The official publication of Engineers Geoscientists Manitoba

THE KEYSTONE PROFESSIONAL

AUTUMN 2017

Ingenium

OCTOBER
17-20, 2017

*Where **great minds** meet to form **great ideas**.*

THEME:
CHANGE MANAGEMENT

INSIDE THIS ISSUE

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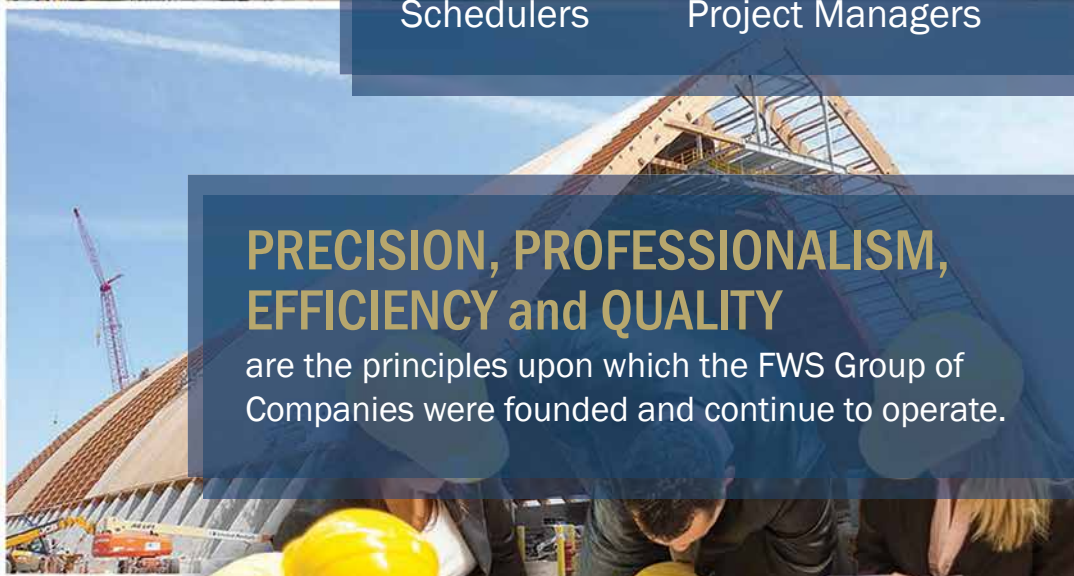

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The Keystone Professional Committee would like to hear from you. Please email your comments to: *amoore@EngGeoMB.ca.* Members are also encouraged to submit articles and photos on topics that would be of interest to the membership.

THE KEYSTONE PROFESSIONAL

The official publication of Engineers Geoscientists Manitoba

ENGINEERS GEOSCIENTISTS MANITOBA

AUTUMN 2017

FEATURES

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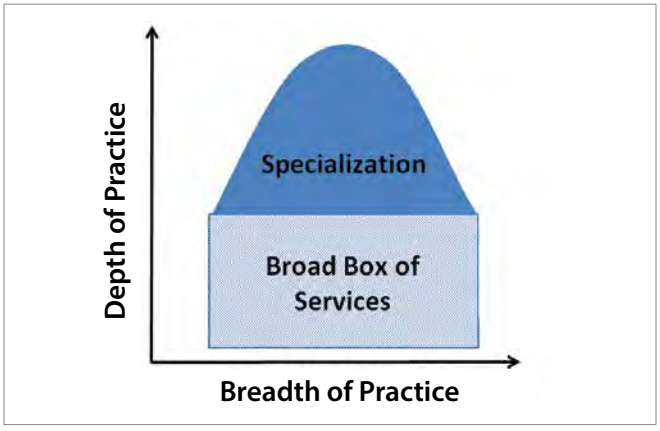
Lindsay Melvin, M.Sc., MBA, P.Eng., FEC, President 2016-2017

Knowing **Your Scope of Practice**

When asked what an engineer or geoscientist does, do you have an answer ready? What if someone inquires what you do, specifically? We often use the term scope of practice, but does the public know what that means?

I would like to offer the following description for what professional engineers and geoscientists do. All engineers and geoscientists offer a broad box of services. We are able to offer these services because of our training, knowledge, experience, and skills. Services could include technical analysis, unique design, and preparing reports and presentations. Over time, the contents of this box may evolve. For example, I notice some engineering programs now have project management as a required course. The width and height of the box could be described as the breadth and depth of professional services that every engineer or geoscientist can offer.

Whether through experience or further education, some of us may develop more specialized skills and knowledge. This specialization could be pictured as a bell curve placed on top of the box. Those practising within the bell curve still rely on, and offer, the tools and services of the basic box, but also offer more specialized services, which rely on greater depth of knowledge and experience.



Do you know where you practice? Do you offer and utilize a broad range of skills or have you specialized in an area? Perhaps your practice has changed throughout your career. For example, some members may complete graduate studies and become very specialized and eventually retire as an expert in their field. Others may build up a specialty and then move into supervisory or management positions. Engineering and geoscience supervisors and managers still rely on and offer the basic box of tools and services. The key is being aware of where you are practising. Are you practicing in the broad box? Or are you practicing within a specialization?

Understanding what we do is fundamental to our professions. This is part of the privilege and responsibility of self-regulation. One needs to recognize and respect the foundation in order to build something that evolves on top. This is something Council considers regularly.

Our Ends are the specific objectives and direction that Council gives our CEO. In the new Ends, adopted at our May 2017 Council Meeting, some Ends represent our basic box. It is unlikely that these Ends, such as ensuring everyone who practices engineering and geoscience is licensed and qualified, will change significantly. Other Ends, such as having practitioners reflect the diversity of the public, recognize the evolution of our professions and where we need to go. Our diversity End represents a specialization that Engineers Geoscientists Manitoba is currently attempting to achieve. Knowing the fundamentals and being able to specialize where needed is important for practising members and for Engineers Geoscientists Manitoba.

Council is very much looking forward to our Annual General Meeting in October and to our accompanying conference, Ingenium. If you have any questions, please email me at *president@EngGeoMB.ca* and be sure to say hi at Ingenium.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G. Koropatnick, P.Eng., FEC, CEO & Registrar

Indigenous **Awareness**

Back in July, the staff and others from Engineers Geoscientists Manitoba attended a training seminar on the topic of Indigenous awareness. The session was titled 'Indigenous Insights' and was presented by Jessica Dumas. Please take the opportunity to attend one of Jessica's sessions. You will be impressed with the content, personal stories, and sensitivity of her presentation. Everyone came away with some reflective thoughts about our part in reconciliation.

The word reconciliation has been in the news a lot lately. I like the word. In my view, it is one of the more hopeful and optimistic words in the English dictionary. See the definition:

Rec-on-cil-i-a-tion[1]
rekən'silē'āSH(ə)n

Noun
1. The restoration of friendly relations.
2. The action of making one view or belief compatible with another.

"The session was titled 'Indigenous Insights' and was presented by Jessica Dumas. Please take the opportunity to attend one of Jessica's sessions. You will be impressed with the content, personal stories, and sensitivity of her presentation."

TRC

The Canadian Truth and Reconciliation Commission (TRC) began its work in 2008 and finished two years ago. It was similar to the inquiry which took place in South Africa back in 1996, where a court-like body assembled after the abolition of apartheid. Witnesses who were identified as victims of gross human rights violations were invited to give statements about their experiences, and some were selected for public hearings.[2]

The TRC report lists 94 recommendations or 'calls to action'. Some of these points could be undertaken by the professions (engineering, geoscience, and others). For example, if you substitute the word "professions" in place of the words "corporate sector" in Recommendation #92 it would read like this:

> *92. We call upon the [professions] in Canada to adopt the United Nations Declaration on the Rights of Indigenous Peoples as a reconciliation framework and to apply its principles, norms, and standards to corporate policy and core operational activities involving Indigenous peoples and their lands and resources.*

NCTR

The National Centre for Truth & Reconciliation (NCTR) opened at the University of Manitoba and houses the archives of the TRC hearings. Officially opened in the summer of 2015, the NCTR is the permanent home for all statements, documents, and other materials gathered by the Truth and Reconciliation Commission of Canada. It is a place you can visit and learn more about reconciliation and the Indigenous peoples of Canada.

