steven and Khuong both won Highly Commendable Paper Award at the conference.



Tu Le Van

Presented at The 25th Australasian Conference on the Mechanics of Structures and Materials (ACMSM25) in Brisbane (4-7th Dec 2018).



AEES Conference, Perth

Rohit Tiwari and Yiwei Hu won the best paper award at the Australian Society of Earthquake Engineering (AEES) Conference in Perth. The award is presented for the best student paper in Engineering Structures (Rohit Tiwari) and Seismology (Yiwei Hu).

Other RHD activities



Arash Kaviani Arani (back row second from left), a fourth-year PhD candidate in CDMPS, attended the VIU Summer School on Critical Infrastructure Resilience (CIR) in Venice, Italy. The summer school brought together academics and professional experts to discuss an emerging topic with a pragmatic and scientific approach. The School, led by the University of Rome Tor Vergata, explained how critical infrastructure works and fails, its cascading impact from local to global, and the strategies to use to build a resilient society. The participants gained (i) a clear understanding of the key concepts, (ii) a methodology to apply it to their specific field/scale, and (iii) an overview of specific tools and solutions from recent applications.



Sina Khatami

Sina was involved in many activities throughout 2018 including:

International conference/symposium attended

- Delivered an oral presentation at European Geosciences Union (EGU) General Assembly in Vienna, Austria, 8-13 April 2018, titled “Conceptual hydrologic models: internal dynamics and realism”, co-authored with Peel, M., Peterson, T., Western, A.
- Participated in the Vienna Catchment Science Symposium 2018 centred on “23 unsolved problems in Hydrology that would revolutionize research in the 21st century” at Centre for Water Resource Systems, TU Wien, Vienna, Austria, on the 14th of April 2018.



TECHNISCHE
UNIVERSITÄT
WIEN
Vienna University of Technology



Vienna Doctoral Programme on
Water Resource Systems
www.waterresources.at



Der Wissenschaftsfonds.



Local conference attended

- Delivered a talk at The 31st Victorian Universities Earth & Environmental Sciences Conference (VUEESC) entitled “Internal dynamics of conceptual models: a window to understanding catchment behaviour”, at Melbourne, 8-9th November 2018

Awards

- Received the Student Research Scholarships from Geological Society of Australia

Invited talks and seminars

1. “Evaluating conceptual (hydrologic) models: overview and the new approach of Flux Mapping”, School of Earth Sciences, University of Melbourne. (26/07/2018) [Invited by the Geological Society of Australia, Victoria Division]
2. “Evaluating the internal behaviour of conceptual models—why you should care?” Department of Earth Sciences, Program for Air, Water and Landscape Sciences; Hydrology, University of Uppsala, Sweden. (19/04/2018) [Invited by Prof. Giuliano Di Baldassarre]
3. “On the internal dynamics of hydrologic models: a multi-model multi-objective approach”, Department of Physical Geography, Stockholm University, Sweden. (19/04/2018) [Invited by Prof. Gia Destouni]
4. “Flux Mapping: a new scheme to evaluate conceptual hydrologic models”, Department of Water Resources Engineering, Lund University, Sweden. (18/04/2018) [Invited by Assoc. Prof. Hossein Hashemi]

Workshops held

1. Co-convener, Workshop ‘Meet the Experts: Identifying Representative Spatial Scales in Hydrologic Modeling’, American Geophysical Union (AGU) Fall Meeting 2018, Washington, DC. [With Andrew Western as a Panelist]
2. Co-convener, Pop-Up ‘The Role of a Scientist in the 21st Century: Big Ideas for the Next 100 Years and How to Get There’, American Geophysical Union (AGU) Fall Meeting 2018, Washington, DC
3. Co-convener, Pop-Up ‘Bridging Science and Policy for Change: Best Practices’, American Geophysical Union (AGU) Fall Meeting 2018, Washington, DC
4. Co-convener, Pop-Up ‘Frontiers in Hydrology: Paths Toward the Next Century in Water Research’, American Geophysical Union (AGU) Fall Meeting 2018, Washington, DC
5. Co-convener, Pop-Up ‘Building Communities Through Shared Experiences: Social Dimensions’ in AGU, American Geophysical Union (AGU) Fall Meeting 2018, Washington, DC
6. Co-convener, PICO Session ‘Future of (hydrological) publishing’, European Geosciences Union (EGU) General Assembly 2018, Vienna, Austria

We extend congratulations to all our graduates and wish them every success in their endeavours, and a brilliant and promising future.

