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ENGINEERING CONSULTANTS ADJUST TO COVID-19

**ARTIFICIAL INTELLIGENCE IN GEOSCIENCE** 

## ENGINEERS AND GEOSCIENTISTS BRITISH COLUMBIA SEPTEMBER/OCTOBER 2020 INNOVATION

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Nature Trust Mount Maxwell property, Salt Spring Island, photo by Graham Osborne







## COVER STORY

## THE PROMISE OF DIGITAL TWINNING

Digital twins are quickly gaining traction across multiple industries: building and large structure design, transportation, utilities, and HVAC control. Here in BC, a consortium of organizations are working together on the Learning Factory Digital Twin—a digital simulation of traditional factory processes aimed at producing complex aerospace parts.



## ADAPTING TO A PANDEMIC

COVID-19 ground many industries to a halt, but many engineering consultants used new tools and methods to adapt and keep their projects alive.

## ARTIFICIAL INTELLIGENCE IN GEOSCIENCE

Engineers and geoscientists are increasingly using computational power to aid them in their work. In BC, artificial intelligence is helping in the hunt for mineral deposits and predicting natural hazard events.



SEPTEMBER/OCTOBER 2020 | VOLUME 24 NUMBER 5

## NEWS / DEPARTMENTS

- 5 LETTERS
- 5 ASSOCIATION
- 8 COUNCIL REPORT
- 9 PROFESSIONAL PRACTICE
- 32 DISCIPLINE AND ENFORCEMENT
- 36 ORGANIZATIONAL QUALITY MANAGEMENT
- 38 IN MEMORIAM
- 39 CONTINUING PROFESSIONAL DEVELOPMENT

## COMMENT

4 VIEWPOINT

## OTHER

- 7 ANNUAL RENEWALS
- 9 CERTIFIED PROFESSIONAL COURSE
- 12 2020 PRESIDENT'S AWARDS
- 35 PROFESSIONAL SERVICES
- 38 CLASSIFIEDS
- 38 DISPLAY ADVERTISERS INDEX

#### ON THE COVER

An inside view of an autoclave at the Boeing Composite Wing Center, using to apply super-heated pressure required to build the Boeing 777X's composite wings. PHOTO: BOB FERGUSON/BOEING





THIS DIGITAL EDITION OF *INNOVATION* INCLUDES VIDEO EXTRAS. LOOK FOR THIS PLAY ICON, AND CLICK ON IT TO VIEW VIDEO AND OTHER MULTIMEDIA CONTENT. AN INTERNET CONNECTION IS REQUIRED.



Lianna Mah, P.Eng., FEC President president@egbc.ca

## REFLECTIONS ON THE PAST YEAR AND OUR PATH FORWARD

As my tenure as Engineers and Geoscientists BC's President draws to a close, I reflect on my goals when I took on this role, and the progress we have made to prepare to implement the new *Professional Governance Act* (PGA), increase diversity, and encourage registrant engagement through volunteerism.

After years of planning and preparation, we are now looking ahead to the PGA coming into force, including new Bylaws, new obligations and requirements, and a new Code of Ethics that will govern professional engineering and geoscience in

BC. In 2021, we will introduce regulation of firms, mandatory continuing education, and reporting requirements for registrants. The PGA enhances our ability to deliver on our mandate to protect the public interest, which will improve public safety and confidence in our professions. I want to thank Engineers and Geoscientists BC staff and Council for their hard work and the countless hours they have spent on implementing the PGA.

We were expecting to see this legislation implemented in November, but the recently announced provincial election will change this timeline. As we learn more in the coming weeks, we will keep registrants informed. In the meantime, I encourage you to visit *egbc.ca/pga* to learn more about your evolving obligations under this new legislation.

Throughout my career, I have been passionate about increasing the number of women in our professions. I am pleased that diversity remains one of Engineers and Geoscientists BC's priorities. Our efforts to promote diversity has increased the percentage of new female registrants to 23 percent, nearing our goal of 30 percent of new female registrants by 2030. We must continue to pursue an inclusive culture for current and future generations of engineers and geoscientists, so we can truly reflect Canada's diverse society, which will result in better solutions and outcomes.

This year, COVID-19 changed our world. Through the impacts and restrictions imposed by the global pandemic, I have observed the resilience, professionalism, and excellence of BC's engineers and geoscientists, who have continued to safeguard our communities and drive economic growth. I've also had the distinct pleasure of working with a dedicated (and fun!) group of professionals on staff and Council who are committed to our work to protect the public.

As a regulator, Engineers and Geoscientists BC is built on the strength of volunteers. We need volunteers to bring different ideas and expertise. Consider how you might contribute to our association and make a positive impact on our professions and the public. To learn about volunteer opportunities, visit *egbc.ca/volunteer-opps*. You can make a difference.

In closing, I thank you for entrusting me to serve you. While my presidency nears its end, our work as a regulator continues. With our dedicated staff and the strength of our volunteers, Engineers and Geoscientists BC is well-positioned to take on the challenges and opportunities of today, tomorrow, and the next 100 years.

Janualle

## INNOVATION

SEPTEMBER/OCTOBER 2020 | VOLUME 24 NUMBER 5

#### ENGINEERS AND GEOSCIENTISTS BRITISH COLUMBIA

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## LETTERS

Letters to the editor containing your views on topics of interest are encouraged. Opinions expressed in letters are not necessarily endorsed by Engineers and Geoscientists BC. Letters should be 300 words or less and can be emailed to innovation@egbc.ca. Find more information at egbc.ca/Submitting-to-Innovation.

## FRIENDS AND COLLEAGUE PAYS TRIBUTE TO PASSING OF JAMES BURKE, P. ENG. (RETIRED)

It is with great sadness that we share with registrants the news of the passing of a fellow registrant, Mr. James Burke, P. Eng. (Retired). Jim had a long and distinguished career as a professional engineer in British Columbia. He touched the lives of many of us through his involvement in many significant transportation infrastructure projects.

Jim started his working career by first completing the electrical apprenticeship program while working for the Calgary Power Corporation, while becoming a journeyman electrician, and then completed his engineering studies at University of Calgary while working at the utility. Upon graduation with a Bachelor of Engineering with a double major in electrical engineering and computer sciences, Jim moved to Vancouver and worked on the Vancouver Expo Line LRT line on the first-generation driverless train control system. He joined SNC-Lavalin in the mid-1990s, and by 2002 he was appointed Senior Vice President and General Manager of the Transportation Division. He then served as Executive Vice President from 2008 to 2015, and upon his retirement from SNC-Lavalin he enjoyed doing some consulting work. Jim sat on several boards, including the Canadian Council for Public-Private Partnerships and Altalink Management Ltd.

Jim was integrally involved in many large infrastructure projects both locally and internationally, including the Kuala Lumpur LRT, Vancouver's Millennium Line, Kuala Lumpur Monorail, and the William R. Bennett floating bridge.

The marquee project of his career though was the Canada Line Project in Vancouver. Jim strategized and led the pursuit, design, and delivery of this highly successful and highly awarded \$2 billion P3 project, which was delivered ahead of schedule, on budget, and with no claims. Jim embodied exceptional leadership and direction. He was a very approachable, inspiring, motivational, and highly respected manager and executive, and made a big impact on many of the lives he touched. He was known for having an opendoor policy and could always be counted on to lend a helpful hand, a listening ear, or supportive word of advice. He had a hands-on approach and could be regularly found walking around the floors, checking on various teams, and assessing the organization's pulse. He enjoyed mentoring the next generation of engineers, and was keen to offer opportunities for learning and growth to everyone.

Jim will be sorely missed by all who had the privilege of working with him throughout his remarkable career.

Eugene Creamer, P.Eng. On behalf of colleagues and friends of James Burke, P.Eng. (Retired)

## ASSOCIATION

## DR. ROBERTA BONDAR TO SPEAK ON RISK AT VIRTUAL ANNUAL CONFERENCE

Dr. Roberta Bondar's professional accomplishments are legendary: she's Canada's first female astronaut, the first-ever neurologist in space, and the recipient of the Companion of the Order of Canada, the NASA Space Medal, and over 28 honorary degrees. She's a household name in Canada—and she'll deliver a keynote address, titled *Considered Risk: Opening Up Possibilities for Change and Growth* at Engineers and Geoscientists BC's forthcoming annual conference.

Dr. Bondar is one of three keynote speakers at our virtual annual conference,

taking place from Wednesday, October 21 to Friday, October 23, 2020. Other keynote speakers include Bob Joseph, Founder and President of Indigenous Corporate Training, and Dr. Sheryl Staub-French, P.Eng., Associate Dean of Equity, Diversity and Inclusion at UBC.

Along with the keynote addresses, registration will also include an allaccess pass to 40 hours of customizable professional development sessions across 10 professional development streams, including Engineering and Geoscience in the Resource Sector; Environmental Engineering and Geoscience; Municipal Engineering; Emerging Professional; Management; Regulatory Affairs; Structural, Energy Efficiency and Renewable Energy; Better Business; and Diversity and Inclusion.

Registration will also include unlimited ondemand access to most conference sessions after the event.

The virtual nature of the annual conference is ideal for professionals working remotely, and provides access and flexibility to registrants across the province. To register for the conference, visit *egbc.eventsair.com/ac20*.

## ASSOCIATION

## **PROFESSIONAL GOVERNANCE ACT RESOURCES FOR REGISTRANTS**

Engineers and Geoscientists BC is preparing for the implementation of the *Professional Governance Act* (PGA), which will replace the almost 100-year-old *Engineers and Geoscientists Act*. The new legislation represents a shift in how the professions of engineering and geoscience are regulated and will introduce new obligations and requirements for registrants.

While implementation of this new legislation was originally planned for November 2020, the recently announced provincial election will impact this timing. We anticipate the PGA will come into force in the weeks following the election and will keep registrants up to date as we learn more.

Throughout the transition, we want to ensure registrants are kept informed on the changes coming into effect.

The next edition of *Innovation* will include a special pull-out PGA reference guide that outlines everything registrants need to know about the new legislation. Registrants are encouraged to review the insert and save it for future reference. Beginning later this year and continuing into 2021, Engineers and Geoscientists BC will host a PGA webinar series on key obligations and requirements for registrants. This series is in addition to the *Professional Governance Act: What You Need to Know* webinar that we hosted in August 2020. To sign up for the upcoming webinars, or to watch the recording from the August webinar, visit *egbc.ca/pga*.