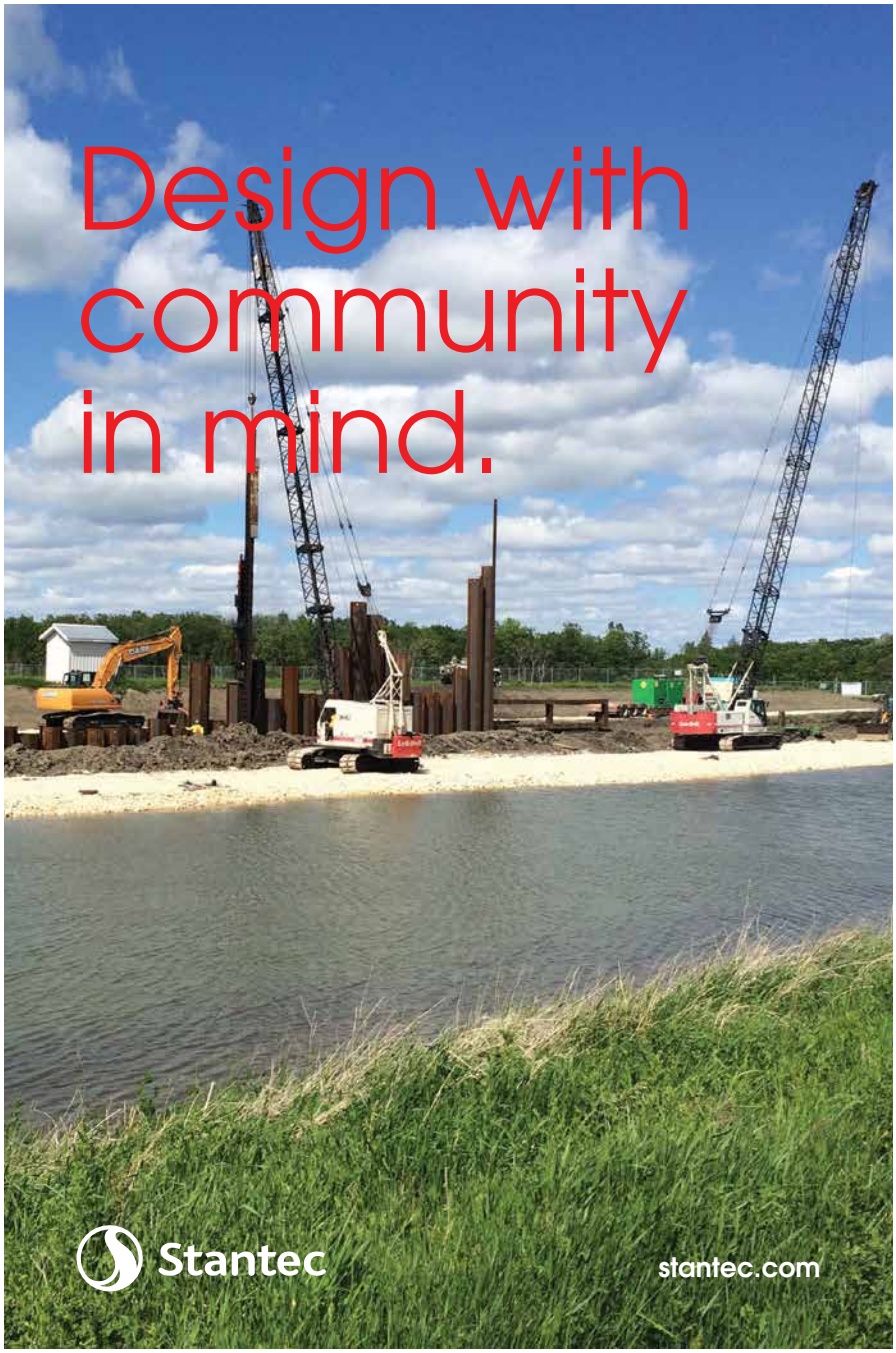
> Over time, the Association will begin to reflect the 16.7% of Manitoba's population who are considered Aboriginal.[3]

Indigenous Declaration

Council has set a new End for the professions: E-5.1 Increasing Indigenous membership. They want to see more Indigenous professionals join Engineers Geoscientists Manitoba each year. Over time, the Association will begin to reflect the 16.7% of Manitoba's population who are considered Aboriginal.[3] Indigenous engineers and geoscientists are invited to make a self-declaration so that Engineers Geoscientists Manitoba can benchmark the number of Indigenous professionals in the membership. Go to the web site main page and click on the menu buttons For Professionals>Indigenous Professionals to learn more.

Your feedback is invited and welcomed. If you have any thoughts on anything you read in The Keystone Professional, please email me at *gkoropatnick@EngGeoMB.ca*. Have a great day!

[1] Source: *https://www.google.ca/#q=reconciliation+definition*
[2] Source: *https://en.wikipedia.org/wiki/Truth_and_Reconciliation_Commission_(South_Africa)*
[3] Source: *https://www12.statcan.gc.ca/nhs-enm/2011/as-sa/99-011-x/2011001/tbl/tbl02-eng.cfm*



Engineering PHILOSOPHY 101

Dr. M.G. Britton,
P.Eng. FEC

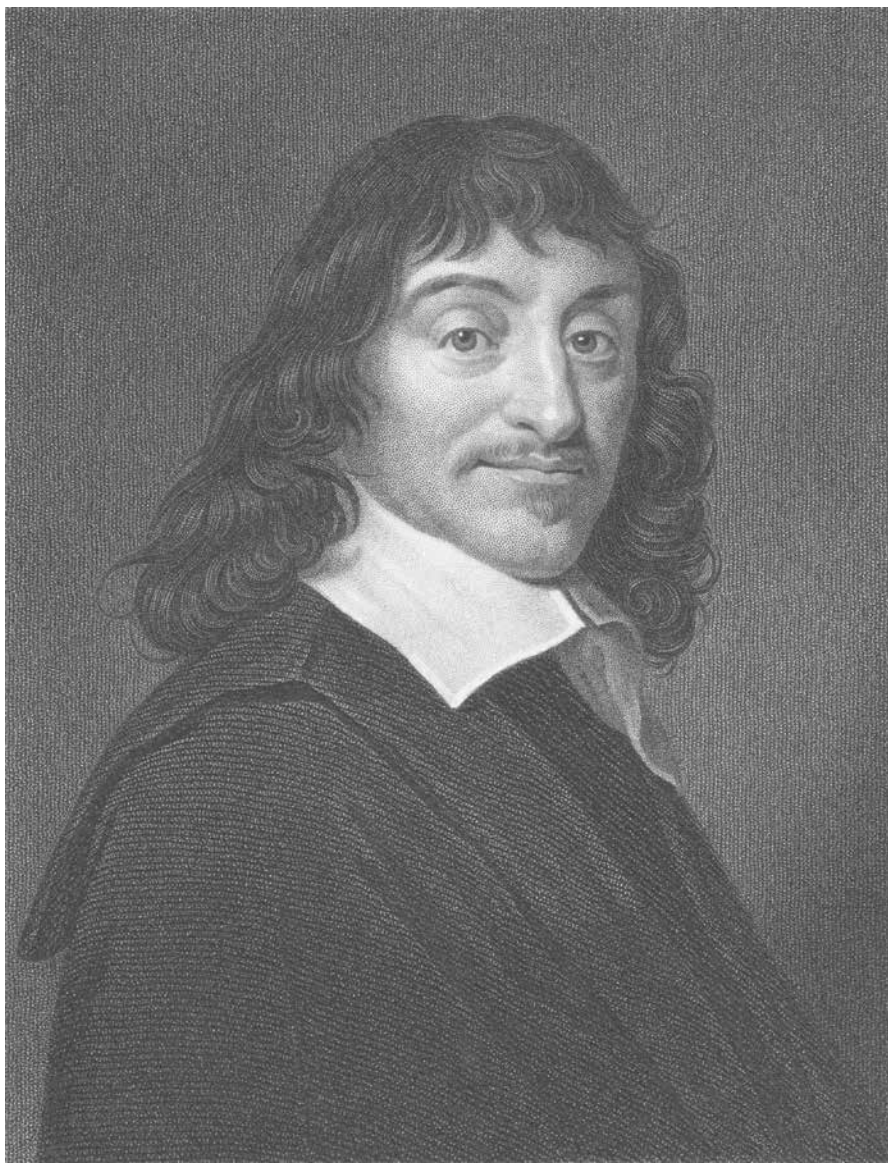
From a philosophical perspective

René Descartes (1596–1650) was a French philosopher and mathematician, who is best remembered for his statement "I think therefore I am". Wikipedia suggests "He has been identified as a foundational thinker in the development of Western notions of reason and science. Apparently his philosophy was built on the idea of radical doubt, in which nothing that is perceived or sensed is necessarily true. The only thing that remains true that there is a mind or consciousness doing the doubting and believing its perceptions".