Theses passed in 2018

- Venkata Radha Akuraju
- Anita Amirsardari
- Judy Bush
- Cheng Cheng
- Glen Currie
- Keirnan Fowler
- Salil Goel
- Fuqiang Gu
- Milad Haghani
- Lloyd Harrington
- Roozbeh Hasanzadeh Nafari
- Sourosh Maghsoudi
- Maizuar Maizuar
- Vjekoslav Matic
- Alireza Mehdipanah
- Rajesh Nune
- Suyoung Park
- Mahil Tharindu Pathirana
- Andrej Peisker
- Andrea Pianella
- Azmir Hasnur Rabiain
- Arie Rahmadi
- Milad Ramezani
- Jing Ren
- Melissa Shahrom
- Marie Truelove
- Hao Wang
- Jun Wang
- Yaoli Wang
- Matthew Webb
- Mehair Yacoubian
- Hamzeh Zarei
- Haifeng Zhao



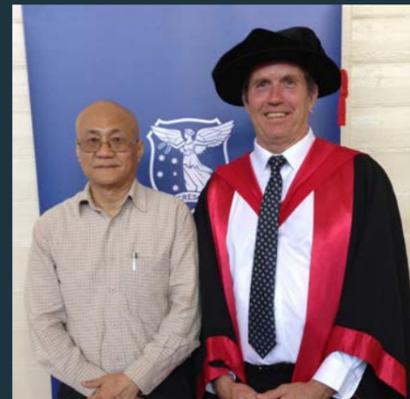
Dr Milad Haghani, Dr Haifeng Zhao, Prof. Abbas Rajabifard and Dr Sourosh Maghsoudi



Dr Judy Bush



Dr Farzad Alamdara and Prof. Abbas Rajabifard



Prof. Lu Aye & Dr Lloyd Harrington

“REMEMBER TO CELEBRATE MILESTONES AS YOU PREPARE FOR THE ROAD AHEAD. — NELSON MANDELA”



Dr Andrea Pianella



Dr Marie Truelove & Prof. Stephan Winter



Dr Hamzei Zarei and Pro Vice Chancellor Hansen



Prof. Stephan Winter and Dr Yaoli Wang



Dr Keirnan Fowler and Dr Murray Peel

IN MEMORY OF...

In 2018 we were saddened to lose the following colleagues...they will be greatly missed.



DR JUSTIN COSTELLOE



Dr Justin Costelloe passed away on June 16.th Justin studied the heart of the continent, its arid centre and the waters that moved through it. He brought together his interests in geology, ecology and hydrology to understand Australia's desert rivers. Justin generously shared his unique perspectives and a love of studying natural systems in the field with students and colleagues. He was down-to-earth. He was a gentle, principled and dedicated friend. Justin looked after people and was always a pleasure to work with. We will miss him.



PROF. LEN STEVENS, AM



Professor Stevens passed away in August. After winning a scholarship to complete a PhD at Cambridge University, he devoted a brilliant career to teaching and research at Melbourne and in supporting major civil works, making important contributions to construction after Cyclone Tracy and the Westgate Bridge failure, to national building codes and in the building of

the Melbourne Arts Centre and the New Parliament House. He continued to teach in the School of Engineering after concluding his term as Dean (1979-1988). Professor Emeritus Len Stevens was a major influence on Melbourne School of Engineering and in particular the Department of Infrastructure Engineering.



MR LLOYD MACEY

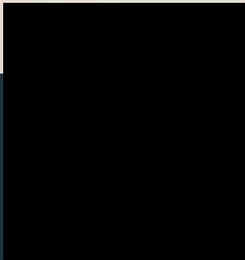


Mr Lloyd Macey passed away in February. He was a former colleague and husband of our dear colleague and friend, Rose Macey. Lloyd was held in the highest regard by those with whom he worked.

Lloyd retired in 2012 after many years of dedicated and intelligent service to the University and the Department. His kindness, thoughtfulness and efficiency are remembered by all.



“ THERE ARE SPECIAL PEOPLE IN OUR LIVES WHO NEVER LEAVE US EVEN AFTER THEY ARE GONE. ”
D. MORGAN



Get in touch

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