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MAY/JUNE 2015

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UNIVERSITY OF WATERLOO

A PRESIDENT FOR THE PROFESSION AND ITS MEMBERS

Thomas Chong, MSc, P.Eng., FEC, PMP
President

I WOULD LIKE to begin this, my first message, by expressing my gratitude for the confidence you have placed in me. You elected me to lead this great profession, which is facing great challenges during a time of immense change in our world. I am both humbled and grateful, and I pledge to provide the leadership, vision and hard work you expect of the president.

Canada's professions are founded on the principle of self-regulation. The reasoning behind this principle is that members of a profession know much better than government what good practice looks like. Our professions have always governed by holding the public interest first. Volunteers from within the profession are what make self-regulation possible. Over the years, I have been one of those volunteers, devoting myself to council, numerous committees and chapters. And now you have asked me to represent you in the association's highest office to represent PEO's 78,000 engineers.

YOUR VICTORY

For some time now, the biggest issues facing PEO have been how to increase the relevance and value of the P.Eng. licence, and how to provide value for our members' hard-earned dollars. For many years, I have heard this from both our chapters and our rank-and-file members. I have always felt our members should view their fees as making an investment, not merely as paying taxes.

For this investment to bear fruit, I need your help and your participation. We need fresh voices to bring their broad experience to council, our committees and our chapters. We need more of our membership to participate in council elections. Our annual budget is $25 million–that's quite an investment you have made. The best way to protect that investment is to take an active part in selecting the councillors who will administer it!

I will work very hard to do my part. I will always be honest with you about the challenges we face. I will listen to you, especially when we disagree. But I will also ask you to join in the work of bringing PEO into the 21st century, raising the prestige of the engineering profession, respecting our members, and fostering partnerships with our strategic stakeholders, including government, industry, communities, the Ontario Society of Professional Engineers, Consulting Engineers of Ontario, Engineers Canada, the Ontario Association of Certified Engineering Technicians and Technologists, the Ontario Association of Architects, and our counterpart professional engineering associations across Canada.

[AS A PRACTISING ENGINEER, I CARE DEEPLY ABOUT THE PROFESSION AND ITS OBLIGATION TO PROTECT THE PUBLIC INTEREST.]

STRONG LEADERSHIP

As a practising engineer, I care deeply about the profession and its obligation to protect the public interest. Our self-regulating model is unique in the world in that professional engineers must have a licence to practise. This is made possible by the many individuals with a strong desire to improve our profession: the more than 900 volunteers who serve on task forces and committees, chapters, our Government Liaison Program, and education, standards and enforcement projects; the wonderful staff who work diligently to execute our regulatory duties and help council make informed decisions; and the councillors sitting at the decision-making table who sacrifice much to advance our profession.

My father, who died some years ago, was a good and decent man. I still remember a couple of things he said that have really stuck with me: "Son, you are either part of the problem, or part of the solution." We need strong leadership to become part of the solution.

NEW VISION

The arrival of the new year brought with it a new vision for PEO. We began implementing our ambitious 2015-2017 Strategic Plan, which determines the priorities for PEO programs and initiatives, and provides guidance for council, committees, task forces and staff over the next three years. To enhance the fiscal accountability of PEO, the annual budget will be aligned to meet the priorities of the organization. Our

association continues to champion strategic collaboration with our valued partners.

A new vision for PEO was solicited and refined as part of the strategic plan development process. Our vision is to be the trusted leader in professional self-regulation. Our mission, the principle object of the *Professional Engineers Act* (PEA), is to regulate and advance the practice of engineering to protect the public interest.

As we approach 100 years of regulating the engineering profession in Ontario, we must continue to evolve and be prepared to overcome the concerns we face. Our strategic plan is a roadmap for how we will meet these challenges and implement the required changes.

Among the plan's strategic objectives are:

- ensuring the practice and title provisions of the PEA are judiciously enforced and continuously improved;
- producing regulations, standards and guidelines through an evidence-based, integrated and streamlined policy-making process;
- optimizing the complaints process, balancing transparency, fairness and timeliness;
- engaging and partnering with key regulatory ministries and industries in engineering public policy development and regulation/act changes, where necessary;
- increasing public respect for the profession and the role of PEO;
- ensuring PEO's governance approach is robust, transparent and trusted;
- engaging PEO chapters in the regulatory mandate of the association;
- integrating equity, diversity and inclusion values and principles into the general policy and business operations; and
- ensuring PEO is recognized as an employer of choice.

WE HAVE TO SET OUR PRIORITIES, DO THE HARD WORK, MANAGE OUR MONEY, REGULATE OUR PRACTICE AND ENGAGE OUR MEMBERS.

VALUE FOR MONEY

PEO is entrusted with the membership fees of our members. We need to:

1. Challenge PEO management to reduce costs and improve efficiency and operational effectiveness;
2. Enhance the self-regulatory function of the profession. This will cover a number of issues, such as precluding non-engineers from doing engineering; more professional guidelines and standards, including the new disciplines; education requirements and improvements to licensure; and more effective enforcement; and
3. Expand PEO's volunteer leadership base with a new communication strategy and engage our members with a shared vision of success for PEO, as defined in the strategic plan. We can get a lot done if you, our members, take ownership of the plan.