The concept of 'radical doubt' appeals to me. Let's play with that idea as it relates to the practice of engineering here in Manitoba.

Our Act states that:

- the "practice of professional engineering" means any act of planning, designing, composing, measuring, evaluating, inspecting, advising, reporting, directing or supervising, or managing any of the foregoing, that requires the application of engineering principles and that concerns the safeguarding of life, health, property, economic interests, the public interest or the environment;
- a "certificate of registration" means the certificate issued under the seal of the Association certifying that a member is entitled to practice professional engineering or professional geoscience within the province;
- a "member" means a natural person who holds a valid and subsisting certificate of registration and whose name is entered on the register of the Association as a professional engineer or professional geoscientist;
- and a "professional engineer" means any natural person who holds a valid certificate of registration or temporary license entitling him or her to practice as a professional engineer.



These definitions provide a perceived value because they are contained in an Act that has been passed in the Manitoba Legislature. One must pause and consider if this makes it true. The definition of the "practice of professional engineering" outlines, in a very broad sense, the scope of activities that constitute engineering. The "certificate of registration" states how a "member" can be recognized, and a "member" is defined, along

click HERE to return to table of contents

"Descartes said, "I think therefore I am". That seems to be a very personal situation. Does, "We think therefore we are" have quite the same inference?"

with other constraints, as a "natural person". The "professional engineer" clause notes the requirement that the "natural person" must be registered. From these definitions it seems logical to assume that engineering (or geoscience) is practised by individuals who are qualified and personally responsible.

But wait a moment.

The Act also states that:

- a "certificate of authorization" means the certificate issued under the seal of the Association certifying that a partnership, corporation, or other legal entity is entitled to practice professional engineering or professional geoscience within the province through partners or employees who are members, temporary licensees or specified scope of practice licensees;
- and a "holder of a certificate of authorization" means a partnership, corporation or other legal entity other than a natural person that holds a valid and subsisting certificate of authorization.

In other words, pseudo-persons (i.e. corporations) can practice engineering, and/or geoscience in Manitoba. In the case of the individual practitioner, both technical competence and responsibility are vested in the individual. Corporations (pseudo-persons) typically have technical responsibilities and financial responsibility assigned to different groups within their structures. Technical decisions, and their associated costs, will be subject to approval by those who control the budget. Shouldn't that possibility raise some 'radical doubt'?

Descartes said, "I think therefore I am". That seems to be a very personal situation. Does "We think therefore we are" have quite the same inference?

Our Act specifically approves corporate practice. That makes it legal, but…

Some may look at this as an unfair characterization of corporate practice. The thoughts I have advanced, like any thoughts should be, are subject to 'rational doubt'. As noted earlier "… nothing that is perceived or sensed is necessarily true." And that should cause each of us to think about the responsibilities associated with the privilege of being a professional engineer, or a professional geoscientist.

The Mirror

By A. Simundsson, EIT

It's been 11 hours in the buddy seat of PAMI's John Deere S690 harvester and my thumb has a permanent imprint from holding down the 'data-catcher' button. We are into day three of our harvest management canola trial and our combine operator is still upbeat and cracking jokes – he lives for harvest time. We have bonded in the only way you can when you are cramped side-by-side in a combine cab for hours on end.

My data-catcher is plugged into the guts of the combine and is recording engine rpm, fuel consumption, and ground speed. I see our field crew standing in the canola that's hip high, ready with their metal pans to measure losses. We close in and at the right moment, I pull the release cord that drops the 12 ft^2 pan secured under the combine and the crew rushes in to add their pans in a straight row alongside it. The chaff from the threshing process lands in the pans, along with any canola seeds that were missed by the thresher. These samples are gathered, labelled, and collected in the truck for a loss analysis back at the office.

We finish the pass and instead of turning around for another, my operator reluctantly drives by the standing crop towards the weigh wagon that has been levelled at the end of the field to measure the yield from our last pass. "In the name of science!" he yells, gazing longingly at the waving rows of ripe crop that will be pressed into golden oil.

This is my first year with PAMI (Prairie Agricultural Machinery Institute), but certainly not my first experience in the combine. Growing up on a farm in the North Interlake, I've been involved in agriculture all my life. I had always imagined my engineering career would take me to different and faraway places, but despite my best efforts to escape my small town roots, here I was comparing the efficiency and cost of canola harvest methods on the Canadian Prairies. And loving every minute.

The advances made in agricultural production over the past decade have been truly astonishing. The rise of precision agriculture allows us to track all manner and efficiency of field operations; integration of drone technology and NDVI imaging enhances crop health monitoring; improved genetics for yield and resilience have led to incredible advances in the amount and quality of food we can grow on a single acre. The possibilities are still endless, leading producers and researchers continue to ask "how can we do better?"

Increased availability of information and production technology has introduced Manitoba farmers to endless methods to improve operations. But with such a vast array of options come many questions: How effective are these new techniques? What are the costs? Is this adaptable to other operations on the farm? What's the payback?

Some producers are early adapters and willing to take the risk to try new options before any of their neighbours. Though these experiences are valuable and can provide more hesitant producers with first-hand information, very rarely are any measurements taken, parameters set, or conditions accounted for in a repeatable manner. It can be difficult for producers to make informed decisions that may put tens of

> **Working with producers to find new and better ways to produce food for the world is just one way my life's work makes life work better.**

click HERE to return to table of contents

thousands of dollars on the line, all with limited or incomplete information.

Agriculture is a fantastic example of an industry where sharing first-hand knowledge and experience is the norm. As a group of entrepreneurs, producers openly share their experiences with others in hopes of providing insight for improved operations across the industry. However, it is inefficient, costly, and impractical for farmers to bear the brunt of the risk and cost of innovation and evaluation, particularly as machinery and farming practices change at an increasingly rapid pace. As a research engineer with PAMI, I work with producers in their operations to gather research data from controlled trials. Interpretation of this data provides objective information that allows producers to make more informed decisions on farms across Manitoba and the Prairies.

My job is to find ways to make agricultural production in the province more sustainable, profitable, and resilient in a world that is becoming more unpredictable, dynamic, and affected by global events. The work I do and the results I present are used by producers and policy makers. I must ensure the data is communicated clearly and concisely, so it can be applied to a farming operation. I have made many friends in the agricultural field over the years, and I find more friends and family asking questions about preventing grain spoilage during bin storage, what I think about straight cutting canola, and whether I would recommend installing tile drainage on their best or worst producing fields. If I don't have an answer for these questions, then I have a new research project I can bring to the table for next year.

The majority of my research is done with cooperating partners, who generously allow us to take part in their operations for a year. This connects me to the users of my research findings, and it is incredibly motivating to join them in their production efforts by understanding their challenges from a first-hand perspective, and sharing in our mutual success. Working with producers to find new and better ways to produce food for the world is just one way my life's work makes life work better.

Does YOUR job have an impact on society?

Though many of us work in technical fields that may seem removed from daily life, work in the engineering and geoscience sectors has a huge influence on our society and its progression and evolution. Taking a step back from our day-to-day work to reflect on how we influence and affect society through our projects, recommendations, and research allows us to recognize the human component of our professions and helps others understand what we do. Directly or indirectly, we all have a hand in shaping our world and its values.

Write to us and tell us how your life's work makes life work better, and maybe your story will be featured in the Keystone's next edition of 'The Mirror'.

CONNECTIONS

CREATE. FOSTER. LEAD.

MCWESTT 2017
MAY 5, WINNIPEG

The third biennial Manitoba Community of Women in Engineering, Science, Trades, and Technology (MCWESTT) Conference was held in Winnipeg on May 5, 2017. *MCWESTT 2017 'CONNECTIONS: Create. Foster. Lead.'* was a resounding success with over 260 people participating in the conference. The one-day conference offered participants a high-quality program with opportunities to learn, share experiences, network, and recharge.