Our virtual annual conference on October 21-23 features a regulatory affairs professional development stream that includes sessions on a number of PGA-related topics, including regulation of firms, the updated Code of Ethics, and mandatory continuing education requirements. Register to attend at *egbc.eventsair.com/ac20*.

We will continue to send important PGA updates via email and include information and reminders in eNews, *Innovation* magazine, and on our website and social media channels. To ensure you receive these updates, make sure your contact information is up to date.

If you have any questions about the new legislation or what the requirements mean for you, visit our website at *egbc.ca/pga* or contact us at *professionalgovernance@egbc.ca*.

### STREAMLINED APPLICANT ASSESSMENT METHODS COMING SOON

Two new advancements for professional engineering and geoscience applicants are expected to make the application process more streamlined and efficient.

#### ENGINEERING APPLICANTS

Professional engineer and engineering licensee applicants will now be able to show that they are competent to work in Canada using new methods to demonstrate a minimum 12 months of "Canadian Environment" work experience.

Previously, Engineers and Geoscientists BC requirements were time-based, calling for applicants to have at least one year of experience in a Canadian environment. The shift away from the time-based Canadian experience requirement is designed to provide better definition and objectivity. The shift also accommodates labour market mobility trends that support applicants who may have extensive engineering experience and knowledge of Canadian codes and standards, but face barriers to acquire in-Canada work experience. The change is the result of over six years of Engineers and Geoscientists BC-led research and feedback.

All professional engineer and engineering licensee applicants must demonstrate 34 competencies, using the popular online competency-based assessment (CBA) system, at *competencyassessment.ca*. Engineers and Geoscientists BC has identified eight competencies that demonstrate Canadian knowledge and experience, mostly related to Canadian regulations, codes, standards, quality control, and safety awareness. The new method means that, while applicants must still show competency in all 34 areas, Canadian Environment experience will be assessed using these 8 competencies, which can now be demonstrated through a combination of Canadian work experience and if necessary, supplemented with approved courses or programs—not just in-Canada work experience alone. The changes are expected to launch in November 2020. For more information on the Canadian Environment experience requirement, email *CanadianCompetencies@egbc.ca*.

#### GEOSCIENCE APPLICANTS

Beginning November 1, the online CBA system, previously available to only engineering applicants, will become available to geoscience applicants. In partnership with Geoscientists Canada, the CBA system has been successfully piloted for evaluating professional geoscientist applicants. The system eases, streamlines, and standardizes experience evaluations for geoscientist applicants, and makes competency requirements clearer, more transparent, and consistent.

The CBA system includes an online reporting function that allows applicants to report their experience within a set of 29 standardized competencies. Geoscience applicants using the system will be asked to select examples from their work history that best highlight an appropriate exposure level to a specific work experience competency. After validation, assessors will review all the competency examples and validator comments. For more information on geoscience competencies, email *register@egbc.ca*.



## ANNUAL REGISTRATION RENEWAL IS COMING SOON

It's almost time to renew your registration for 2021. Here's what you need to know to complete your renewal.

#### CHANGES TO RENEWAL DEADLINES UNDER THE PROFESSIONAL GOVERNANCE ACT

Later this year, the *Professional Governance Act* (PGA) will come into force, and will introduce new regulatory tools, processes, and requirements for Engineers and Geoscientists BC and its registrants. The new legislation will introduce changes to key dates for renewal that registrants and employers responsible for registrants' renewals should be aware of.

Under the PGA, the payment deadline for annual registration fees is December 31, 2020, which is unchanged from current date in the *Engineers and Geoscientists Act*. Under the PGA, however, registrants who have not paid their annual fee as of January 31, 2021 will be struck off the register—one month sooner than under our current legislation.

## UPDATE YOUR CONTACT INFORMATION

To make sure we can reach you with important information related to your renewal, take a moment to sign into your account to ensure your contact information is up to date. You can update your information at *egbc.ca/update-info*, using your six-digit User ID number and password.

#### HOW DO I RENEW?

You can renew your registration beginning November 1, 2020. The deadline to renew your registration is December 31, 2020, after which late fees will be applied to overdue payments. After January 31, 2021, registrants who have not paid their fees will be struck off the register.

For 2021, registrant fees have not changed. The fees for non-practicing registrants are 50 percent of those for practicing registrants. To learn more about these fees, visit *egbc.ca/about/governance/responsible-financial-management*. Renew your registration by signing into your Engineers and Geoscience BC account at *egbc*. *ca/account*, using your six-digit User ID number and password. COVID-19 has impacted many areas of our operating environment, including our communications methods. For the annual renewal cycle, Engineers and Geoscientists BC is encouraging registrants to pay their fees electronically to limit the amount of paper handled by staff and to avoid processing delays associated with paper communication.

The December 31, 2020, renewal deadline also applies to registrants who submit their 2021 annual renewal invoice to their employers for payment. Please allow enough time for your employer to process your renewal.

## WHAT IF I WANT TO RESIGN?

If you wish to resign your license with Engineers and Geoscientists BC, be sure to resign before December 31, 2020, to avoid being liable for renewal fees.

Registration can be tendered by signing into your Engineers and Geoscientists BC account, or by contacting Engineers and Geoscientists BC directly.

Resigned registrants can reapply for registration according to the organization's Return to Practice procedure. Engineers and geoscientists in training who reapply must comply with the Reinstatement Policy. Any outstanding annual registration fees, late fees, and associated administrative fees must also be paid before a registrant can be reinstated.

For more information on renewing your registration, visit our website or contact the Registration Department at *register@egbc.ca*.

## COUNCII REPORT

#### **SEPTEMBER 11, 2020**

*Engineers and Geoscientists BC's Council of elected members* and government representatives meets throughout the year to conduct the business of association governance. The following are the highlights of its September 11, 2020 meeting.

## **PROFESSIONAL GOVERNANCE ACT IMPLEMENTATION UPDATE**

Council received an update towards implementation of the Professional Governance Act (PGA). The organization is on track to meet all implementation targets, including updated Bylaws, a transition plan for moving to a smaller Council, a process for recruiting lay persons to serve on committees, and an updated Register. Council also received an update on a review of its committee structure and made several recommendations to modernize the current structure and align it with new governance requirements for committees under the PGA, and approved updates to the Terms of Reference for key committees.



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A special pull-out section in the next edition of *Innovation* will provide information on your obligations and requirements you need to be aware of under the PGA.

#### AUDITED FINANCIAL STATEMENTS APPROVED

Council received the report of the Audit Committee and approved the organization's audited financial statements for the fiscal year ended June 30, 2020. The audit was conducted virtually and resulted in no adjustments or control issues. Council approved an appropriation of \$500,000 to its Property, Equipment and Systems replacement fund to address required building repairs for the organization's offices over the next five years. Council also approved a new target for its General Operating Fund of six months operating expenses (currently three months) and will work to achieve this target through incremental increases over the next several years.

## EDI PRINCIPLES FOR COUNCIL AND VOLUNTEER **APPOINTMENTS REVIEWED**

Council reviewed several recommended updates to its policy and guidelines on volunteer appointments to incorporate equity, diversity and inclusivity (EDI) requirements. The recommendations were developed based on leading practices and aim to address EDI principles in an intentional way, reflecting the organization's commitment to fostering equity, diversity and inclusion. The approved recommendations include clarifying the organization's EDI value statement, tracking demographic changes in volunteer representation, succession planning, outreach to under-represented groups, and assessing barriers. The recommendations will be incorporated into organizational policies and procedures for committee appointments.

#### UPDATED FOREST CROSSINGS GUIDELINES APPROVED

Council approved an updated version of the Guidelines for Professional Services in the Forest Sector – Crossings (Version 3.0), a joint guideline with the Association of BC Forest Professionals. The updated guidelines are a major revision from the previous version published in 2014. The update includes expanded descriptions of the responsibilities and skill sets of the Coordinating Registered Professional and the Professional of Record, updated assurance statements, and a new assurance statement to document the transfer of responsibility between two Coordinating Registered Professionals if required during the project. The guideline also addresses environmental considerations, including fish habitats, and professional responsibilities around considering climate change. The guidelines will be published following legal and editorial review.

## PROFESSIONAL PRACTIC<mark>E</mark>

## 2021 CERTIFIED PROFESSIONAL AND ADVANCED CODE KNOWLEDGE COURSES NOW OPEN FOR REGISTRATION

Engineers and Geoscientists BC and the Architectural Institute of British Columbia (AIBC) are offering the popular Certified Professional (CP) Course and the Advanced Code Knowledge (ACK) Course in 2021, both of which are now open for registration. The courses will be based on the 2018 BC Building Code and the 2019 Vancouver Building By-law. This year, both courses will be conducted online. CP Exams will be conducted in person in a manner that follows government guidance on COVID-19. Registration for both courses closes December 15, 2020.

#### CERTIFIED PROFESSIONAL COURSE

Engineers and Geoscientists BC and AIBC have been jointly offering the CP Program since 2015. The CP Program is an alternative to the conventional building permit and inspection process used by the cities of Vancouver, Surrey, Abbotsford, and other municipalities. Through the program, participating municipalities can issue a building permit on the assurances of a CP, who also must be a registered professional (i.e., professional engineer or architect).

The CP Course schedule comprises 12 full-day sessions on Wednesdays, from January 6 to March 31, 2021 (with no classes on February 24 and April 7, and a half-day tutorial on April 14). The CP Course concludes with 2 full-day exams. This year, the CP Course cost is \$4,900 until October 31, 2020, and \$5,300 thereafter.

Although anyone may take the CP course, only architects and

professional engineers may practice as CPs. Intern Architects AIBC and engineers-in-training who meet all CP course requirements and pass the CP exams will be able to practice as CPs when they become registered as architects or professional engineers.

ADVANCED CODE KNOWLEDGE COURSE The ACK Course is designed to provide advanced building code knowledge without CP certification. It provides all the content of the CP course, but excludes exams, projects, and site tours. The ACK course comprises seven full-day sessions on Wednesdays from January 6, 2021 to February 17, 2021. The cost for this course is \$3,000 until October 31, 2020, and \$3,300 thereafter. Potential participants are encouraged to explore the possibility of partial grant funding for the courses, through the BC Employer Training Grant. To learn more, visit the Government of BC's Workforce Training Stream webpage, at www.workbc.ca.