ENHANCING PEO's GREATNESS

We live in an age that, arguably, is more dependent on engineers and technology than at any other time in history. In Ontario, Canada's manufacturing heartland, engineers should be front and centre. Yet engineers are rarely acknowledged as the main contributors to our society's progress.

I am of the opinion that addressing this problem requires that we get our own house in order. We have to set our priorities, do the hard work, manage our money, regulate our practice and engage our members. When we do our job well, our stature will grow.

I intend to do *my* job well. Again, I thank you for the confidence you have placed in me. I am relying on each of you to help me make this a watershed year for engineering in Ontario. Σ

ENGINEERING DIMENSIONS

May/June 2015
Volume 36, No. 3

FEATURE ARTICLE

SECTIONS

ASSOCIATION BUSINESS

NEWS AND COMMENTARY

ADVERTISING FEATURES

THE SPARK

Jennifer Coombes
Editor

WHO KNOWS WHAT IT IS, or where it comes from? But each one of the people we interviewed for our innovations feature this issue has it. It's the spark–the drive to make the world a more comfortable, happy, healthy and secure place to live.

In "Inspiring Innovators" (p. 50), we'll introduce you to professional engineers and engineering graduates and students across Ontario who are revolutionizing medical treatments for people living with paralysis, those in developing countries who lack access to vision care, and those who suffer from a variety of diseases and conditions like diabetes and heart disease. Others of them are transforming various areas of our daily lives–better predicting how energy will be absorbed during a car accident to increase the safety of occupants; developing refrigeration technology that, somewhat counter-intuitively, runs on waste heat rather than electricity; and making sure the image quality of the screens we're all addicted to is the best we can perceive. One of them is even building the world's largest functional model of the human brain.

While ingenuity is very much valued in the engineering profession, so, too, is the volunteer spirit. On April 24, the 2015 Order of Honour Awards gala kicked off what's come to be known as PEO's AGM weekend by celebrating the achievements of volunteers who have all given a great deal back to their profession (p. 9). These eight recipients have, like the awardees before them, sacrificed countless hours of their personal time over many years to serve in PEO's chapter system, on committees and on council.

Another notable event during the weekend was, of course, the installation of Thomas Chong, P.Eng., FEC, as PEO president on April 25. Chong's first message as president appears on page 3 and you'll learn much more about what makes him tick in a feature profile to appear in our July/August issue. PEO's first Volunteer Leadership Conference was also part of the packed weekend of events. Full coverage of the AGM and the conference will be published in our July/August issue.

On a slightly self-serving note, I invite you to take part in our 2015 *Engineering Dimensions* reader survey starting May 20. The survey helps us gauge reader satisfaction and assists our advertising efforts. We're once again automatically entering each survey respondent into a draw to win a $600 gift certificate from TryThat (www.trythat.ca), a company that offers experiences of a lifetime. If you receive the digital edition of *Engineering Dimensions*, click the link on page 26 in this issue, or visit PEO's home page (www.peo.on.ca) to take part in the survey. I hope you'll take the time to let us know your thoughts before the survey closes June 17. Σ

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Professional Engineers Ontario

THIS ISSUE: Engineering innovation stories bring credit to the engineering profession, and invite consideration of the profession's role in building and maintaining strong, healthy, vibrant and safe communities. It's difficult not to be inspired by the profiles contained in this issue.

ENFORCEMENT HOTLINE

Please report any person or company you suspect is practising engineering illegally or illegally using engineering titles. Call the PEO enforcement hotline at 416-224-9528, ext. 1444 or 800-339-3716, ext. 1444. Or email enforcement@peo.on.ca.

Through the *Professional Engineers Act*, Professional Engineers Ontario governs licence and certificate holders and regulates professional engineering in Ontario to serve and protect the public.

FORMER PRESIDENT ELECTED **for second term**

By Jennifer Coombes

THE RESULTS ARE IN for the 2015 elections and George Comrie, P.Eng., FEC, will join the ranks of the few multi-term PEO presidents when he takes office at the 2016 annual general meeting. Comrie previously served as president for the 2004-2005 term, and also as elected vice president for the 2012-2013 and 2014-2015 terms. Patrick Quinn, PhD (hons), P.Eng., FEC, also a former PEO president (1999-2000 and 2006-2007), will serve as elected vice president for the 2015-2016 term.

This election, 11 per cent of PEO members voted for the position of president-elect, a position for which all members are eligible to vote. This year represents a decline of 1 per cent over the 2014 council elections.

The new council, including 2015-2016 President Thomas Chong, P.Eng., FEC, and the following newly elected and acclaimed councillors, took office on April 25 at PEO's annual general meeting in Toronto.

- Councillors-at-Large Roydon Fraser, PhD, P.Eng., FEC, and Roger Jones, P.Eng.
- Eastern Region Councillor David Brown, P.Eng., BDS, C.E.T. (acclaimed)
- East Central Region Councillor Changiz Sadr, P.Eng., FEC (acclaimed)
- Northern Region Councillor Dan Preley, P.Eng. (acclaimed)
- West Central Region Councillor Warren Turnbull, P.Eng.
- Western Region Councillor Ewald Kuczera, P.Eng. (acclaimed)

At the first meeting of council on April 25, Bob Dony, PhD, P.Eng., was appointed to the position of vice president elected by and from the members of council, and Rebecca Huang, LLB, and Changiz Sadr, P.Eng., were elected as additional members of the Executive Committee.