The conference program was kicked off with greetings from Mr. Terry Duguid, MP and the Parliamentary Secretary for Status of Women and Honourable Rochelle Squires, MLA and the Minister responsible for the Status of Women (Province of Manitoba). The conference program consisted of three keynote speakers, an expert panel discussion, and ten breakout sessions. The program was carefully selected to provide numerous opportunities to expand existing skill sets, with topics ranging from Leading in a Technical Environment to Fostering Connections Through Presence. The conference program was full of talented speakers including keynote speakers:

- Susan Auch, three-time Olympic medalist from Winnipeg, MB;
- Shari Graydon, award-winning author, advocate, and speaker; and
- Sarah Neville, communication expert and acclaimed speaker.

The 260 participants, including over 30 volunteers, and 25 presenters, were primarily from Manitoba, with a few presenters from other provinces. The participants reflected a diverse background of professions from a variety of industry, academic, and public sector workplaces. The conference theme focused the event on the many connecting women and people in these unique careers.

Manitoba comedian, Dana Smith, was the conference's Master of Ceremonies, keeping the attendees laughing and celebrating the common strengths that unite this special community. The conference was held in the beautiful facilities at The Fort Garry Hotel. In addition to the superb program, participants were treated to a delicious hot breakfast and lunch, and some sweet treats to accompany their coffee breaks, including the delicious chocolate fountain that was sponsored by the Winnipeg Construction Association.

For the first time since the conference's inception in 2013, the conference also featured a pre-conference workshop sponsored by the NSERC Chair for Women in Science and Engineering – Prairies, Dr. Annemieke Farenhorst. The WinSETT Effective Communication Workshop was sold-out and participants had the opportunity to spend the day prior to the conference building their communications skills.

Engineers Geoscientists Manitoba partnered with the conference planning committee for financial, technical, and logistical support. Without Engineers Geoscientists Manitoba and the other generous MCWESTT 2017 sponsors, this conference would not have been possible.

click HERE to return to table of contents

A full list of sponsors is available on the conference website at *www.mcwestt.com*.

It is also important to mention the role that the University of Manitoba – Faculty of Engineering, Faculty of Agriculture, the NSERC Chair for Women in Science and Engineering – Prairies, and the University of Winnipeg had in encouraging the student attendance at the conference. Because of their financial support, over 60 students received a significantly reduced enrollment cost for the conference, an opportunity many of them could not otherwise afford.

Similarly, the volunteer support provided by the over 30 volunteers to plan, organize, and ensure the smooth operation of MCWESTT, was generous, creative, and inspiring. These volunteers were vital to the conference's success. Without these volunteers, the conference would not be possible.

The Manitoba Community of Women in Engineering, Science, Trades, and Technology is an initiative of Engineers Geoscientists Manitoba's Committee for Increasing the Participation of Women in Engineering towards meeting End E-5.2 to achieve the Engineer's Canada '30 by 30' goal that 30% of newly licensed engineers are female by the year 2030.

MCWESTT 2017 Conference Committee

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"The conference theme focused the event on the many **connecting women and people** in these unique careers."

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Managing Change

Change is a constant: technologies, processes, people, idea, and method often change affecting the way we perform and live our lives.

Leaders navigate change smoothly and with acceptance.

Understanding Personalities

Each of us enters this world with an innate personality that determines how e interact, engage, energize, think, and navigate our surroundings. Understanding who we are and being able to recognize traits in those around us can help make our teams and relationships more effective.

Leaders embrace differences.

Writing Reports

Reports are a major deliverable but many technical professionals are not confident in their writing skills. Even with advanced communication tools, the report is still the main way firms distribute their ideas and findings.

Leaders recognize the power of well-written documents.

Thinking Ethically

Good decisions are ethical decisions and require logic. Unlike a legal course, we take a philosophical perspective at how/why individuals act, react, and decide what to do.

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OCTOBER
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THEME:
CHANGE
MANAGEMENT

WELCOME TO INGENIUM 2017

Engineers Geoscientists Manitoba's annual conference, Ingenium, is a premier professional development opportunity for the engineering and geoscience community in Manitoba.

This year's conference explores the theme of 'Change Management'. As a constant presence in all our lives, change brings a variety of both personal and professional challenges. Effective change management is a key skill for individuals and organizations, and the Professional Development Seminars will focus on equipping attendees to better predict, plan for, and manage change. Future challenges and opportunities affecting the fields of engineering and geoscience will be explored, best practices examined, and soft skills developed.

ENGINEERS
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My life's work
makes life work better.

THURSDAY, OCTOBER 19, 2017

7:30–8:30	**Registration & Continental Breakfast**				
8:30–9:15	**Welcome and Keynote** Change Management: Chaos to Calm…or is it? – *Donna Castellano, PMP CCMP*				
	…As a Profession	*…In your Workplace*	*…In the Province*	*…In your Personal Career*	*…In Technology*
9:20–10:05	Changing Before We Must: The evolution of Experience Review Committee's modus operandi *– Dr. Jitendra Paliwal, P.Eng., FEC*	The Three Spaces of LEAN Management *– Brent Timmerman, P.Eng. & Steven Spry, P.Eng.*	Panel Discussion: Partnership Supports Change *– Faculty of Engineering, UofM*	Taking Your Career Into Your Own Hands *– Leanne Bonnar, David Aplin Group*	Improving Safety in Bangladesh Garment Factories *– Brad Loewen, P.Eng.*
10:05–10:25	**Coffee Break & Booths**				
10:25–11:15	Government Relations Panel Discussion: Limitation of Actions – Changing of Legislation	Just One Last Change… *– Saju Sam, P.Eng., PMP*	Including the Excluded: Engaging Diverse Populations *– Jessica Dumas, Prime Image Life Coaching*	Communicating Strategically for Change *– Rhonda Honke, inVision Edge*	Resilient Design in Our Changing Climate *– Melanie Chatfield, P.Eng. & Jordan Lanoway, P.Eng.*
11:20–12:10		Resolving Construction Industry Disputes on Our Own Turf *– Roy McPhail, P.Eng.*	WE Design: Students Designing A Greener Future *– Benjamin Gibson & Laurissa Bridgeman*	Managing Change in a Technical Environment *– Lisa Moretto, RGI Learning*	Virtually Possible: An Introduction to Virtual Reality and its Possibilities Within Industry *– Chris Hall, The Portal Winnipeg*
12:10-1:30	**Lunch and Keynote** Road to Manitoba's North: Overcoming Engineering Challenges – *Dr. Marolo Alfaro, P.Eng.*				
1:35-2:20	Changing ABCs *– Mike Gregoire, P.Eng., FEC*	Leveraging Diversity and Stimulus to Drive Innovation *– Rhonda Honke, inVision Edge*	Winnipeg Transportation Centre: It's more than traffic! *– Ryan Patrick*	Your Retirement Income Blueprint *– Eliott Einarson, Diamond Retirement Planning*	Student-Led Innovations Towards Sustainability *– Kim Laberinto*
2:30	**Annual General Business Meeting**				
	Friends of Engineering Networking Reception				

Ingenium

www.EngGeoMB.ca/Ingenium

OCTOBER
17-20, 2017

WHAT'S CHANGING FOR 2017?

NEW LOCATION

After several years at The Hotel Fort Garry, we are expanding into a new conference space for 2017: the RBC Convention Centre. With an accessible downtown location and all of our professional development sessions on the same floor, we're sure you'll like the new location.

MORE PROFESSIONAL DEVELOPMENT HOURS

You spoke, we listened. Based on feedback from last year's attendees, we've added another session to your day, as well as an additional keynote, so that you can maximize your professional development time.

MORE CHOICE

Ingenium 2017 offers attendees the choice of 19 unique sessions: the most breakout sessions we've ever had.

LOOKING TO LOG PRODEV HOURS?

DID YOU KNOW... that attending the Annual General Business Meeting counts as hours towards your 'Participation' category for ProDev? So if you stay all day, you'll be earning hours for both 'Informal Activity' and 'Participation', while gaining valuable knowledge and being an active member of the Association.

click **HERE** to return to table of contents

OPENING KEYNOTE

DONNA CASTELLANO, PMP, CCMP

With over 25 years' experience, Donna is a seasoned senior program, project, and change management practitioner. Striving to be a powerful driver with implementing, educating, and practicing the strategies, methods, and lessons both experienced and learned at a local, global, and virtual level, she will share how to bring 'Chaos to Calm' when impacted by change.