For more information or to register, visit *aibc.ca/professional-development/ courses/additional-pd-activities*. You may also contact CP Program Manager, Teresa Coady, FRAIC Architect AIBC AIA LEED Fellow, at *tcoady@egbc.ca* or 604.639.8185.

For more information, about the Certified Professional Program, visit *egbc.ca/Certified-Professional*.



## THREE GUIDELINES ISSUED TO SUPPORT PROFESSIONAL PRACTICE

Engineers and Geoscientists BC recently issued one new and two revised professional practice guidelines. These guidelines, and other professional practice guidelines and practice-related resources, are provided at *egbc.ca/Professional-Practice*.



## DEVELOPMENT OF SAFETY-CRITICAL SOFTWARE

Development of Safety-Critical Software, published in July 2020, clarifies the standard of practice for engineering professionals responsible for the specification, design, implementation, verification, deployment, or maintenance of software that is used in safety-critical applications and scenarios. The guidelines identify software development, security, and safety-related activities essential to such projects, and provide guidance to assist in applying the Engineers and Geoscientists BC Quality Management Guidelines in a software context.



## DEVELOPING CLIMATE CHANGE-RESILIENT DESIGNS FOR HIGHWAY INFRASTRUCTURE IN BC

Developing Climate Change-Resilient Designs for Highway Infrastructure in BC, first published in 2016 and revised in July 2020 (version 2.0), outlines the consistent manner in which highway infrastructure should be designed, including conformance with BC Ministry of Transportation and Infrastructure Technical Circular titled "Resilient Infrastructure Engineering Design – Adaptation to the Impacts of Climate Change and Weather Extremes" (T-04/19).

The guidelines outline project roles and responsibilities, provide advice on how to incorporate best practices (such as considering the use of future climate projections), and outline appropriate quality management procedures. The updated guidelines also establish the standard of practice when conducting climate-risk assessments, and include updated and new case study examples and updates to the climate science section.



## PROFESSIONAL RESPONSIBILITIES FOR THE DESIGN AND INSTALLATION OF ELEVATING DEVICES IN NEW BUILDINGS

Professional Responsibilities for the Design and Installation of Elevating Devices in New Buildings, first published in 2016 and revised in September 2020, continues to guide professional practice related to the design, construction, installation, and commissioning of elevating devices in new buildings. This revision clarifies the responsibilities listed in the Elevator Professional Responsibility Matrix, adds an assurance statement related to mechanical systems of new elevating devices to satisfy the requirements of Technical Safety BC for professional assurance, and provides reference to quality management requirements.

The guidelines summarize the responsibilities of professionals who are involved in work related to the integration of elevating devices in new buildings, and use a matrix to crossreference the disciplines or areas of responsibility to the appropriate types of registered professionals, to clarify which professionals should be taking responsibility for the various aspects of an elevating device in a new building.



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## PRESIDENT'S AWARDS

## **2020 PRESIDENT'S AWARD RECIPIENTS**

The President's Awards are British Columbia's top awards for professional engineers and professional geoscientists. These awards recognize outstanding professional, technical, and community contributions of registrants of Engineers and Geoscientists BC. We are pleased to honour seven recipients, in the following categories: the R.A. McLachlan Memorial Award, the C.J. Westerman Memorial Award, the Meritorious Achievement Award, the D.C. Lambert Professional Service Award, the Community Service Award, the Teaching Award of Excellence in engineering or geoscience education, and the Young Professional Award.

## C.J. WESTERMAN MEMORIAL AWARD DR. ROBERT DANIEL MOORE, P.GEO.





Throughout his exemplary career, Dr. Robert Daniel Moore, P.Geo., has been a dedicated researcher and teacher at UBC as a professor in the Department of Geography. With a passion for engaging in work that contributes to real-world issues in environmental management, he has made outstanding contributions to the practice of geoscience, specifically in hydrology.

One of the biggest challenges in hydrology is the collection and analysis of high-quality stream discharge data. Dan refined and

popularized a technique that uses salt as a tracer to estimate discharge in small, steep streams. This method is not only more accurate, but often far safer than other measurement techniques.

Dan has made many other technical contributions to the profession. He helped advance the ability to predict streamflow in ungauged catchments by evaluating and improving how regional temperature and precipitation estimates are downscaled over complex mountainous terrain, and by improving the theoretical basis of the predictive models themselves. He contributed to the development of a novel technique for estimating flows in ungauged watersheds by using a robust water balance approach. And, he helped develop various open-source software tools intended for use by consulting geoscientists in their analysis of hydrological data.

Dan has a long history of service to the community. He is a former board member and past president of the Canadian Parks and Wilderness Society's BC Chapter. He was an active member of the Groundwater Advisory Committee for Galiano Island and provides technical advice on hydrology for ecological restoration projects run by the Galiano Conservancy Association. Over the years, he has also provided technical support to the Burns Bog Scientific Advisory Panel and the City of Vancouver.

Dan's unwavering scientific integrity has earned him the respect of scientific and professional colleagues alike. He has been an outstanding mentor to many who have gone on to become professional geoscientists in BC and beyond. He is truly a leader in his field.

## R.A. MCLACHLAN MEMORIAL AWARD DR. LORETTA LI, P.ENG.





Over the past 25 years, Dr. Loretta Li, P.Eng., has advanced the field of environmental engineering through her research and leadership as a professor in the Department of Civil Engineering at UBC. Her outstanding contributions to environmental quality and sustainable remediation have significantly enhanced public safety and had an impact on policy decisions in Canada and around the world.

Loretta's work on sites contaminated by per- and poly-fluorinated alkyl substances and polybrominated diphenyl ethers has led to three publications within the United Nations Industrial Development Organization and contributions to the Stockholm Convention. This research has also resulted in 12 refereed publications, including the first reported study of leachability, absorption, desorption, and mobility of PBDEs from wastes to soils. It also generated new knowledge on how brominated flame retardants are entering the environment and their impact as by-products in surface and subsurface soils.

Loretta's findings on metals dispersion and distribution along highways have helped shape our province and have led to collaborations with the BC Ministry of Transportation and Infrastructure. Based on her research, the Ministry revised one of their highway rights-of-way and subsequently saved over \$40 million in soil handling costs. This research was also used in environmental assessments along the Sea-to-Sky, Okanagan Lake Bridge, and Highway 37 widening projects.

In addition to her technical expertise, Loretta volunteers with 14 technical associations, has helped organize 28 national and international conferences, and has been a guiding mentor to high school and young engineering students. She is passionate about bridging the gender gap in engineering and has been involved in many womenin-engineering initiatives. She has organized and led small group discussions with female high school students to cultivate the next generation of female engineers. Loretta's leading-edge research, paired with her passion for inspiring the next generation, will undoubtedly change the landscape of environmental engineering in BC.

## MERITORIOUS ACHIEVEMENT AWARD DR. TONY T.Y. YANG, P.ENG.



Dr. Tony T.Y. Yang, P.Eng., has made remarkable contributions to the field of structural and earthquake engineering. As a professor at the UBC, his work focuses on the advanced simulation and experimental testing of complex structural systems under dynamic loads. He has worked with many top structural engineering firms and research institutes

worldwide to push the boundaries of structural and earthquake engineering and is well regarded as one of the leading experts in the world.

One of Tony's most significant contributions is the development of the fundamental underpinnings for performance-based earthquake engineering (PBEE), which has resulted in the implementation of PBEE in numerous design codes worldwide. Over the last 20 years, Tony and his research team have developed multiple innovative structural components and systems which have significantly improved the safety and economy of infrastructures in Canada and worldwide.

Tony is a dedicated teacher and is committed to finding new ways to inspire his students and educate the public on earthquake safety. He has given over 100 public seminars on earthquake engineering to both technical and community groups and has worked closely with the national and international communities to improve public safety. Tony's exemplary commitments to his professional field has made the world safer from future earthquakes.

## D.C LAMBERT PROFESSIONAL SERVICE AWARD DON DOBSON, P.ENG.



Throughout his nearly 50-year career, Don Dobson, P.Eng., has made significant contributions to the field of water resource engineering. As Principal of Dobson Engineering, his expertise in the Okanagan Valley—a water-stressed region that is being further impacted by climate change—is highly sought-after and respected.

Don's ability to stay calm and confident is invaluable during extreme events such as wildfires and floods. One of the best, most recent examples of Don's leadership was his role as a Subject Matter Expert during flooding in Grand Forks in 2018 that devastated the community. During the emergency, Don provided technical leadership and expert hydrology advice, conducted engineering assessments, and provided recommendations for flood mitigation.

Don also played a significant role in the 2003 Okanagan Mountain Provincial Park fire when he recognized that the creation of water-repellent soils represented a public safety threat. Under Don's leadership and direction, the City of Kelowna was able to mitigate damages associated with the fire, including an intense rain event that was occurring over one of the burned drainages.

Don's watershed management work has informed and guided many initiatives, including forestry impacts on watersheds, flood protection, fish habitat restoration, and water supply management. His leadership and technical guidance have ensured a safe and secure water supply in the Okanagan and has helped the region stay safe from flooding.

## COMMUNITY SERVICE AWARD DR. GORD LOVEGROVE, P.ENG.



Dr. Gord Lovegrove, P.Eng., is passionate about his community and works tirelessly to make it a better place for everyone. He is an associate professor at UBC's Okanagan Campus School of Engineering, where he was instrumental in the school's launch and development in 2004. Gord's teaching focuses on using innovative engineering approaches to planning and designing communities that sustain a high quality of life while protecting the environment. He created the first Go Global programs

for the School of Engineering, which enables students and professionals to study the planning and design of new communities in the Netherlands. The course teaches participants the importance of protecting the environment, maximizing green space, and achieving biodiversity.

Committed to improving the campus community, Gord was instrumental in launching UBC's award-winning student U-Pass BC, which provides students with access to public transportation as part of their student fees, and a similar program at the Okanagan campus. He is currently working on long-term strategies to promote smarter growth neighbourhood design and increase active transport choice, intending to reduce traffic crashes, congestion, and injuries for all road users.