HOW YOU VOTED

PRESIDENT-ELECT	
George Comrie	**4664**
Nancy Hill	3406
Anthony Warner	838
VICE PRESIDENT (ELECTED)	
Patrick Quinn	**5176**
Rob Willson	3681
COUNCILLORS-AT-LARGE	
Roydon Fraser	**4727**
Roger Jones	**4054**
Fred Saghezchi	2768
Michael Wesa	2679
Noubar Takessian	2005
EASTERN REGION COUNCILLOR	
David Brown	**acclaimed**
EAST CENTRAL REGION COUNCILLOR	
Changiz Sadr	**acclaimed**
NORTHERN REGION COUNCILLOR	
Dan Preley	**acclaimed**
WESTERN REGION COUNCILLOR	
Ewald Kuczera	**acclaimed**
WEST CENTRAL REGION COUNCILLOR	
Warren Turnbull	**633**
Greg Wowchuk	581
James Chisholm	494
Galal Abdelmessih	278

CHONG takes over as PEO president at 2015 AGM

Outgoing President David Adams, P.Eng., FEC, congratulates and passes the ceremonial gavel to incoming President Thomas Chong, P.Eng., FEC, at PEO's annual general meeting April 25 in Toronto. Full coverage of the meeting will be included in the July/August 2015 issue of *Engineering Dimensions*.

ORDER OF HONOUR 2015

recognizes eight extraordinary volunteers

By Jennifer Coombes

On April 24, the Westin Harbour Castle in Toronto was the setting for a black-tie gala to celebrate the volunteer achievements of eight professional engineers–the Order of Honour Awards. The Order of Honour is PEO's honorary society that recognizes extraordinary service to the profession. Most recipients of the awards have dedicated years, if not decades, to the profession.

Christopher Yuen Fun Kan, P.Eng., FEC, was elevated to the rank of officer, while Oscar R. Avila, P.Eng., MBA; Michael Kwok-Wai Chan, P.Eng.; Tapan Das, PhD, P.Eng.; Sucha Singh Mann, P.Eng., FEC, PMP; John Simmonds, P.Eng., FEC; Vera Straka, P.Eng.; and N. (Madu) Suthanan, P.Eng., FEC, were inducted as members.

Nancy Hill, LLB, P.Eng., chair of the Professional Engineers Awards Committee, said: "Through their diligent work, tonight's inductees have raised awareness of the value of the engineering profession in Ontario, provided leadership to the profession, and served as mentors to young minds."

David Adams, P.Eng., FEC, then PEO president, added: "Tonight we celebrate the dedication of eight individuals to the service of our profession. Over many years, each has made outstanding volunteer contributions to the profession and the association."

The evening was attended by many guests, including Digvir Jayas, P.Eng., FEC, president-elect, and Kim Allen, P.Eng., FEC, CEO, Engineers Canada; Danny Young, P.Eng., president and chair, and Sandro Perruzza, CEO, Ontario Society of Professional Engineers; David Bannister, P.Eng., chair, Consulting Engineers of Ontario; Ann English, P.Eng., CEO and registrar, Association of Professional Engineers and Geoscientists of British Columbia; Andrew Loken, P.Eng., FEC, president, and Dennis Paddock, P.Eng., FEC, executive director and registrar, Association of Professional Engineers and Geoscientists of Saskatchewan; Marcia Friesen, P.Eng., FEC, past president, Association of Professional Engineers and Geoscientists of Manitoba; Anna Godo, P.Eng., president, and John Simmonds, executive director, Municipal Engineers Association; Toon Dreessen, B.Arch., president, Ontario Association of Architects; Bob van den Berg, C.E.T., president-elect, and David Thomson, CEO, Ontario Association of Certified Engineering Technicians and Technologists. Bas Balkissoon, MPP (Scarborough-Rouge River) also attended.

Following are some notable quotes from the awardees' acceptance speeches:

"When I reflect about what it means to be a volunteer, it is basically the ability to help people who need help. And that's why I love being a volunteer with PEO. That's why I love being here. Thank you for having this event and allowing me to feel special tonight.
Oscar R. Avila, P.Eng., MBA

"It gives me great pleasure to stand here tonight to receive this honour. I'm both honoured and humbled. Based on my 30 years as a PEO volunteer, eight years as [PEO] staff, and eight more years as a volunteer, I want to share with you some of my thoughts and experience: PEO needs all of you to be volunteers. If we don't have volunteers it will cost you a lot more to be a member. So keep on volunteering. One can learn a lot by volunteering, which will be of great benefit to yourself and your future career."
Michael Kwok-Wai Chan, P.Eng.

"I sincerely thank Professional Engineers Ontario for investing me in the Order of Honour. I've had the opportunity of meeting many people from whom I've learned a lot. I would like to thank those who helped to make the [PEO] Mentorship Program a success. Lastly, and most importantly, I dedicate this award to my late, dearest wife Samira, whose love, care and inspiration were behind everything I've done with my life. Once again, thank you all for your support and friendship."
Tapan Das, PhD, P.Eng.