Currently working at the Workers Compensation Board of Manitoba, Donna is also a founding member and current President of the Association of Change Management Professionals Manitoba Chapter, Past President of Project Management Institute (PMI) Manitoba, and Winner of the PMI Manitoba 2015 Project of the Year award. In early 2017, she was selected to be one of the first individuals worldwide to write and successfully obtain the new global certification in Organizational Change Management, the CCMP. Donna also holds the PMP designation and is certified in the Prosci/ADKAR method.

Donna's personal passion for sharing and giving back keeps her busy with volunteering, instructing, speaking engagements and content contributions. Add in the gift of storytelling, high energy, and a quirky sense of humor to put the sprinkles on top.

CHANGE MANAGEMENT: *CHAOS TO CALM…OR IS IT?*

Our opening keynote session is where you will walk away with that 'epiphany moment' as to why changes you initiated on others or had bestowed upon yourself may have felt so chaotic.

Essentially, how do you implement or receive change in this day and age with such diverse personalities, multiculturalism, multiple generations, varying genders, and locations without the sky falling? This session will focus on what causes resistance and chaos and the helpful hints and tips you can follow to successfully achieve the calm.

Donna will share her vast experiences gained both locally and abroad and reveal the universal steps to assist with change management and how to sustain it.

This keynote session will strike a chord with anyone who has had to implement change or has been impacted by change.

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LUNCH KEYNOTE

DR. MAROLO ALFARO, P.ENG.

Marolo Alfaro is a professor in the Department of Civil Engineering at the University of Manitoba. He obtained his PhD from Saga University, Japan, and received postdoctoral fellowships from the Royal Military College of Canada and the University of Calgary. Dr. Alfaro's research interests include geosynthetics for civil engineering applications, ground improvement techniques, hydroelectric earth dams, road embankments on soft foundations, stabilization of natural and engineered slopes, northern infrastructure impacted by climate change, and cold regions engineering. He has published widely in technical journals and in conference proceedings, and has co-authored a book and two book chapters.

Dr. Alfaro has served as Vice-President for Canada of the North American Geosynthetics Society, Executive Board Member of the Canadian Geotechnical Society, Canadian representative to the Committee on Ground Improvement of the International Society of Soil Mechanics and Geotechnical Engineering, and Associate Head of the Department of Civil Engineering. He also helped establish the Filipino Members Chapter of Engineers Geoscientists Manitoba.

ROAD TO MANITOBA'S NORTH: *OVERCOMING ENGINEERING CHALLENGES*

The northern Manitoba town of Churchill is now without rail service after the railway was shut due to flood damage. The town currently relies on rail to transport goods and services, so the closed rail line has stimulated calls for building a road to Churchill.

Building a road to Churchill poses a host of complex engineering challenges. The road has to cross regions of continuous permafrost in the northern stretch and sporadic permafrost in the south, and climate change is expected to result in warming, and therefore thawing, of the permafrost. Another challenge is building a road on peat bogs. If not frozen, peat is a highly compressible material with very low shear strength. It also decomposes over time, reducing its capacity to carry loads. The extreme compressibility and low shear strength of peat causes stability problems or excessive deformations. Flooding is also a challenge. It can wash out road embankments, bridge crossings, and drainage culverts in the same way it did the existing rail line.

This presentation discusses Dr. Alfaro's research findings from instrumented sites along two northern Manitoba roads and an Arctic road in the North West Territories. Lessons learned from the performance of those roads can be applied to building a road to Churchill.

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AWARDS GALA DINNER & DANCE

FRIDAY, OCTOBER 20, 2017

The grand finale of Ingenium 2017 is the Awards Gala Dinner & Dance. Taking place in the York Ballroom, in the newly extended **RBC Convention Centre**, this annual black tie event honours member achievements and corporate contributions to the professions. Guests will be joined by representatives from government and industry on this special evening, culminating in a performance by the Big City All Star Band, where guests can dance the night away!

Tickets are available for $80 each, or $720 for a table of 10. For further information and to purchase tickets, visit *www.EngGeoMB.ca/Ingenium.*

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2nd Place Team: Jaret Hiebert, Jared Boguski, Ryan Cook, Sebastian Putzke

3rd Place Team: Rich Sison, Roman Hudon, Silvestre Urbano, *not pictured – Graeme Liebe*

University of Manitoba's ecoMotion team members display their 2017 race vehicle

Shot gun start…and they're off!

KidSport's Putting Contest

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Great-West Life representative, David Devine, and MLEC Committee Chair, Roger Petursson, P.Eng., FEC, present cheque to Dean of the Faculty of Engineering, University of Manitoba, Dr. Jonathan Beddoes, P.Eng.

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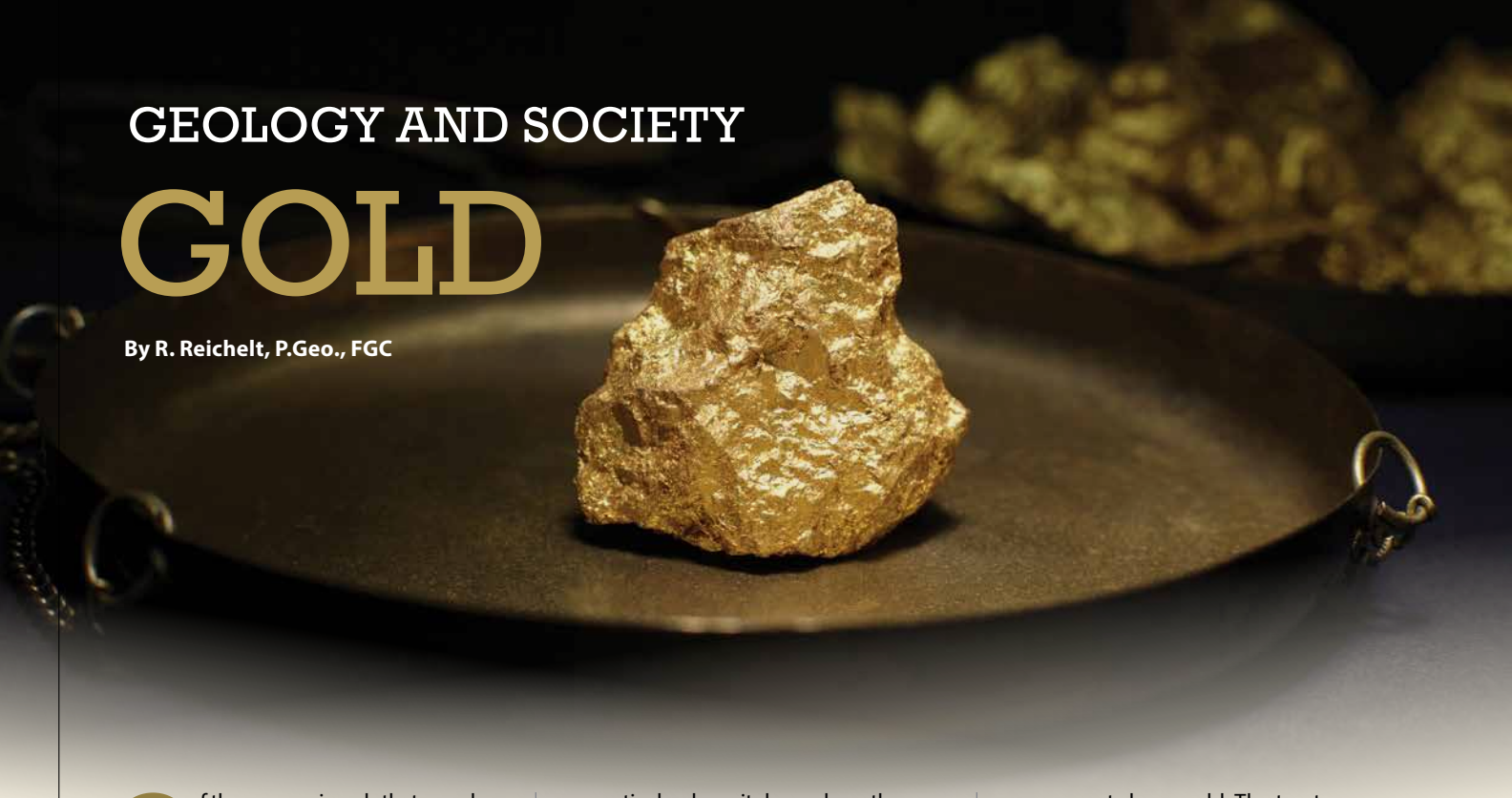
GOLD



By R. Reichelt, P.Geo., FGC

Of the many minerals that people have sought over the years, gold has a special place. We have desired it, searched for it, fought for it, and sometimes died trying to get it. Since the beginning of recorded history, we have used gold to decorate ourselves and our sacred objects. We have also used it as money.