Both personally and professionally, Gord works to promote sustainability wherever possible. He is active in serving on several related boards in the Okanagan, including those related to heritage, neighbourhood associations, homelessness, and co-housing.

Whether it's through his teaching, his advocacy, or simply his contagious enthusiasm for creating a happier, healthier future, Gord has made a lasting impact on his community.

## TEACHING AWARD OF EXCELLENCE DR. PETER OSTAFICHUK, P.ENG.



Dr. Peter Ostafichuk, P.Eng. (or Dr. Pete, as he is known across UBC) is a Professor of Teaching in the Department of Mechanical Engineering at UBC. He is a passionate teacher, innovator, and role model who strives to create lasting connections with students. He is among the first UBC faculty members to be promoted to the rank of Professor of Teaching,

which requires a proven track record of outstanding teaching, educational leadership, and curriculum development.

Peter is highly regarded for his work developing the Mech 2 program, the cornerstone program of the UBC Mechanical Engineering Department and a revolutionary new way to think about undergraduate education. In Mech 2, rather than take six or seven concurrent courses per term, students take four consecutive courses over the entire academic year. This helps them learn the principles of mechanical engineering in an integrated and more practical context. With Peter's visionary leadership, Mech 2 has dramatically improved student learning outcomes and has received national and international recognition.

In 2014, Peter took on a newly created role as the Chair of First-Year Engineering at UBC, where he brought his experience to the redevelopment of the first-year curriculum. This redevelopment included a new introduction to engineering courses and a strong focus on engineering practice, design, teamwork, sustainability, communication, professionalism, and ethics.

Equally admired and respected by both his students and peers, Peter is strengthening engineering education in British Columbia for generations to come.

## YOUNG PROFESSIONAL AWARD DAVID ELLIS, P.ENG.



David Ellis, P.Eng., has made significant contributions to the engineering community, demonstrating technical excellence and delivering highquality, innovative projects throughout the first 10 years of his career.

David joined McElhanney in 2017 as an intermediate bridge engineer; he's since led a variety of

projects, including highway bridge replacements, seismic retrofits, and conditional renewal projects.

Most recently, David took on the challenge of managing McElhanney's Bridge Engineering Division in Victoria. In this role, David leads a team of 16 bridge engineers, technologists, and site inspectors, and is responsible for developing solutions to address complex site-specific challenges.

An accomplished structural engineer, David was recently named the 2019 Young Professional of the Year by the Association of Consulting Engineering Companies British Columbia. His contributions to the Telford Bridge Replacement project and the Highway 99 – Bridgeport Road Culvert Rehabilitation Project resulted in recognition through the BC Ministry of Transportation and Infrastructure Deputy Minister's Awards in 2016 and 2018.

In addition to his professional accomplishments, David is a tireless volunteer both within the profession and the community-at-large. He is an inspiration to younger staff at McElhanney, taking it upon himself to create a program for young professionals within the firm. He is a collaborative teammate, a willing mentor, and a positive influence in the engineering industry.

## 2020 SUSTAINABILITY, MENTOR OF THE YEAR, AND EDITORIAL AWARD RECIPIENTS

Engineers and Geoscientists BC is pleased to recognize outstanding individuals and projects in BC with the 2020 Sustainability, Mentor of the Year, and Editorial Awards. These awards and their recipients will be profiled on our website and social media channels in October, along with the President's Awards.

## SUSTAINABILITY AWARD

The City of Vancouver's Green Infrastructure Plaza at the intersection of 63rd Avenue and Yukon Street is awarded the 2020 Sustainability Award. The plaza in the Marpole neighbourhood of South Vancouver treats and manages runoff from more than 1,170 square metres of adjacent impermeable areas, such as roads and sidewalks, and supports the diversion of 2,200 cubic metres of rainwater from the sewer system each year. Green infrastructure projects such as this one play an important role in supporting rainwater management utilities in building an environmentally, socially, and economically sustainable city.

#### MENTOR OF THE YEAR AWARD

Deyanira Dominguez, P.Eng., is awarded with the 2020 Mentor of the Year Award for her leadership and support of future professional engineers. Deyanira joined Engineers and Geoscientists BC's Mentoring Program in October 2018, and is currently a mentor to a young female engineerin-training. She is passionate about empowering young professionals with tools, resources, and knowledge so they can take charge of their careers. At the same time, she provides her mentees with tangible professional advice, puts them in touch with industry contacts, encourages professional development, and meets with them regularly to ensure they are on the path to achieving their goals.

#### EDITORIAL AWARD

The 2020 Editorial Award is shared by Pattie Amison, P.Geo., Nick Sargent, P.Geo., and Jacqueline Foley, Geo.L, for their co-authored article "Taming a Rogue Well", which appeared in the March/April 2020 edition of *Innovation* magazine. The article outlines the experience of the authors and their colleagues as they investigated and mitigated an artesian well located on the Coldstream Range near Vernon, BC. This particular artesian well had been flowing with limited control since 1965, and had undergone many mitigation attempts during that period. The well was finally successfully plugged in 2015. In their article, the authors outline the nature and dangers of flowing artesian wells and explain how they approached and completed the plugging project. ◆

# THE PROMISE OF DIGITAL TWINNING

ost engineers involved in designing and prototyping complex parts and components are familiar with the drawbacks of traditional manufacturing: producing, testing, revising, more testing, and more revisions—and then, more testing. The process tends to be iterative, and often expensive and lengthy. The steps are important for all engineered components, but they're even more critical if the components themselves are designed to ensure public safety—like, for instance, aerospace components.



Melanie Chin (left) and Thuong Pham check a Boeing 777X wing. That's why digital twinning—the creation of a simulated digital replica of a physical component that produces real-time operating feedback—shows such great promise.

The Digital Technology Supercluster is a BC-based organization—a sort of consortium of organizations that reads like a who's-who of technology and design in the province—that aims to position BC and Canada as a global leader in digital innovation. The Supercluster, which includes aerospace, mining, forestry, healthcare, data, design, and advanced computing organizations, is spearheading a collection of projects, designed to strengthen BC's presence on a global scale. It's one of five national Superclusters that make up the Government of Canada's Innovation Superclusters Initiative, a program that expects to create more than 50,000 jobs over ten years.

One of the key projects of the BC-based Supercluster is The Learning Factory Digital Twin—a \$6.6 million digital simulation of traditional factory processes that uses sensors and visualization to create a digital twin of a physical production facility. The Supercluster brought together Avcorp Industries Inc., AMPD Ventures Inc., UBC, Convergent Manufacturing Technologies Inc., and LlamaZOO Interactive Inc. (all in BC) together with Boeing and Microsoft—each of whom plays a unique role developing the technology, but none of whom could make it happen on their own.

Although digital twins could be used in almost any manufacturing situation, this Supercluster project aims to digitize segments of two existing aerospace component production lines, one of which is here in BC, to produce complex Boeing aircraft parts.

## FEATURE



An Avcorp employee works on a Boeing commercial aircraft panel. PHOTO: AVCORP

## WHAT IS DIGITAL TWINNING?

Conceptually, the first example of twinning may have occurred more than 50 years ago, when an explosion in the oxygen tanks of Apollo 13 in 1970 about 333,000 kilometres above Earth threatened the lives of the three astronauts on board. NASA engineers scrambled to quickly simulate and perfect new strategies and procedures on the ground before they were communicated to the astronauts in space.

Digital twinning essentially takes a real-world physical asset and creates a copy in the digital world using cloud-based data, primarily gathered by physical sensors. A digital twin delivers a visual copy comprised of pure data, which—combined with physics-based simulations—can accurately report on how a component or asset will perform in the real world. Digital twinning is quickly assuming a major role in manufacturing and design around the world. Tesla, for instance, uses digital twinning to analyze and determine whether its cars are performing as intended. And the Crossrail Ltd. project—a 117-kilometre new railway in the late stages of development in the UK—uses a digital twin of its entire line to assess and optimize the behaviour of components in real-time.

## PARTNERSHIPS ACROSS BC

Avcorp—a leading aerostructure manufacturer headquartered in Delta, BC—is playing a key role in the Learning Factory Digital Twin project. Mike Elvidge, P.Eng., General Manager of Structures and Integration at Avcorp, said that digital twinning is all about using data to learn and predict defects, and then adapting and applying those lessons upstream in the design and manufacturing process. "For us, it's applying sensors to measure appropriate variables in the manufacturing process," he said. "For example, temperature, exposure of adhesives, and humidity can all affect how



Convergent develops software that performs physics-based simulations that predict how aerostructures will perform in the real world. For example, COMPRO is designed for process analysis of geometrically complex structures, and can calculate process induced deformations (spring-in) and develop recommendations for geometric tool compensation. IMAGES: CONVERGENT

[components] perform, and that can give you information that may be predictive. You're looking for correlations that appear to happen consistently when a part is defective."

Elvidge said that digital twinning captures data and uses it as a teaching tool that relies on science rather than only intuition and experience. "Step one is learning," he said. "Step two is to adapt to that process, and step three is predicting. It's taking a traditional process and laying data on the framework to give you the necessary information and to start pushing that knowledge upstream."

To Elvidge, the Supercluster partnership focused on The Learning Factory Digital Twin could help Avcorp and other partners normalize digital manufacturing and help BC companies compete on a world stage.

## SIMULATING PHYSICS IN DIGITAL TWINS

Gathering and storing large amounts of data is essential to digital twinning. But analyzing the data and using it to produce a physics-based account of an asset gives digital twinning its meaning. That's why this Supercluster partnership includes Convergent Manufacturing Technologies Inc., a Vancouver-based UBC spin-off with strong ties to the UBC-led Composites Research Network. Convergent develops sophisticated software used to simulate the physics of complex aerostructures. Dr. Anoush Poursartip, P.Eng., is Convergent's Chief Strategy Officer and Director of Research and Development.

"Imagine a tomato," he said. "When you pick it up, it deforms. A good physics simulation of that tomato has to capture its softness. Likewise, in a good video game, you can see hair [realistically] moving in the wind. We can simulate how a t-shirt wrinkles," he said. "These physics-based models have to be right...for a composite product, it's not just the product itself, but also the oven in which the product is cooked. We do all that in computer simulation. We simulate all this stuff, we create a virtual world to see how composites react [in the real world]," he said.