"It's a real honour to be part of the professional engineers. Professional engineering teaches us how to be accountable for everything we design by backing the facts. In my work life and home life, I've always been impressed by energy efficiency and recycling. There is a lot we can learn from each other to make a minimum impact on our environment. Over the years my chapter colleagues have supported me organizing sustainable technical seminars and workshops. The chapter executive has been a real supporter for us to bring awareness to the public on sustainable technology to our colleagues and the public."
Sucha Singh Mann, P.Eng., FEC, PMP

"Having been to many of these events, I've often wondered what it would be like to be up here. For those who haven't come up, it's indeed a pretty humbling experience. There's nothing finer than acknowledgment of service from your peers and I'm very grateful for that. With volunteering you always get more out of it than what you put in. You're dealing with like-minded people, logical people. And I'm

Eight professional engineers were inducted into PEO's Order of Honour at the April 24 gala in Toronto: N. (Madu) Suthanan, P.Eng., FEC (member); John Simmonds, P.Eng., FEC (member); Sucha Singh Mann, P.Eng., FEC, PMP (member); Vera Straka, P.Eng. (member); Christopher Yuen Fun Kan, P.Eng., FEC (officer); Tapan Das, PhD, P.Eng. (member); Oscar R. Avila, P.Eng., MBA (member); and Michael Kwok-Wai Chan, P.Eng. (member).

always blown away by the quality and the service of the young engineers coming up."
John Simmonds, P.Eng., FEC

"Thank you to PEO for recognizing my humble contribution to the organization. Thank you to my many deans at the faculty of engineering and architecture for supporting activities associated with promoting engineering to young girls at various levels of schooling. This recognition is very precious for me and I take it as an encouragement to continue my work with PEO. My first commitment is to increase the diversity in the engineering profession. I fully support the Engineers Canada 30 by 30 goal that is the commitment to have 30 per cent of new licences granted to women by 2030. Thank you to PEO for this honour."
Vera Straka, P.Eng.

"Today I'm deeply honoured and feel so humbled. When I came to Canada in 1996, I came with great enthusiasm. My friends said, 'Don't apply to PEO, you will never get in.' But thanks to other people who guided me, I applied and I got my licence. When we volunteer we get nothing, no financial return. But you are helping other engineers come up. So, I would say volunteering is one of the best things. When I was born, my father told my mother, 'I want my son to be an engineer.' My mother said, 'Don't dream impossible dreams.' But today, thanks to PEO and the Awards Committee, I think this dream has come true."
N. (Madu) Suthanan, P.Eng., FEC

"I'm humbled to receive this honour. None of these achievements are possible without my friends, my fellow volunteers, from the chapter and committees, as well as all the PEO staff that work alongside all of us. To get this award actually is not all my work– it's a combination of a lot of people's effort and dedication. My brother encouraged me, sometimes relentlessly, to choose engineering as my career. Without him, I might not be standing here today. Working as a PEO volunteer has been very rewarding for me. I made many friends and have learned many things. It has been fun. Thank you for the opportunity and thank you all."
Christopher Yuen Fun Kan, P.Eng., FEC

QUEEN'S GRADUATE 2015 STERLING AWARD RECIPIENT

Emma Barlow, EIT, was presented with the 2015 G. Gordon M. Sterling Award, which celebrates professional leadership achievements of engineering graduates. Barlow received the award to recognize her commitment to the profession through extensive volunteer work. On accepting her award, she said: "I couldn't have been more pleased and surprised when I opened my mailbox to find a letter from PEO congratulating me on winning this award. I'd like to thank the Sterling family and Gordon Sterling for his passion in encouraging young engineers to take their places in society, and his belief in developing leadership skills in young professionals. The role of an engineer goes beyond crunching numbers and the technicalities of design. Engineers are influencers and world changers, but they don't appear overnight. They appear through the development of skills, by being in an environment that promotes continual growth, and being surrounded by people who continually challenge and encourage them. I feel very blessed to have won this award."

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MINISTRY GETTING P.ENG. INPUT on building safety plan

By Michael Mastromatteo

ENGINEERS ARE ASSISTING Ontario's housing ministry in responding to the Elliot Lake Commission of Inquiry.

The Ministry of Municipal Affairs and Housing's (MMAH) Building Safety Technical Advisory Panel (BSTAP) was struck late last year as recommended in the report of the Elliot Lake inquiry.

Headed by retired Ontario justice Paul Bélanger, the inquiry was commissioned in the wake of the June 2012 partial roof collapse at the Algo Centre Mall in Elliot Lake, Ontario. The collapse killed two Elliot Lake residents, injured several others and created severe economic disruption to the northern Ontario community.

The commission released its final report October 15, 2014, and recommended that the housing ministry, municipal officials, building inspectors and professional associations all work to improve building safety in the province.

Recommendation 1.16 of the commission report calls for creation of an advisory panel of experts to consider a building safety inspection regime. The housing ministry panel is to make its own recommendations by October 2015.