Geology of Gold

Gold is one of the few elements that naturally occurs as 'native', that is, uncombined with other elements. This has to do with the unique chemistry of the element – it is very difficult to form a chemical compound with gold. Geologically, gold occurs in a variety of environments.[1] The main division is between placer deposits, where the gold is hosted in alluvial sediments, and lode deposits, where the gold is found within bedrock.

Gold Production

World gold production was approximately 3,100 tonnes in 2016[2] of which the top five producers were China (455 tonnes), Australia (270 tonnes), Russia (250 tonnes), United States (209 tonnes), and Canada (170 tonnes).[3] Interestingly, the largest single category of producers was 'Other Countries' (900 tonnes) which suggests that there are many small producers.

A variety of techniques for extracting gold have been developed over the years. The technique for extracting gold from any particular deposit depends on the geochemistry and other characteristics of the deposit hosting the gold. Generally, gold is extracted from placer deposits using mechanical extraction techniques, such as panning and sluice boxes, sometimes followed up with chemical extraction of the concentrate. Separating gold from a lode deposit is similar in that the rock is first pulverized in a mill, followed by mechanical extraction of a gold concentrate, and finally by chemically extracting the gold from the concentrate. Chemical extraction techniques include those that use mercury or cyanide and can be environmentally hazardous (a good summary can be found in the Encyclopedia Britannica entry on Gold Processing[4]).

Gold Deposits in Manitoba

In Manitoba, gold deposits have been discovered in the Lynn Lake Belt, the Flin Flon Belt, the Oxford-Stull Domain, and the Rice Lake Belt.[5] There is one operating gold mine in Manitoba, the True North Gold Mine in Bissett, owned by Klondex Mines Ltd.[6] Gold is also produced by HudBay[7] as secondary production.

Gold as Money

While gold is used in jewelry and electronics, most of the gold in the world is stored in bank vaults. While the gold standard for national currencies is no longer officially in place, many national governments keep gold. The top ten national gold stockpiles, as of February 2017, are shown in Table 1:

Table 1 National Gold Reserves[8]

1	United States	8,133.5 tonnes
2	Germany	3,377.9 tonnes
3	Int. Mon. Fund	2,814.0 tonnes
4	Italy	2,451.8 tonnes
5	France	2,435.8 tonnes
6	China	1,842.6 tonnes
7	Russia	1,615.2 tonnes
8	Switzerland	1,040.0 tonnes
9	Japan	765.2 tonnes
10	Netherlands	612.5 tonnes

The 20th century economist, John Maynard Keynes (1883-1946) asserted that the use of gold as money, as in the 'gold standard' for national currencies, is a "barbarous relic"[9] of the past. Although central banks have largely abandoned the practice of officially backing their currencies with gold, Table 1 shows that many governments prudently maintain stockpiles of gold as national assets, just in case.

Speaking of national assets, did you notice that Canada is not on the list in Table 1? While the Bank of Canada used to have more than 1000 tonnes as a national gold reserve, in the past few years it has sold almost all of it so that

click HERE to return to table of contents

only around 1 tonne remains in their vaults.[10] I guess that they agree with Lord Keynes.

In contrast to those who agree with Lord Keynes and disparage gold, we have 'gold bugs' who advocate buying gold as an investment or as a form of money that keeps its value regardless of the ups and downs of state-established currencies. One such 'gold bug' is financial analyst James Rickards. In his 2016 book, *The New Case for Gold,*[11] he makes the case for keeping gold, not as an investment but as a store of value in case of financial and economic upheaval. Mr. Rickards further explores the likelihood of financial and economic upheaval in his more recent book, *The Road to Ruin: The Global Elites' Secret Plan for the Next Financial Crisis,*[12] in which he advocates owning gold as a form of money that keeps its value independent of currencies established by government authority. I will leave it up to you, dear reader, to decide on the relative merits of Mr. Rickards' arguments, but for the purposes of this essay it is clear that for many people gold will remain an important form of money for the foreseeable future.

Wrapping It Up

Gold is a fascinating subject, in geology, process engineering, and in economics. I have to admit that I have only just scratched the surface here. For those who are interested in exploring this subject, the references given are a good starting point. I warn you though, if you get the gold bug as a result of studying the subject, as many already have, there is no telling where that exploration will lead you to.

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Engineering at the UofM is Growing and Building

By Dean J. Beddoes, P.Eng.

With the only accredited engineering programs in Manitoba, the Faculty of Engineering at the University of Manitoba strives to ensure an adequate supply of well-trained engineering graduates, at all levels from Bachelor to Doctoral degrees, are available to the Manitoba workforce. Since the beginning of this decade, undergraduate and graduate enrolment in engineering programs at the University of Manitoba has grown by 60% and 36% respectively, among the fastest growing engineering enrollment of any province. Filling the Engineering and Information Technology Complex to full capacity and beyond are nearly 1800 undergraduate and 500 graduate engineering students.

As part of their studies, these students enjoy a wide range of opportunities: the Cooperative Education/Industrial Internship Program has grown from about 110 student co-op work placements per year at the start of this decade to more than 400 placements in 2016; students can choose to participate in a wide range of design competition teams, with more than 500 making this choice every year; and students are key participants in the more than 175 research, development, and collaborative agreements the Faculty of Engineering has with external partners.

To enhance the hands-on component of students' engineering education, so far this decade more than $6 million has been invested in laboratory refurbishment. Along with investments in numerous laboratories throughout the Faculty, noteworthy among the improvements are the redevelopment of the High Voltage Building into the Stanley Pauley Centre and establishment of the IKO Construction Materials Testing Facility.

To continue our mission to "graduate students…to improve the well-being of society and the creation of new wealth that benefits society in Manitoba, Canada, and beyond" with the growing enrolment and increasing research intensity, construction of an additional engineering building is now underway – the Stanley Pauley Engineering Building, named to recognize the $5 million foundational donation to this building by Mr. Pauley, a 1949 engineering graduate.

The Stanley Pauley Engineering Building will be over 46,100 sq.ft., connected to the E3 block of the Engineering and Information Technology Complex via a second level bridge, and connected to the existing Stanley Pauley Centre. It will house the Price Innovation and Prototype Centre to support design team project fabrication, new offices for the IEEQ and Co-op programs, engineering laboratories, and student study/office space.

Despite the generosity of Mr. Pauley and support from the Government of Canada Strategic Investment Fund ($12.1 million), the Province of Manitoba ($4 million), and more than 350 donors to date, about $1.5 million remains to be secured to reach the $28 million total building project budget. With construction expected to be completed in the third quarter of 2018, now is the time to do your part, regardless of how big or small, by contributing to the Stanley Pauley Engineering Building and the transformation it will bring to engineering education in Manitoba.

To contribute please visit *https://give.umanitoba.ca/.* All gifts of $1000 or more will be recognized on a donor listing in the new building. We look forward to inviting you to tour the new Stanley Pauley Engineering Building in 2018.

The **APEGM Foundation** has set up a program to match donations made to the Stanley Pauley Engineering Building. Individual donations made by Engineers Geoscientists Manitoba members will be matched on a dollar-for-dollar basis, so for each dollar you donate, the building receives two dollars. The matching program covers donations up to $100 but you can, of course, give more. Only the first $100 will be matched and a tax receipt will be issued for the amount you donate. The Foundation has set aside $25,000 for this program so please give generously to this great cause. Visit the Foundation's web page *www.EngGeoMB.ca/FoundationProjects.html* to take advantage of this program.
If you have any questions about the matching program please email ***apegm.foundation@mtsmail.ca.***

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- New Internationally-Educated Engineers Qualification Program (IEEQ) Office and Facilities
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- Graduate Student Study Space
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UNIVERSITY OF MANITOBA

LEARNING FROM EXPERIENCE IN MANITOBA

Seasons of Work

By C. Geddert, P.Eng.