Convergent supplies the simulation software (as standalone software and plug-ins for Dassault Systèmes' SIMULIA and CATIA), that gives meaning to massive amounts of data that the digital twin can theoretically produce. "[In a digital twin,] you are managing an infinitely complicated problem by determining how to mitigate the infinitely complex data," he said.



## EEATURE



Avcorp is responsible for the assembly of the highly complex Lockheed Martin F-35 Carrier Variant Outboard Wing—a foldable wing for aircraft carrier F-35s. PHOTO: AVCORP/BAE SYSTEMS

Poursartip said that machine learning and artificial intelligence help manage and filter data in physics-based simulations that are ultimately useful to designers and manufacturers. He also said that education and research are critical ingredients. "All these things have to merge. The physics cannot be violated. The issue becomes merging all these approaches into one for an incredibly complex aerospace product."

"The digital learning factory allows us to create a sandbox where we can bring all these technologies together, where at one end we're doing manufacturing and at the other we're doing practice, research, and education," he said. "We don't have that in engineering, but maybe that didn't matter in the old days."

Another partner of The Learning Factory Digital Twin is Boeing, who commissions components from Avcorp, and has a vested interest in the success of digital twinning in BC. Raj Talwar, a USbased professional engineer and Boeing's Technology Director for the Americas, says he's enthusiastic about digital twinning in BC.

"When you're building airplane wing parts as long as 130 feet, defects could occur if you don't use innovative technology and smart, digital processes," he said. "These defects could be expensive and time consuming to repair. Boeing conducts extensive modelling of our parts during the design phase and using digital twinning will ensure that we eliminate processing related defects." "That's the beauty of it. [UBC's Composite Research Network] and Convergent have these models that we use every day on our production aircraft to decide how we are going to process and manufacture the materials," he said.

"Digital twinning can help any kind of manufacturing process dramatically," he said. "There is a lot of hit-and-miss in component manufacturing. We envision different steps in the manufacturing process. We try to acquire data, the state of the material, how we place the material, how we collate it, what kind of machine we are using, what kind of pressure we apply, what are the autoclave conditions," he said.

"Along with the digital factory in BC, we also have expertise [in BC] in artificial intelligence and data analytics, so we are building a coalition of organizations that really help solve problems."

While Mike Elvidge is enthusiastic about the promise of digital twinning, he also understands the critical nature of the Supercluster partnership, and the importance of competing on an ever-advancing world stage.

"Ten years ago, there was no Wi-Fi in hotels. Now, no one books a hotel room without it. This change is inevitable. Manufacturing is going to become digital. If you don't stay at the forefront, other manufacturers will. So for us, the Supercluster [partnership] makes sense." ◆

# Just the facts

about Engineers Canada-sponsored Critical Illness Insurance

Maybe you can relate to Jen,\* P.Eng., 2007. She's an established civil engineer, loves her job, loves her two children, and she and her partner are grateful for their health.

Or maybe you can relate to Matthew,\* P.Eng., 1996. He's an established chemical engineer, loves his job. loves his daughter, and he's grateful for his recovery from a stroke. Unfortunately, his wife was recently diagnosed with breast cancer.

Matthew and his family have had a tough time, while Jen and her family have been lucky. But that doesn't mean Jen's family is immune to critical illness - which is why it's important to be prepared.

## III Manulife

1 Canadian Cancer Society, "Nearly 1 in 2 Canadians expected to get cancer: report," June 20, 2017. 2 Heart & Stroke, "Stroke Report 2016 just released!", June 9, 2016. 3 ctvnews.ca, "The Health of Canadians: Looking back at 60 years of heart health," February 3, 2015.

4 Net 5-year survival rate.

5 Survival rate for those who have a heart attack and get to a hospital. Heart & Stroke, "Getting to the Heart of the Matter," 2015. 6 Heart & Stroke, "The Heart & Stroke 2017 Stroke Report," July 19, 2017. 7 TheRecord.com, "Cancer patients face high out of pocket expenses," April 15, 2017.

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The Manufacturers Life Insurance Company

## **Critical Illness** is all too common.

The statistics relating to critical conditions are eve-opening:

1 in 2 Canadians will develop cancer.1

1 in 3 Canadians will develop stroke. dementia, or both.<sup>2</sup>

Canadians will be impacted by heart disease.

## More people are surviving critical illness

Certainly, the good news is that, despite the fact that facing a critical illness can be frightening. more and more people are surviving these days thanks to medical breakthroughs. Consider these numbers:

	Cancer	Heart attack	Stroke
Survival rate	60%4	95% <sup>5</sup>	80% <sup>6</sup>

## But what about the financial cost?

Survival is priceless. However, many cancer patients spend over \$20,000 on various costs during their treatment.<sup>7</sup> And consider the lost wages suffered by the more than 400,000 Canadians who live with long-term disability due to stroke.6

## **Critical Illness** Insurance can help

Engineers Canada-sponsored Critical Illness Insurance pays a lump sum upon diagnosis of a covered life-threatening condition, to help in any way you choose. You and your spouse may apply for benefit amounts between \$25,000 and **\$1 million**. Choose one of two plans to cover either 6 or 18 conditions.

## To learn more and apply:

manulife.ca/egbcCl 1877 598-2273





GEOSCIENTISTS

FEATURE

# **ADAPTING TO A PANDEMIC**

YVR Pier D, a \$300-million expansion of the international terminal, was originally scheduled to open in July 2020. Construction was put on hold this spring, but has since resumed and will be completed by the end of 2020. Bush, Bohlman & Partners is the structural engineer on the project. Architectural

RENDERING: BUSH, BOHLMAN & PARTNERS.

## **HOW ENGINEERING FIRMS HAVE RESPONDED TO COVID-19**

ROBIN J. MILLER

As soon as the BC Government declared engineering work an essential service, BC engineers knew they would need to adapt—and adapt fast—to the world in the age of COVID. Many have made remarkable strides in developing and adopting new tools and methods, and some are even busier than ever.



## FEATURE

R. Michael Wrinch, P.Eng, does not underestimate the carnage COVID-19 has wrought on people and businesses around the world. But, like a number of other BC engineers, the president of Burnaby-based Hedgehog Technologies believes the virus "has worked in a way to our advantage because innovation is our thing, and everyone's now in flexible mode." Where most clients pre-COVID preferred to avoid risk and stick with what's most familiar, "they've now fully accepted and embraced alternative means, and they're allowing us to try new things all over the place."

For Hedgehog, a 20-person electrical engineering consulting firm whose work has ranged from determining the root causes of a thrill ride derailment, to helping the Gitga'at Nation install Canada's first smart remote microgrid, and supplying electrical designs for US military submarines, "trying new things" has included a new approach to completing site inspections. "We can send a client a program we developed," said Wrinch, "where they can walk around with a tablet and a checklist, take photos and write in the information, press send and it comes to us in a Word document. We can then determine whether that is acceptable, or go back on site and finish the inspection. This allows us to do social distancing more easily, and it's more efficient." Hedgehog also set up a system involving live-feed cameras and iChats for one client in California who originally wanted them to—as they usually would—fly down in-person to commission a project. "With the cameras on, we were right there with them live, walking them through step-by-step how to commission this machine," said Wrinch, "and it went really well. Normally a client would never accept that kind of remote activity, but they were pretty happy with what unfolded. And other than missing the fuzzy warmness of going to dinner with the client, so were we."

Other Hedgehog clients have been just as accepting of new programs and methods, and Wrinch firmly believes that the new normal under COVID-19 will, in fact, prove to be the permanent new normal—not only for how employees in his firm work in the future and how open his clients are to innovation, but for the profession of engineering as a whole. "We see this as our moment. It's our opportunity as engineers to change the way work is done and really show our value."

Dr. Timothy White, P.Eng., a partner in Vancouver consulting structural engineering company Bush, Bohlman & Partners LLP, feels much the same. In a very short period of time, the company—which works on institutional builds, like hospitals and schools, as well as commercial and transportation projects, such as car dealerships and airports has pivoted to embrace both new tools and new work methods.





Construction of UBC's Pacific Residence, the new 1,000-bed student residence and community space, has continued throughout the pandemic, with the support of Bush, Bohlman & Partners as structural engineers. Photo: Bush, Bohlman & Partners.

Early in March 2020, Bush, Bohlman was in the middle of a large project at Vancouver International Airport, when work suddenly "ground to a complete halt." While that project has started again, no new work is coming out of YVR right now, and that situation will probably remain, said White, "until travel fully comes back." Since this could be many months if not a couple of years away, the company was lucky in also having a number of substantial post-secondary and hospital projects already on the go, several of which actually accelerated.

"We haven't suffered financially," said White, "and I think our firm has adapted really well. For us the big challenge was right at the beginning. We had begun talking with our IT provider about how we could get our engineers and technicians working from home about a week before lockdown, but the lockdown forced us to move faster than we ever expected." The firm ended up with a mix of solutions: their engineers would leave their computers on at work and "remote-in," while the technicians, responsible for Revit 3D modelling, would bring their more powerful machines home. After about half a day of hiccups, mostly from traffic overload on the company's physical server, "it's been extremely smooth sailing ever since."

Bush, Bohlman's design workflow also changed dramatically, and for the better. "It used to be that when we'd start on a new building, we'd physically print out the plans that the architect sent over," said White, "and we'd overlay that with trace paper and draw out by hand our structural framing. The technician would then take that and start modelling. That's not very convenient right now. We've moved instead to a

## SHK IS CONSTRUCTION LAW.





## FFATURF



#### Bluebeam's Revu software. IMAGE: BLUEBEAM

program called Bluebeam [Revu], which is a lot like Adobe Acrobat, but designed to manipulate drawings instead of text documents." Bluebeam's tools make it easy for engineers to take technical drawings and digitally mark them up, and also keeps a permanent record of all design iterations until the drawing is officially approved. "No more red markers," said White, "and no more storing of each paper drawing. It's one of the improvements that will stay with us even when things go back to normal again."