In November, housing ministry officials met with PEO to ask for the names of structural engineering specialists to be invited to join the panel. Chris Roney, P.Eng., BDS, FEC, a then-member of PEO council, and Will Teron, P.Eng., of Guelph-based Tacoma Engineers, subsequently agreed to be part of the BSTAP.

The housing ministry has special interest in the Elliot Lake inquiry as it is the body responsible for enforcing Ontario's building code.

Although Roney and Teron are PEO members, they do not represent the regulator on the BSTAP.

The advisory panel held its first meeting April 11 to review its terms of reference and work plan. A key consideration for the panel is to establish risk categories for existing large buildings in the province and timeframes for safety inspections.

PEO's own Elliot Lake Advisory Committee, on which Roney sat, was charged with developing the regulator's response to the inquiry. During the inquiry, PEO presented 11 building safety and inspection recommendations, many of which were adopted in the final report (see "Elliot Lake Commission releases report, adopts many PEO recommendations," *Engineering Dimensions*, November/December 2014, p. 8 and "After the fall: Learning the lessons of Elliot Lake," *Engineering Dimensions*, January/February 2015, p. 30).

National ENGINEERING Month

NEM sparks inspiration IN YOUTH

By Alan Ham and Erica Lee Garcia, P.Eng.

It was truly a mighty March as volunteers across Ontario spent their time spreading the message about the profession during National Engineering Month (NEM) 2015. This year's theme, "Make a world of difference," was highlighted in all of the 280 NEM-funded events, sparking inspiration in elementary and high school youth, delighting their interested parents, and informing the general public about the role engineering plays in shaping the world around us.

Through the continued partnership among Engineers Without Borders, the Ontario Association of Certified Engineering Technicians and Technologists, the Ontario Society of Professional Engineers and PEO, a groundswell of activities were held in schools, colleges and universities, malls, libraries and community centres across Ontario. The 280 events would not have been possible without NEM 2015's generous sponsors, as well as the passionate volunteers who devoted their time and expertise to make these events possible, and who are role models for the future generation of innovators.

NEM 2015 saw many new and creative outreach events run by PEO chapters that reflected a broader scope of what engineering is and the value the profession has to society and the environment. PEO's Brantford and Niagara chapters joined in on the fun this year, running events for the first time with great success. The Oakville Chapter received innovation funding for their event, Change the World, and the Lake Ontario Chapter kicked off a special new outreach event called Go CODE Girl.

Coverage for the events exceeded the 2014 media push. Beyond traditional media, #NEM2015 made quite an impact on social media. Live tweets, photos and video clips took over newsfeeds and showed Ontario and the rest of Canada that National Engineering Month is not just a celebration of

engineering, but also a reflection of a thoughtful and inclusive profession.

The NEM website features a blog (nemontario.ca/blog), with coverage and photos of NEM events. New for this year, the site features an Innovator of the Week series that profiles engineering professionals making unique contributions to the profession. You can also search on social media sites Twitter and Facebook under @NEMOntario.

Preparations for NEM 2016 begin when chapters include an event budget in their business plan in June. Applications for the next outreach events are due to the National Engineering Month Ontario Steering Committee in November 2015. Please contact Erica Lee Garcia, P.Eng., at nem@peo.on.ca with comments or questions. We look forward to a successful 2016 campaign!

Laurentian University students put together an interactive display at Sudbury Chapter's booth March 7 at the New Sudbury Shopping Centre.

Excitement was high at Grand River Chapter's Mathletics competition March 28 at Conestoga College. The competition invited young people to apply mathletics to real-life engineering situations, helping to build their confidence and interest in the engineering profession.

On March 26, PEO's York Chapter hosted an Engineering Design Challenge for grades 7 and 8 students in York Region. The students teamed up to design and build drag racers and then tested them against other teams' designs. Judging was based on problem solving, design, construction and performance.

INROADS TO POLICY DEVELOPMENT realm still elusive for P.Engs

By Michael Mastromatteo

Professional engineers should insist on a more active role in public policy development rather than waiting for invitations from those setting the policy-making agenda, said participants at the March 30 "Engineers Want In" symposium at Ryerson University in Toronto.

Organized by Ryerson, the symposium was aimed at discussing strategies to "amplify the voice of engineering" in the public realm. PEO Registrar Gerard McDonald, P.Eng., and Sandro Perruzza, CEO, Ontario Society of Professional Engineers (OSPE), co-chaired the event.

More than 150 participants, and 18 presenters with experience in government, policy-making, media relations, engineering education and stakeholder engagement, took part in the day-long session.

Omar Alghabra, P.Eng., a distinguished visiting fellow at Ryerson and Liberal party candidate in the next federal election, was a key organizer of the conference.

"I've often wondered why engineers tended to be absent in many public conversations," Alghabra told *Engineering Dimensions*. "I've always felt engineers bring an informed perspective that can be very helpful, yet are typically silent. I wanted the conference to bring subject matter experts who can tackle that quandary and offer advice to engineers on how they can increase the presence of their voice."

In his opening remarks, McDonald said PEO, as the licensing body, has to walk a fine line between regulation and advocacy of the profession. Nonetheless, he said, there is a strong need for PEO to work with other engineering organizations to bring a consistent message to government and policy-makers, namely that the profession has a central role to play in the public domain.