Traditional education is a seasonal business. We are trained from our earliest educational experiences that there is a new year starting in the fall. We are accustomed to planning around the school semesters and school holidays. Eight plus four: eight months on campus plus four months off campus for a summer job or vacation. Academic days also have a schedule and timing that is ordered so everything fits and breaks are included. There is deliberate and inherent time management provided to a student's day. Often without their even knowing it. This schedule provides regularity and predictability that is comfortable. It can be a difficult transition for a student to realize that they will no longer have those schedules and breaks to provide a planning framework for their day-to-day life. They will no longer have a summer off to get a summer job. Some students aspire to be teachers in order to maintain that regular rhythm.

Engineers in industry will experience different seasons or cycles of work. These cycles can arise from the type of work and its environment, the needs of an organization or industry, clients, or even the needs of society. There is the construction industry where the cycles of weather play an important role. The planning for a project will often start in the season before work can begin, the weather will not allow a start before winter roads are set or the frost is out and workers are ready to work outside. The construction will need to continue through to the next season to complete.

In the consulting industry, the seasons can be tied to your customer base. There is a project bidding season for some. Seasons are sometimes subtle and often less rigid. They may be responding to consumer trends or the product cycle of a large manufacturer. From production volume ramp up, to lower volume for mature product parts and service requirements, the input of engineers changes throughout a product's life cycle. In industries with an emphasis on cutting edge technologies, it is often the case that there is a four to eight month training cycle for all new employees. Any students that were engaged to work on a four month project over the summer would not understand the place of their work within the life cycle of the project, product, or industry. Experiencing these changing conditions or seasons is an important lesson for engineering students.

Seasons of work do not match the academic seasons. Something different is required. In order to support students and employers in Manitoba we realized we had to accommodate the seasons of work. We could no longer only accommodate eight plus four. We needed to be flexible and provide opportunity for more. As a result, students are getting introduced to the seasonal requirements of different industries and cycles that make them work.

Co-op/IIP provides a place for these industry seasonal opportunities within the academic calendar. Co-op/IIP works within academia to give students time away from campus to experience these realities of industries, within the overview of an academic program. Employers can access talented engineering students for a work placement that is not restricted to four months in the summer. Students can participate in an eight month project or provide additional capacity to a project in the fall or winter months. Students can participate in work placements for an entire year or even 16 months and experience an entire project or business cycle. This knowledge of the seasons of work contributes to an engineering graduate's 'industry readiness'. Co-op/IIP has worked with the faculty, students, and employers to respond to and create opportunities to work in all seasons and provides an environment for an introduction to the seasons of work. This knowledge is an important part of creating university graduates who have an understanding of the industry in which they will work.

"Seasons of work do not match the academic seasons. Something different is required. In order to support students and employers in Manitoba we realized we had to accommodate the seasons of work."

We invite you to contact the new co-op office at *CoopIIP@umanitoba.ca* or call Carolyn Geddert at 204-474-8948 or Lynda Peto at 204-474-6586. You may want to relate your organization's seasons of work. Your input is welcome.

Partnering for DIVERSITY

By S. Baragar

Canada and Manitoba's government want more women in engineering and geoscience. As the federal and provincial governments embark on their third year recognizing International Day of Women and Girls in Science on February 11, a day of awareness established by the United Nations in 2016 to address gender inequality in science education, opportunities, and employment, both continue to participate in and launch campaigns toward increasing women in science, technology, engineering, and mathematics (STEM) such as last year's national social media campaign 'Choose Science'. The time is now for government relations to connect stakeholders and governments to achieve an increase of women in STEM and to allow professional engineering associations across Canada a chance of reaching 30 by 30.

Engineers Canada's 30 by 30 goal is ambitious. An aim to increase the number of newly licensed engineers who are women to 30 percent by 2030, the goal has been adopted by all provincial and territorial engineering associations across Canada. This past year, Engineers Geoscientists Manitoba formally adopted the goal as a Strategic End for the Association. As the average percent of newly licensed engineers who are women across Canada sat at 17.2 percent in December of 2016, it will take significant change to nearly double the average nationally.

In May, the Manitoba Community for Women in Engineering, Science, Trades, and Technology (MCWESTT) hosted its third biennial conference to provide professional development and networking opportunities for women. Engineers Geoscientists Manitoba's Government Relations Department worked with MCWESTT to invite Manitoba's Minister responsible for the Status of Women, Honourable Rochelle Squires, and Member of Parliament and Parliamentary Secretary to Canada's Minister for Status of Women, Terry Duguid, to the event. Not only did both government officials accept the invitation to attend the conference, but both Minister Squires and MP Duguid presented spoken greetings to start off the conference on behalf of the provincial and federal government respectively, a partnership with government not previously displayed at an MCWESTT Conference. Minister Squires additionally participated as a panelist at the conference during which she underlined her support for women in Manitoba entering careers such as those in STEM with male overrepresentation, and related as a minority herself being an MLA and a Minister in government where men still dominate the role of elected officials in comparison to women.

Minister Squires and MP Duguid were both in contact with Engineers Geoscientists Manitoba ahead of their invitation to the MCWESTT Conference, requesting information regarding the participation of women in Manitoba's engineering and geoscience disciplines and information as to the work being done to achieve greater gender parity within both. After meeting with the Association and members of the Association's Engineering Education Task Group, Manitoba's provincial government partnered with the University of Manitoba's Women in Science and Engineering (WISE) outreach to be part of the group's annual 'Make Your Move' event which invites grade eight girls from schools across Manitoba to participate in a science and engineering focused design-create-build challenge. In addition to Minister Squires attending the event, the provincial government sponsored a group of girls to participate and sent three of its female civil service engineers to be present as mentors for the students. Further exemplifying support demonstrated by government, this focus on increasing the number of girls and women involved in STEM in Canada is far from moribund.

In a country recognized for its diversity, women's rights, and gender-equal federal cabinet, work to improve gender equality and equal opportunity is still needed. It is valuable to recognize that the equal opportunity culture we often think is present, particularly for positions achieved after significant education such as engineering or geoscience, is an ideal culture rather than a real one, and is heavily influenced still by cultural norms and biases we unknowingly favour. Government and Engineers Geoscientists Manitoba is addressing inequalities in education and career opportunity by means of setting goals and partnering for positive change. With strong government relations, these partnerships will continue to increase diversity in the professions and can provide the opportunity we need to fulfill our national and provincial 30 by 30 goal.

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In Memoriam

Orest Stephen Roscoe

New Members Luncheon

New Members in attendance at the June 20, 2017 New Members Luncheon, where they received their official license certificates.

ACEC Awards of Excellence Gala

The Association of Consulting Engineering Companies Manitoba (ACEC-MB) honoured excellence in engineering at their 18th annual awards gala.

The Keystone Award for the project that best represented the program's standards of excellence was presented to AECOM Canada Ltd. for the Eureka Nunavut – Water and Sewer in the Far North Project.

Awards of Excellence were presented for projects submitted by KGS Group, WSP Canada Inc., AECOM Canada Ltd., and Teshmont Consultants LP. Stantec Consulting Ltd., TREK Geotechnical, AECOM Canada Ltd., and KGS Group also received Awards of Merit.

David Krahn, P.Eng., of Dillon Consulting Ltd. was presented a Lifetime Achievement Award and Dana Bredin, P.Eng., of WSP Canada Inc., with the Rising Star Award.

ACEC-Manitoba's mission is to promote the business interests of the Consulting Engineers of Manitoba: and to promote the application of engineering for the benefit of Society. Further information can be found on *www.acec-mb.ca.*

Congratulations

Congratulations to Digvir Jayas, P.Eng., FEC, FGC(Hon.), on being the recipient of the 2017 Sukup Global Food Security Award for his research and teaching career that has led to enhanced grain preservation throughout the world. The purpose of the award is to recognize the enhancement of food security by innovative engineering or the application of engineering in the production and distribution of food, including the storage and handling of grains, oilseeds, and other food products.

Jay Doering Elected as Fellow of the Canadian Academy of Engineering

Congratulations to Association Council member Dr. Jay Doering on being inducted as a Fellow of the Canadian Academy of Engineering (CAE).