Other innovations that will stick are electronic meetings with clients-"we've found they work amazingly well," said White, "because everyone's at their computer and if you have to share something, doing it on screen is actually easier than getting the projector in the boardroom to work"-and direct deposit for cheques from clients and paycheques to staff. "It only took a pandemic to get us to finally change our banking." One frustration still remains, however. Almost all building authorities continue to require "hard copy, wet signed and sealed and delivered drawings. We all have electronic seals now and could easily submit everything electronically, but they don't want that."

Digital sign and seal technology has also been top of mind for Caroline Andrewes, P.Eng., CEO of the Association of Consulting Engineering Companies British Columbia (ACEC-BC). When COVID-19 hit last March, the association narrowed its focus to helping ACEC-BC members deal with a myriad of practical issues created "really, really quickly" by the pandemic.

Andrewes said it was clear from the Government of BC in the early part of the crisis that "one of the most critical things we could do as essential workers was to keep construction and engineering projects moving forward-that it's not just about

keeping critical services like utilities going, it's also about keeping as many of our fellow citizens of British Columbia as possible working in a time when many were experiencing, or were in danger of experiencing, pretty extreme economic hardship. So our focus really was on practical solutions to keeping construction going, keeping the industry open."

Included in those practical solutions were seven free webinars (available through ACEC-BC's COVID-19 Resource Centre) on such topics as how to lead remote teams, provide effective scope and change management, and "one of the core aspects of engineering, how to sign your documents without actually using paper," Andrewes said. "It was really timely because as much as we were supporting our members in learning how to make the transition to digital, we were also supporting our members' clients to understand how to receive documents with a digital seal. Many of those clients had not contemplated making that shift until everybody moved to remote work."

Now, the COVID-19 working group ACEC-BC formed over the past few months-which includes major infrastructure owners as well as consulting engineers—continues to explore ways to keep the industry aware of better ways to work and ahead of any new issues COVID-19 might present.

"We are a fortunate industry: essential but not frontline," said Andrewes. "We are also fortunate in that engineers have a strong commitment to community. For us, they have showed up with their dues and with selfless volunteerism, joining working groups, sitting on web panels. They've also provided information directly to each other-even to companies that would normally be their competitors—and they are clearly dedicated to helping all of BC get through this unusual time. I see it as a hallmark of the profession."

## 2020 ANNUAL CONFERENCE REGISTRATION IS OPEN

Engineers and Geoscientists BC's 2020 Annual Conference is going virtual October 21–23. Join us for **10 professional development streams** across **40 sessions**, and more than **60 speakers**! All delegates will also have access to on-demand content after the conference.

Don't miss the opportunity to watch three special keynote speakers:



**Dr. Roberta Bondar** Canada's First Female Astronaut and Acclaimed Nature Photographer



**Bob Joseph** Founder, President–Indigenous Corporate Training Inc.



**Dr. Sheryl Staub-French, P.Eng.** Associate Dean of Equity, Diversity and Inclusion at the University of British Columbia

## **REGISTER TODAY**

## egbc.ca/conference



# OPENING THE LID ON ARTIFICIAL INTELLIGENCE APPLICATIONS IN GEOSCIENCE

KYLIE WILLIAMS

Geoscientists and engineers are learning new ways to communicate with machines and each other to extract maximum value from data using artificial intelligence, from finding buried mineral deposits to predicting natural hazards.







0 1

■ Minerva GAIA: Sea to Sky Landslides

pplications of artificial intelligence (AI) are not futuristic possibilities. AI is all around us. from the facial biometric software your smartphone uses to recognize you, to the algorithms behind your Netflix dashboard suggesting what to watch next.

Some engineers and geoscientists have embraced AI tools to help solve the biggest challenges facing us today, from finding new deposits of valuable minerals, to optimizing mining processes and operating mine vehicles, to predicting areas at the highest risk of natural disasters. AI applications are not as widespread in geoscience as in other industries, such as finance, but acceptance is growing.

A challenge common to all geoscience problems is organizing huge volumes of data. AI applications such as machine learning and cognitive AI help make sense of data by organizing, automating and accelerating data processing in ways similar to the human brain: gathering information, making connections, forming models, and learning from each iteration to make the next one better.

## MAPPING GEOHAZARDS

A Vancouver-based AI company, Minerva Intelligence Inc., is applying cognitive AI techniques to solve both mineral exploration challenges and predictive geohazard applications. Cognitive AI represents human knowledge on computers and reasons with it to solve complex problems.

TOP: At least 16,000 cubic metres of debris crashed down on the Sea-to-Sky highway on July 29, 2008. Photo: Dr. Erik Eberhardt, P.Eng.

MIDDLE AND BOTTOM: Screenshots of Minerva's GAIA Landslide application, which uses a proprietary form of AI to help users identify landslides before they happen. IMAGES: DAVE BIGELOW, P.ENG./MINERVA INTELLIGENCE. "We can use cognitive AI to identify specific geospatial features," said geological engineer David Bigelow, P.Eng., who specializes in natural hazards and hydrology at Minerva. "In the same way you look for a gold deposit, you can also look for a slope susceptible to landslide."

In July 2020, Minerva released an interactive, constantly-updating web map showing where landslides are most likely to occur along southern BC's Sea-to-Sky corridor. Minerva built the web map by combining the knowledge of landslide experts with data from publicly available databases.

Bigelow describes the AI tools Minerva have developed as "reasoning tools": tools that link concepts and information together like a human brain does. When a human geotechnical engineer sets out to determine where a landslide may occur, he explained, they gather data about all of the attributes that could contribute to a slide, such as slope angle, surface materials, weather patterns, and more. They then compare that information with their own knowledge of landslides to identify which slopes are most susceptible to failure.

"We are providing tools for expert engineers and geoscientists to be able to make those connections more quickly and across wide areas," said Bigelow. "It gives them an initial screening tool to sort through large volumes of data."

Conditions along the Sea-to-Sky corridor are constantly changing. In trying to find areas that are susceptible to landslides, a huge number of changing variables need to be considered. Minerva segmented the area into representative mapping units, sorted and standardized the data, and assigned attributes to each unit. They used machine reasoning to compare the units with an expert-defined landslide-hazard model, a conceptualization of a slope susceptible to a slide.

"The great thing about our technology is that it can take in any form of data, as long as it's classified properly," said Bigelow.

## MACHINE LEARNING GUIDES DISCOVERY

Finding valuable ore deposits buried below the ground is often compared to finding a needle in a haystack. Over the past decade, exploration and mining companies have been spending much more and finding far fewer needles. In response, explorers are turning to AI tools, and machine learning tools in particular, to reduce investment risk and increase discovery success in mineral exploration.

Pim van Geffen, P.Geo., principal geoscientist at CSA Global, sees machine learning tools in geoscience as an "up-scaling of data analysis." In exploration geochemistry—van Geffen's area of expertise—there is a point where the human geoscientist is no longer able to interact with each data point or visualize meaningful patterns, trends and outliers: this is where machines take over the analysis.

"Machine learning can find relationships that you would not be able to find just looking at individual [data] plots yourself," said van Geffen. "I can look at the geochemical data myself, do some analysis, run it through different software. But I can also turn on a [machine learning] algorithm and ask it to look for patterns instead of me, and that's the first step in machine learning."

During a typical mineral exploration program, companies spend millions of dollars drilling and logging holes, performing surveys and collecting gigabytes of geological, geochemical and geophysical information. This data is typically analyzed in three-dimensional space. Machine learning algorithms, most of which are open-source and available for anyone to download from online libraries and modify to solve their unique challenge, can handle huge datasets with tens, hundreds, or thousands of variables and rapidly compute spatial relationships between many points and shapes.

This ability for algorithms to think faster and make more connections than the human brain is both an attraction and a barrier for the adoption of machine learning in geoscience. Van Geffen estimates that about 20 percent of his colleagues in the mineral exploration business are comfortable with the concept of AI and machine learning, but just five percent are

CONTINUES ON PAGE 37...



## DISCIPLINE AND ENFORCEMENT

*Engineers and Geoscientists BC's website contains information on the complaint, investigation, and discipline processes. You can contact us at 604.558.6647 or toll-free at 1.888.430.8035 ext. 6647, or by email at complaints@egbc.ca.* 

## DISCIPLINARY NOTICE: AHMED RAZA SYED, SURREY, BC

Ahmed Raza Syed has been the subject of Engineers and Geoscientists BC disciplinary action stemming from two complaints: one regarding structural engineering services for four residential buildings in the City of Abbotsford, and another regarding engineering services for glass guard rails for six residential projects in the City of Langford.

#### PREVIOUS DISCIPLINE

In February 2018, as a result of Mr. Syed's failure to provide records to the Investigation Committee in relation both the Abbotsford and Langford files, the Discipline Committee issued a decision requiring Mr. Syed to pay a fine of \$5,000, and pay \$7,500 towards Engineers and Geoscientists BC's legal costs. Mr. Syed was further ordered to complete the Professional Practice Examination and the Professional Engineering and Geoscience Practice in BC Online Seminar. As Mr. Syed did not complete the Professional Practice Examination within the timeframe provided, his licence was suspended from June 1, 2018 to June 29, 2018. Mr. Syed's licence was reinstated once he successfully completed the Professional Practice Examination. Having received the records, the Investigation Committee continued its investigation on both files.

In December 2018, during the continuing investigation, Engineers and Geoscientists BC applied to the Discipline Committee for an interim suspension of Mr. Syed's licence because of concern for public safety. On December 23, 2018, the Discipline Committee determined that Mr. Syed's lack of structural engineering knowledge raised serious questions about his ability to safely perform structural engineering on wood frame single-family dwellings and guard rails. The Discipline Committee ordered an interim suspension of Mr. Syed's licence until it reached a decision on the findings of the Investigation Committee on the Langford file. On June 18, 2019, following a disciplinary inquiry relating to the Abbotsford file, the Discipline Committee ordered a suspension of Mr. Syed's licence for six months (consecutive to the existing interim suspension). The Discipline Committee also required that, following the six-month suspension, Mr. Syed must be subject to direct supervision by another professional engineer approved by the Registrar, and that he pay \$29,000 towards Engineers and Geoscientists BC's legal costs. The Investigation Committee continued its work on the Langford file.