Perruzza seconded the profession's solid front approach to policy influence. "Politicians respect engineers but they don't fear them," Perruzza said, "because we're seen as a divided profession that hasn't done much communicating about its societal role."

Rather than waiting for invitations for input, engineers have a moral obligation to take part in the development of public policy, especially around the best use of science and technology, he said.

The March 30 Engineers Want In symposium included the role of educators in fostering debate on the engineering-public policy link. From left to right are Omar Alghabra, P.Eng., moderator; Brenda McCabe, PhD, P.Eng., University of Toronto; Pearl Sullivan, PhD, P.Eng., University of Waterloo; Robert Hardt, president and CEO, Siemens Canada; Tom Duever, PhD, P.Eng., Ryerson University; and Andrew Hrymak, PhD, P.Eng., University of Western Ontario.

The conference was divided into separate sessions on policy/opinion setting, media relations, stakeholder engagement and the role of universities in preparing the next generation of more socially engaged engineering practitioners. Each session ended with a question and answer exchange between audience and presenters.

VALUES CONVERSATION

In discussing ways for engineers to extend their influence, Karim Bardeesy, deputy principal secretary to Ontario Premier Kathleen Wynne, suggested a "values conversation" within the wider engineering community should precede any attempt to gain access to policy development officials. He said it would be helpful for engineers interested in public policy to study the government's general policy agenda and to then interact with deputy ministers to lend more specific policy advice.

More sophisticated media relations also dominated much of the discussion at the symposium. Public relations expert Jaime Watt of Navigator Ltd. said recent media monitoring studies indicate that professional engineers are cited in only 1 to 2 per cent of Canadian news stories. Meanwhile, Bob Hepburn, director of community relations and former editorial page editor at *The Toronto Star*, said a search of his own newspaper found only seven references to engineering associations over the last several years of daily news reporting.

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"A lot of reporters and editors just don't see engineers as good resource people," Hepburn said, adding that the profession would benefit from a few lessons on how to present engineering information in a way that's relevant and engaging to reporters and to local communities.

The profession's image, as both a source of news and as a contributor to technically informed public policy was a recurring theme throughout the symposium.

Tom Duever, PhD, P.Eng., dean of Ryerson's faculty of engineering and architectural science, said negative stereotypes of engineers need to be addressed. "As a chemical engineer, that is not the identity that inspired me to become an engineer, and it is certainly not the image I have of the students and colleagues I have had the privilege of working with over my career," Duever said. "I believe that engineers are highly skilled, engaged and adaptable professionals who make meaningful and sustainable impacts on Canada's prosperity. However, I am not blind to the fact that the negative public perception of the engineering community is based in and continues to grow out of a real lived experience. I feel it is important to examine our weaknesses, both real and perceived, and strive to do better."

Duever's observations tied in with the panel devoted to engineering education and public engagement. Panelists Duever, Pearl Sullivan, PhD, P.Eng., dean of engineering, University of Waterloo, Brenda McCabe, PhD, P.Eng., acting dean of engineering, University of Toronto, and Andrew Hrymak, PhD, P.Eng., dean of engineering, Western University, discussed ways to instill a "citizen engineer" mentality at the undergraduate level. Engineering educators were joined on the panel by Robert Hardt, president and CEO, Siemens Canada.

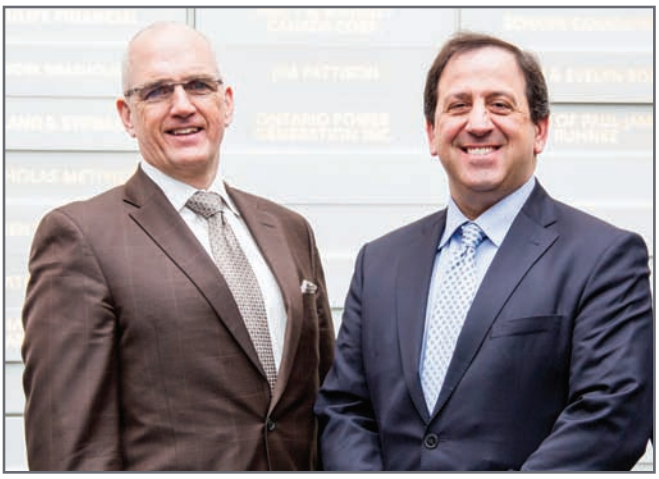
Panelists also discussed how a negative image of today's engineer could impact recruitment of the next generation of practitioner.

"The degree to which engineers lack direct interaction with people, both in real life and in media, has contributed to a negative stereotype of engineers as isolated technocrats," said Duever. "This identity runs counter to the aspirational identities of most adolescents, but is especially unappealing to girls."

INFLUENCE STILL LACKING

Panelists and participants were generally impressed with the ideas exchanged at the symposium.

"I thought the conference was interesting and confirming of some impressions I had about how those working in media and policy view engineering as a profession," said Hrymak. "At the same time, I was surprised how little influence engineers and the professional groups had on contributing to significant public policy decisions, especially where engineers would play a major part in implementation."