Members of the CAE are nominated and elected by their peers, in view of their distinguished achievements and career-long service to the engineering profession.

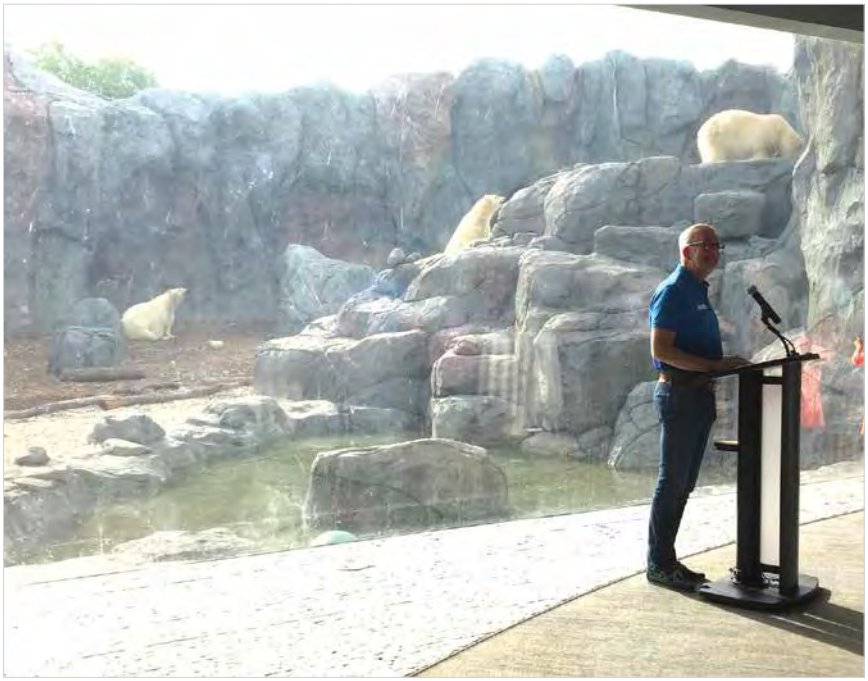
Following the devastating 1997 Red River flood, Doering was instrumental in working with the Manitoba Floodway Authority and continues to be on the expansion project committee to this day.

Doering joins 15 other current CAE Fellows at the University of Manitoba. CAE Fellows are committed to ensuring that Canada's engineering expertise is applied to the benefit of all Canadians.

Annual Volunteer Appreciation Event

On Tuesday, June 27, the Association held its Annual Volunteer Appreciation event, this year changing the venue to the Assiniboine Park Zoo's Gateway to the Arctic. The event was very well attended with approximately 150 guests taking in the delicious food, fellowship, and of course the beautiful bears and seals. The polar bears were very active during the event, which wowed both the children and the adults in attendance. The Association received a lot of positive feedback about the evening and is looking forward to planning next year's Appreciation Event.

The Association once again thanks all of its members and volunteers who volunteer their time on the numerous committees, task forces, and special events.



By M. Gregoire, P.Eng., FEC

Making Math Illegal

There were several articles this Spring describing a decision that was made a few months ago by the Oregon State Board of Engineers. The decision has caused many to decry the move as evidence of regulation gone too far and of a violation of free speech. Some have even tried to classify the decision as an attempt by that state board to make it illegal for people to use math.

The actions by the state board involves a person, Mats Järlström, who, in his retirement, decided to do some research into the timing of yellow (amber) lights at traffic signals. The topic of traffic light timing has received much attention from the public since the implementation of so-called red-light cameras. The topic has been covered most heavily by the media in the U.S., but even locally there have been several articles describing the protests by public interest groups seeking to have red-light cameras banned.

The validity of amber light timing is not the central issue at hand in the Oregon case, however. The issue, according to the state board, is related strictly to whether or not Järlström violated state law regarding improper representation as a professional engineer. Essentially, the board determined that Järlström led people to falsely believe that he was licensed as a professional engineer in Oregon. They also determined that he practised professional engineering without a license.

Järlström is decidedly opposed to the decision. He and the board are therefore, at the time of writing, in court surrounding the charges by the state board. As has been the case regarding similar issues in the past, Järlström defends his actions using three elements: academic qualifications, free speech, and good will.

Järlström is quick to point out that he received an undergraduate degree in engineering from Sweden, which is where he grew up. Many, apparently including Järlström, falsely assume that an engineering degree is the only criteria required for acquiring the right to practice professional engineering. Members of Engineers Geoscientists Manitoba know that academic knowledge is only one of four major components required to practice engineering.

Before a person can be licensed to practice engineering, they must first demonstrate that they have a sufficient academic background. They must also demonstrate a minimum of four years of experience under the mentorship of a licensed engineer. Thirdly, applicants must demonstrate that they are of good character. Finally, a professional engineer must be willing to adhere to a code of ethics to which they may be held accountable. Järlström has therefore failed to demonstrate three of the four components that are required before he could practice engineering.

Järlström has also pointed out that he believes the decision by the board violates his right to free speech. However, his actions went beyond the traditional image of a person standing on street corner exclaiming their position on a particular political matter. Järlström, by his own admission,

submitted a report to municipal government to convince them that their system was flawed.

Had a similar report been written by someone without an engineering education, it would likely have been dismissed by the recipient as not having merit. It is the combination of the engineering advice and Järlström's use of the title of engineer that creates the problem being addressed by the engineering board. The public has come to trust advice of an engineering nature from engineers. That trust can only be maintained if engineering regulators continue to fulfill their role.

Finally, Järlström is quick to point out that the engineering direction he gave in this matter was done voluntarily. Although he doesn't explicitly say it, the implication is one we at Engineers Geoscientists Manitoba have heard from individuals; if you aren't paid for the advice, it doesn't count as the practice of professional engineering. There is no mention of remuneration in the definition of professional engineering and, in fact, there are several legal cases supporting the notion that an engineer is liable for advice that was offered for free.

It is clear from the information in all of the news articles surrounding this case that the board's decision was correct. The manner with which they handled the public relations aspect, however, could have been better. I would assume that the board's silence through these news storms is due to the fact that the case was at trial.

However, when the person being charged is speaking so publicly about the case, and is spinning news stories to suit their side of story, the board should have made sure to educate the public about the nuances and reasons. Unfortunately, from the comments sections of many of the articles as well as a few editorials on the matter, the public is being misled to decry the actions by the board. This example shows how important it is for organizations like Engineers Geoscientists Manitoba to have a voice in the public before cases lead to misguided animosity.

As always, I appreciate comments and discussion about standards issues. If you'd like to talk about the above topic or any other area of concern, please do not hesitate to contact me at: *mgregoire@EngGeoMB.ca.*

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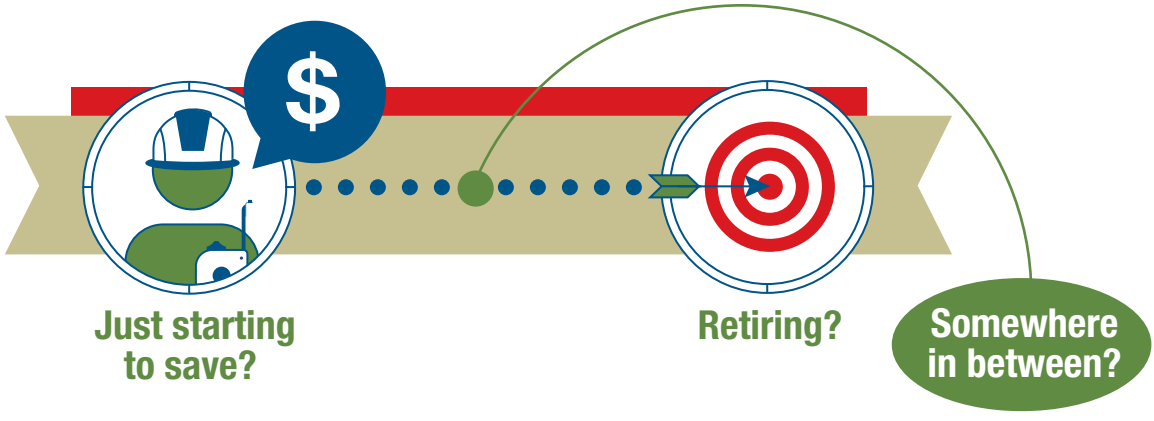

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