#### CURRENT DISCIPLINE

On November 12, 2019, Engineers and Geoscientists BC issued another Notice of Inquiry to Mr. Syed, regarding the Langford file, alleging that Mr. Syed demonstrated unprofessional conduct, negligence, or incompetence related to the design and field reviews of glass guards on six separate properties.

On May 9, 2020, the Panel concluded that, pursuant to section 33(1)(b) and (c) of the *Engineers and Geoscientists Act*, Mr. Syed violated Engineers and Geoscientists BC's Code of Ethics, and demonstrated unprofessional conduct as his conduct constituted a marked departure from the standards expected of an engineer in his circumstances. The Panel found that:

- Mr. Syed failed to prepare drawings, or prepared inadequate drawings after the glass guards were installed, failed to perform any calculations, and provided assurances under seal for work that had not yet been performed.
- The glass guards installed at four of the projects did not meet the requirements of the 2012 BC Building Code because the glass guards were incapable of resisting all applicable loads.
- Drawings for glass guards at two of the projects were missing

material information required by Engineers and Geoscientists BC's Professional Practice Guidelines for Designing Guards for Buildings.

- For four of the projects, Mr. Syed signed and sealed Schedule B forms indicating he had designed the glass guards before they were installed, and that their design substantially complied with the 2012 BC Building Code, when he did not perform adequate engineering work or analysis prior to the installation of the glass guards.
- For two of the projects, Mr. Syed signed and sealed Schedule C-B forms indicating that he had fulfilled his obligations for field review and that the design of the installed glass guards substantially complied with the 2012 BC Building Code when he had not conducted field reviews or performed adequate engineering work or analysis prior to the installation of the glass guards.
- Mr. Syed failed to maintain adequate records for assessments, designs, and load calculations, and failed to retain adequate records of his field reviews.
- Mr. Syed undertook and accepted responsibility for the glass guards when he lacked sufficient training or experience in the practice area of engineering glass guard systems, and that he provided opinions on a professional subject which were not founded upon adequate knowledge and honest conviction.

On August 18, 2020, the Panel issued its Decision and Order on Penalty and Costs. The Panel found Mr. Syed's conduct amounted to very serious unprofessional conduct and posed serious risks to the public. In its Decision, the Panel wrote:

The Panel agrees with the Association's submission that Mr. Syed acted as a "seal for hire" when he agreed to act as the responsible registered professional on projects where the glass guards were already installed and to provide the contract clients with whatever sealed documents were required to obtain approval from the City.

The Panel is not convinced that a suspension would adequately address the requirements for specific and general deterrence in this case, particularly given the seriousness of the conduct, Mr. Syed's lack of acknowledgement and remedial action, and his level of adherence to prior suspension terms.

The Panel agrees with the Association that the number of Projects and applicability of identical allegations to different Projects is significant as it demonstrates a general failure on Mr. Syed's part to meet basic and minimum engineering standards and practices. The Panel also agrees that Mr. Syed's repeated failure to maintain proper documentation and to perform calculations, and the fact that

## he undertook projects where he lacked sufficient training and experience created a significant safety risk to the public.

The Panel expressed concerns about the pattern and scope of Mr. Syed's conduct, and found that his prior discipline history to be relevant. The Panel found that Mr. Syed's prior disciplined conduct demonstrates many similarities to the current matter, and further noted that the costs ordered against him in the June 18, 2019 decision of the Discipline Committee in relation to the four Abbotsford residential projects have yet to be paid.

In addition, the Panel found that Mr. Syed expressed some remorse, but has largely failed to take responsibility for his conduct in a meaningful and complete manner. Mr. Syed has deflected blame to others, suggesting he had no other options available to him. Mr. Syed also denied that a cap rail was required by the 2012 BC Building Code, contrary to the expert opinion. The Panel is not aware of any remedial steps which Mr. Syed has undertaken. The Panel ordered that:

- Mr. Syed's membership is cancelled.
- Mr. Syed must pay costs of \$32,582.98 to the Engineers and Geoscientists BC by November 18, 2020.
- Mr. Syed may not apply for re-admission until 24 months from the date of the order, which is August 18, 2022.
- Mr. Syed's membership will remain cancelled until he pays the costs ordered against him in both previous and current matters.

The full text of the Determination of the Discipline Committee and the Decision and Order of the Discipline Committee on Penalty and Costs can be found in the Discipline Notices section of our website, at *egbc.ca/Discipline-Notices*.

## DISCIPLINARY NOTICE: ROBERT UNGER, VANCOUVER, BC

Engineers and Geoscientists BC issued a Notice of Inquiry to Robert Unger on March 4, 2020 regarding his failure to provide a completed Practice Review Questionnaire (the Questionnaire) at the request of the Professional Practice, Standards and Development department, and his failure to provide the Questionnaire in response to numerous subsequent requests from the Professional Practice, Standards and Development department and the Legislation, Ethics and Compliance department. A disciplinary inquiry was held virtually via Zoom, and hosted by Charest Reporting, on April 24, 2020. Mr. Unger resigned his membership with Engineers and Geoscientists BC after the Notice of Inquiry was issued, but before to the inquiry was held.

On April 28, 2020, a panel of the Discipline Committee (the Panel) concluded that Mr. Unger breached section 44 of the *Engineers and Geoscientists Act*, which requires that a member provide the Practice Review Committee with any information or documents it requests.

The Panel found that the case's material facts were not in dispute, as Mr. Unger admitted to all the allegations in the Notice of Inquiry.

On June 18, 2020, the Panel issued their Decision and Order on Penalty and Costs. The Panel found Mr. Unger's conduct to be serious, as his failure to provide documentation to the Practice Review Committee impeded Engineers and Geoscientists BC's statutory obligation to regulate the engineering profession. The Panel also found that Mr. Unger's conduct impeded Engineers and Geoscientists BC's ability to maintain public confidence in the engineering profession. Since the Practice Review Program serves as a quality assurance check on member's practices, allowing members to not comply with the Practice Review Program impedes Engineers and Geoscientists BC's ability to uphold and protect the public interest.

The Panel also found that Mr. Unger's refusal to provide documentation was deliberate, and designed to cause a hearing at which Mr. Unger could raise an unrelated previous grievance.

The Panel ultimately ordered the following penalties against Mr. Unger.

- He is required to pay a fine of \$5,000 within 30 days of the date of the Panel's decision on penalty.
- He is required to pay \$10,969.64, as contribution to Engineers and Geoscientists BC investigation and legal costs, within three months from the date of the Panel's decision on penalty.
- If his membership is reinstated, he must complete the Practice Review Questionnaire within 30 days.

The full text of the Determination of the Discipline Committee and the Decision of the Discipline Committee on Penalty and Costs can be found in the Discipline Notices section of our website, ategbc.ca/Discipline-Notices.

## DISCIPLINE AND ENFORCEMENT

## DISCIPLINARY NOTICE: REZA GHODOUSI, P.ENG. (NON-PRACTISING), SURREY, BC

Engineers and Geoscientists BC issued a Notice of Inquiry to Reza Ghodousi, P.Eng. (Non-Practising), on June 2, 2020, which indicated that he demonstrated incompetence, negligence, or unprofessional conduct by failing to design and verify a fire suppression system for a dental office to the standard expected of a professional engineer. Specifically, the Notice of Inquiry indicated that he used a design method, and signed and sealed drawings, which were only permitted for a single family or duplex residential occupancy and not a commercial space, and which were not prepared by Mr. Ghodousi or anyone under his direct supervision. The Notice of Inquiry also indicated that Mr. Ghodousi failed to provide the Investigation Committee with a copy of his complete file for the project when requested.

The Notice of Inquiry indicated his conduct was in contravention of the *Engineers and Geoscientists Act*, and Principles 1, 2, 3, and 6 of the Engineers and Geoscientists BC Code of Ethics. Instead of proceeding to a disciplinary inquiry, Mr. Ghodousi agreed to a Consent Order, dated August 18, 2020, in which he admitted the allegations in the Notice of Inquiry.

At the time of the Consent Order, Mr. Ghodousi's membership status was Non-Practising. Regardless whether he maintains this status, he will pay \$3,000 towards Engineers and Geoscientists BC's legal and investigation costs within 30 days from the date of the Consent Order.

If Mr. Ghodousi wishes to reinstate his practising status, his membership will be suspended for four months upon his reinstatement. He must also:

 provide written notice to Engineers and Geoscientists BC, prior to reinstatement, that he has completed and passed Engineers and Geoscientists BC's Professional Practice Examination;

- undergo a Practice Review conducted by Engineers and Geoscientists BC within six months of the completion of the suspension; and
- restrict his practice from performing engineering work related to fire suppression systems until he completes and passes the National Fire Protection Association's NFPA 13 Standard for the Installation of Sprinkler Systems Online Training Series, and a competency assessment related to fire suppression engineering conducted by the Engineers and Geoscientists BC Credentials Committee.

If he fails to comply with the requirements of the Consent Order, his membership will be suspended until he has done so.

The full text of the Consent Order can be found in the Disciplinary Notices section of our website, at *egbc.ca/Complaints-Discipline/Discipline-Notices*.

#### DISCIPLINARY NOTICE: LYNN JOHNSON, P.ENG., BURNABY, BC

Engineers and Geoscientists BC issued a Notice of Inquiry to Lynn Johnson, P.Eng., on April 7, 2020, regarding his conduct related to inspections of a concrete pumper truck. The Notice of Inquiry indicates that on multiple occasions, Mr. Johnson permitted or directed an unqualified person to conduct concrete pumper truck inspections. The Notice of Inquiry also indicates that:

- his signed and sealed inspection reports did not contain a scope of inspection work;
- he used vague and misleading language to suggest that the inspection reports complied with the Occupational Health and Safety Regulation when he knew or ought to have known they did not;
- he did not maintain adequate records of the inspections, including failing to maintain field notes, correspondence, notes of phone conversations, photographs, or other relevant materials;

- he did not provide adequate instructions following the inspections, including calculations, drawings, or other documentary instructions, on how to complete repairs, and did not ensure or document that the repairs were completed by a qualified person; and
- he did not seek or maintain adequate records of the required repairs.