PEO Registrar Gerard McDonald, P.Eng. (left), joined OSPE CEO Sandro Perruzza in offering opening remarks at the March 30 Engineers Want In symposium at Ryerson University.

Stephanie Theriault, a master's student in McMaster University's engineering and public policy program (MEPP), said combining engineers' problem-solving ability with greater openness to the contributions of other stakeholders might improve the profession's influence on policy development. "One of the primary takeaways from the conference was that engineers need to feel their opinion is valued, but also understand that it's just one of many perspectives the policy-makers need to consider," Theriault said. "The conference highlighted that engineers are natural problem solvers, and in my work experience the number one obstacle I faced in implementing great solutions was usually policy-related. I believe the key to getting engineers engaged in policy is to encourage interdisciplinary collaboration and offer formal training on the diverse career avenues for engineers, which starts with education."

Sullivan suggested the Engineers Want In symposium could lead to more interaction between government and the profession on the policy development front. "In spite of the cost and future impact of policies, the question remains: 'How many engineers have provided input in a policy-making process?'" Sullivan said. "It will take two sides to make this work–engineers wanting to provide input and governments wanting input from engineers."

The effort to increase engineers' impact on public policy development should be of ongoing concern to PEO and OSPE, said Alghabra. "If the engineers want to make a change, we need to bring together all stakeholders, including the regulator, professional associations, educators and practitioners," he told *Engineering Dimensions* April 6. "We need to break down real and perceived barriers and talk amongst each other."

Alghabra said Ryerson will produce a written report and video of the symposium, which will be shared with participants and stakeholders.

Success of Pan Am Games
RESTS ON ENGINEERING GROUNDWORK

By Michael Mastromatteo

Presenters at the 2015 Engineering Innovation Forum (left to right) Douglas Birkenshaw, B.Arch., B+H Architects; David Kirkland, P.Eng., vice president, Kenaidan Contracting Ltd.; and Jeff Miller, P.Eng., manager of engineering design, University of Toronto.

The engineering challenges involved in staging international events dominated discussion at the 2015 Engineering Innovations Forum (EIF).

Held March 26 at its customary Ontario Science Centre location, the forum this year examined the constraints faced by engineers and architects in building the leading-edge athletic facilities to host this summer's Pan Am Games in Toronto.

Presenters at this year's forum were Douglas Birkenshaw, B.Arch., B+H Architects, David Kirkland, P.Eng., Kenaidan Contracting Ltd., and Jeff Miller, P.Eng., manager of engineering design, University of Toronto (Scarborough campus).

Signa Butler, CBC senior writer and on-air host of several Olympics and international games broadcasts, moderated the event. Butler was introduced by Paul Annis, C.E.T., chair of the 2015 Engineering Innovations Forum.

In addition to the technical and design challenges related to building Olympic-calibre sporting venues, speakers described some of the social challenges they faced in preparing for the Pan Am games.

In particular, games officials were always cognizant of how the auditoriums, swimming pools, race tracks

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2015 EIF committee members and presenters included (seated, left to right): Signa Butler, Douglas Birkenshaw, B.Arch., and Jeff Miller, P.Eng., and (standing, left to right) Sharon Rashid, P.Eng., Katie Pfisterer, Andrew Lee, Rajiv Rattan, P.Eng., Pat Scanga, P.Eng., Paul Annis, C.E.T., Noorein Ladha, P.Eng., David Kirkland, P.Eng., and Paul Di Novo, P.Eng.

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and related facilities would benefit local communities long after the games conclude. In Milton, southwest of Toronto, for example, Kenaidan Contracting is completing work on the Cisco Milton Velodrome, site of the Pan Am and ParaPan Am high performing cycling events.

Meanwhile, University of Toronto (U of T) officials are putting finishing touches on the CIBC Pan Am Aquatics Centre and Field House, the largest new-build facility for the games, and the single largest investment in Canadian amateur sport history.

Designing and building such venues requires innovative financing and procurement efforts to reduce the burden on local communities in operating and maintaining the facilities for the future, the panelists said.

In his "games versus legacy" presentation, Birkenshaw emphasized that financing and budgeting for the games venues adhered closely to Infrastructure Ontario's procurement guidelines. A key to the planning, he added, was that all new facilities bring lasting value to local communities and not become underused "white elephants" once the games are finished.

Later, Miller described how engineering input is a key component of the advance work for projects like the Pan Am games.

"An engineering mindset can add efficiency and rigour to the project development stage as its problem-solving basis can be vital to identifying the key challenges/barriers of the project early on," he told *Engineering Dimensions*. "This is vital in documenting community core concerns impacting the project when they can be most fully evaluated, and implemented in the most effective manner."

Miller said games planners want to leave a lasting legacy of sustainable, reliable facilities that have long-term value to participating communities.

The EIF debuted in 2003 with the goal of raising public awareness of the role of engineers in bringing science and technology together for the public good. The forums also aim to encourage students and young people to consider careers as engineers, technicians or technologists.

Engineered transit solutions highlighted at YORK CHAPTER SYMPOSIUM

By Michael Mastromatteo

ON MARCH 25, PEO's York Chapter convened a day-long Engineering the Future of GTA Transportation symposium, which drew more than 350 people to the Markham Event Centre, northeast of Toronto. The event included presentations from municipal officials, consulting engineers, automotive innovators and transportation authorities.