Instead of proceeding to a disciplinary inquiry, Mr. Johnson agreed to a Consent Order, dated July 24, 2020. In the Consent Order, Mr. Johnson admitted to the charges listed in the Notice of Inquiry, and that his conduct violated section 20(9) of the *Engineers and Geoscientists Act*, section 14(b)(1)-(3) of Engineers and Geoscientists BC's Bylaws, and Principles 1 and 3 of the Engineers and Geoscientists BC Code of Ethics, and the *Occupation Health and Safety Regulation*.

As part of the Consent Order, Mr. Johnson agreed that his membership will be

suspended for two months, beginning August 11, 2020, and that, from July 24 to August 11, 2020, he will arrange for the transfer of his ongoing project files to other professional engineers and will limit his practice to those project files on which he was engaged. Further, Mr. Johnson agreed to attend Engineers and Geoscientists BC's webinars on Professional Practice Guidelines: Annual Equipment Inspection and Certification and the Organization Quality Management Certification Training Session. Mr. Johnson also agreed that he will complete a practice review, conducted by Engineers and Geoscientists BC, at his expense, within six months of resuming practice. Finally, he will pay \$5,000 towards Engineers and Geoscientists BC's legal and investigation costs.

The full text of the Consent Order can be found in the Disciplinary Notices section of our website, at *egbc.ca/Complaints-Discipline/Discipline-Notices*.

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#### CONTINUED FROM PAGE 31...

familiar enough to run a machine learning algorithm with little effort and stress and to understand the process and the result.

"That's where people get uncomfortable," said van Geffen, "when they no longer understand what the algorithm is doing with the data versus what they are doing with the data."

Although technology companies in BC and beyond are now partnering with mineral exploration companies to incorporate AI and machine learning into exploration and mining, it is still viewed by many as separate and unique. Currently, most companies do not have the data science expertise in-house to conduct machine learning on their own.

In British Columbia, where van Geffen has worked for over a decade, individual geoscientists and small technology companies have demonstrated success applying machine learning to mineral exploration challenges. Numerous researchers around the province are interrogating data extracted from public geoscience databases to test if machine learning can re-find known deposits.

In 2018, Dennis Arne, P.Geo., published a study supported by Geoscience BC that used machine learning techniques to analyze almost 15,000 geochemical results from stream sediment samples collected across northwest BC. The methods he used were able to "amplify" the signal of the useful elements to identify underexplored

areas worthy of investigation.

## SPEAKING THE RIGHT LANGUAGE

When most people think of AI and machine learning, they imagine numbers: rows of zeros and ones zipping past. But much of the time professionals like Bigelow and van Geffen spend preparing data for AI algorithms is spent on semantics: discussing and formalizing clear definitions of words.

"It's really, really important to be careful with the words that we use to make sure our inputs and outputs are universally understood," said Bigelow.

For example, an inexperienced geologist instructed to map thousands of metres of core one summer may group all of the mudstone, siltstone and sandstone layers as "sediments." Years later, geologists discover that gold mineralization in this area is closely associated with the siltstone but accurate data about the siltstone layers is simply unavailable. "It is critical that the subject matter expert is involved in conditioning the data and making it ready for the analytics," said van Geffen. The limiting factor in machine learning, he said, is the quality of the input data and understanding what the algorithm does.

## NOT A SILVER BULLET

"AI is absolutely not a silver bullet," said Bigelow, "but it means we can scale-up and do our work more quickly. It's another tool in the toolbox." The maps and models generated by AI algorithms may contain uncertainties that need to be communicated, but they also help engineers and geoscientists better understand the world and help predict what will happen next.

"Machines aren't going to solve all our problems," added van Geffen, who views machine learning as an opportunity to learn something new and achieve different results than with traditional methods. He cautions geoscientists not to dismiss these results simply because they do not understand the method: machine learning is speeding up an existing process, not replacing anything, or anyone.

"That's the magic with machine learning," van Geffen said. "You let the machine find relationships that are statistically valid, and it will tell you how valid. As a researcher, this should jazz you up and get you excited as you try to figure out what this means."

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## MFMBERSHIP

## **IN MEMORIAM**

The association announces with regret the passing of the following members: James Alexander Burke, P.Eng. (Non-Practising) Norman Henry Dinsmore, P.Eng. John Waters Hogan, P.Eng. (Non-Practising) Roger Kenneth Nelson, P.Eng. (Non-Practising) Francis Kenneth MacDonald, P.Geo. Donald Ernest Reksten, P.Eng. (Non-Practising) Lloyd William Stock, P.Eng. (Non-Practising) Robert George Urquhart, P.Eng. 🔷

## **AD INDEX** SEPTEMBER/ **OCTOBER 2020**

## **INNOVATION**

Foundex 9
Great West Life40
Manulife21
Nature's Trust 2
Nilex31
Oyen Wiggs19
Park Insurance11
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## CONTINUING PROFESSIONAL DEVELOPMENT personal investment. professional commitment.

We encourage you to take advantage of the Online Learning Centre, at egbc.ca/Events/Online-Learning, which provides remote educational opportunities. The Centre now hosts more than 50 online learning opportunities on a variety of topics.

## **2020 VIRTUAL ANNUAL CONFERENCE**

#### October 21-23, 2020

Engineers and Geoscientists BC's virtual annual conference will focus on education with 40 hours of professional development sessions, topical streams, and keynote addresses. The virtual nature of the conference is ideal for professionals working remotely and will also provide access and flexibility to registrants across the province. On-demand sessions will also be available to delegates after the event. For more information or to register, visit *egbc.ca/conference*.

#### UPCOMING WEBINARS

#### HOW TO BE AN ALLY TO RACIALIZED PEOPLE October 15, 2020

Racism is a complex topic and it's important that learners have the full picture to ensure they become active participants in dismantling systemic racism. It's not enough to just be an armchair ally— we need people to be active! This webinar helps the learner understand their role in doing the work of anti-racism, and how they can actively ally with racialized people.

#### ASPHALT PRODUCTION AND PLACEMENT October 16, 2020

This course examines the basic design principals of flexible municipal pavements and their associated infrastructure to give participants a good understanding of what matters to ensure the maximum pavement life possible. Case studies of cause and effect are presented in a sequence of construction commencing at the subgrade and working towards the pavement surface to illustrate the impact of both best practices and poor quality construction and inspection on pavement performance.

#### **DESIGN OF STORMWATER PONDS** *October 29, 2020*

Urban stormwater ponds have a long-term cost and the potential to become amenities in communities. The planning and design processes are becoming increasingly complex and must include consider multiple use systems that are operated and maintained while providing recreational and educational opportunities to the community. This seminar will explore advanced topics of concern in the planning and design of modern stormwater management ponds in urban areas.

#### BUILD YOUR ONLINE LEADERSHIP PRESENCE November 4, 2020

The webinar incorporates leading processes and practices for being an effective leader online. Participants will gain powerful skills in communicating their leadership in a virtual setting: addressing business issues, needs for collaboration, setting expectations, and leading teamwork.

#### URBAN WATERSHED MANAGEMENT November 5, 2020

This seminar provides participants with a comprehensive understanding of methods that can be employed to describe watershed hydrology and the infrastructure required to mitigate the impacts imposed upon streams in an urban environment.

#### MASTER MANIPULATORS AND WORKPLACE SABOTEURS: HOW TO DEAL WITH YOUR MOST DIFFICULT PEOPLE

#### November 16, 2020

The focus of this webinar is on providing leaders with tools for approaching and resolving disrespect issues, before they become full-blown conflicts. Participants will learn how to assess the situation early, maturely, and how to change the context of the conversation.

#### HYDRAULIC MODELLING OF SANITARY SEWER COLLECTION SYSTEMS

#### November 25, 2020

The sanitary sewer modelling training begins with the basics of hydraulic theory as it applies to sewer collection modelling, and then takes participants through the sanitary sewer data model. Both steady-state and extended-period simulations will be presented in this course. Sewer load allocation and model calibration will be discussed.

## SEDIMENT ENGINEERING FOR RIVER AND COASTAL PROJECTS

#### November 26 and 27, 2020

The course offers fundamentals of sediment engineering for river and coastal projects by determining when and how erosion and sediment is transported, how to estimate the magnitude of transport, and will familiarize participants with applications for river and coastal projects.

#### WEBINAR RECORDINGS

#### LEADING REMOTE TEAMS WITH EQUITY, DIVERSITY, AND INCLUSION: PART 1 COMMUNICATION AND STRUCTURE

This webinar will discuss what it means to consider equity, diversity, and inclusion while leading remote teams and why it is important. We will then explore strategies and approaches that bring EDI to remote work teams, discussing the topics of communication and structure.

#### LEADING REMOTE TEAMS WITH EQUITY, DIVERSITY, AND INCLUSION, PART 2: OWNERSHIP, ACCOUNTABILITY, PRODUCTIVITY, AND CONNECTION

This webinar will further explore strategies and approaches that bring equity, diversity, and inclusion to remote work teams, focusing on ownership, accountability, productivity, and connection.

#### PUTTING A BUILDING INTO REST MODE

The Energy Efficiency and Renewable Energy Division, FortisBC, and Prism Engineering hosted a webinar to discuss the process of putting a building into rest mode during low occupancy periods.

#### THE VALUE OF INDIGENOUS ENGAGEMENT ON ENGINEERING AND GEOSCIENCE PROJECTS

This session will teach best practices for collaboration with Indigenous communities when working on engineering and geoscience projects on Indigenous land. The session will take a practical approach by assessing a hypothetical project from both the technical and First Nation's perspective, and finish with a panel of experts sharing their experiences.

#### WATERSHED ASSESSMENT AND MANAGEMENT OF HYDROLOGIC AND GEOMORPHIC RISK IN THE FOREST SECTOR

This webinar will discuss the relevance of the Professional Governance Act, provide the background as to why the guidelines were developed, indicate what the guidelines do, and who they apply to, set out the structure and scope of the guidelines, and briefly discuss what is new in these guidelines with respect to the relative roles of forest professionals and specialists in assessing and managing risk.

For a complete listing of online learning opportunities, or for more information, visit eqbc.ca/online-offerings, or contact us at 604.430.8035 or 1.888.430.8035.

## CALL FOR PRESENTERS

Are you an expert in your field who would like to contribute to engineering and geoscience practice? Engineers and Geoscientists BC is actively seeking members to present on a variety of topics. For more information, please visit *egbc.ca/Practice-Resources/Professional-development*.



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