PEO Registrar Gerard McDonald, P.Eng., offered opening remarks on behalf of the regulator. He said it's a special engineering challenge to ensure that a multi-faceted and increasingly complex transportation network operates holistically at a time of increasing population density and lack of investment in existing transportation infrastructure.

Others to address the gathering included Markham Mayor Frank Scarpitti; Metrolinx President and CEO Bruce McCuaig; Charles Halasz, P.Eng., head of rail electrification, Siemens Canada; Jonathan Hack, P.Eng., Bombardier Aerospace; Paul May, P.Eng., York Region Rapid Transit Corporation; and Ersoy Gulecoglu, P.Eng., head of the Metrolinx sustainability team.

Federal Transportation Minister Lisa Raitt, Toronto Mayor John Tory, and TTC Chair Andy Byford were all invited to the symposium, but unable to attend.

In addition to an overview of the transit situation in the greater Toronto area (GTA), the symposium offered insights into various modes of travel, including car and rail, public transit developments, and eco-friendly air traffic.

Presenters emphasized the challenges faced by engineers and policy-makers in easing traffic congestion and providing alternatives to car travel. McCuaig, for example, described the GTA as a "region under pressure," with the average commute times for area residents now the longest in all of North America.

Metrolinx is the provincial government-created agency charged with coordinating public transit options for the greater Toronto-Hamilton area, and employs more than 50 professional engineers.

Scarpitti later lamented the fact that Canada is the only G8 nation without a national transportation strategy, and urged engineers to use

Kam Leong, P.Eng. (right), an engineer with Metrolinx, discussed electric car technology as part of the March 25 transit symposium organized by PEO's York Chapter. With Leong are Jessica Mahon of the transportation ministry and Richmond Hill city councillor Greg Beros.

PEO Chapter Manager Matthew Ng, P.Eng. (left), attended York Chapter's transit symposium, along with past chapter chair Dennis Woo, P.Eng. (centre), and secretary Patrick Yeung, P.Eng.

their influence to lobby governments and policy-makers to dedicate more resources to transit solutions.

Anticipating the impact of innovation in the transit sector, the event also featured discussion of such disruptive technology as driverless vehicles, which could have a profound impact on commuting and transportation patterns over the next few decades.

Dennis Woo, P.Eng., York Chapter past chair and a member of the symposium organizing committee, said the event was organized to bring together engineers, policy-makers and other urban planners in a non-partisan forum to discuss far-reaching transportation issues.

"Engineers are uniquely suitable to organize such an event because of our close proximity to the operation of everyday transportation," Woo said. "Not only do engineers ensure the continuous operation of our transit system, we offer a unique perspective to policy-makers and urban planners to arrive at better and more economical transportation plans."

Woo said York Chapter has been especially active in building relationships with businesses and organizations in York Region, especially those hiring engineers.

"This strategy allows us to develop trust between them and PEO York Chapter," Woo added. "With the trust we built, [businesses] are more receptive to our ideas and are more willing to attend our events.

[IN MEMORIAM]

THE ASSOCIATION HAS RECEIVED WITH REGRET NOTIFICATION OF THE DEATHS OF THE FOLLOWING MEMBERS (AS OF MARCH 2015).

ADAMS, Derek Arthur
London, ON

ALDI, Richard Gordon
Windsor, ON

ANDREWS, Arthur Gary
Sudbury, ON

ASHBAUGH, Philip Gardner
Burlington, ON

AUS, Heiki
Bowmanville, ON

BABBS, Arnold Gary
Belleville, ON

BAKER, Thomas Joseph
Sudbury, ON

BANFIELD, Leonard Charles
Burlington, ON

BARKOVITS, Geza Kalman
Stittsville, ON

BARNARD, Alfred Francis
Dundas, ON

BELLAMY, Graham
Guelph, ON

BELTRAN, Rowena
Mississauga, ON

BERGER, Josif Zwi
Dollard-des-Ormeaux, QC

BEVERIDGE, William Stanley
Ottawa, ON

BLUE, Robert James
Bethlehem, PA

BOGOSLAVOV, Sonja
Toronto, ON

BOLLIGER, Emil
Kanata, ON

BOROVOY, William Fredrick Godfrey
Ramat Hasharon, Israel

BROWN, Robert Ronald
West Kelowna, BC

BROWN, Stephen Robert
Mount Albert, ON

BUCHANAN, George
Carleton Place, ON

BURNFIELD, Roye George
Markham, ON

BURROWS, David Ross
Richmond, BC

CAMPBELL, William Ralph
Oakville, ON

CANN, George Brown
Aurora, ON

CASWELL, Ralph Secord
Toronto, ON

COCKBURN, Paul Grenville
Unionville, ON

CORPUZ, Pacifico Gabriel
Stoney Creek, ON

COXALL, Norman
North York, ON

CUMBERLAND, Neville Colgate
Burlington, ON

CURLOOK, Walter
Toronto, ON

CUTHILL, James Ivan
East Gwillimbury, ON

CZEGLEDY-NAGY, Kalman
Toronto, ON

DALTON, Eric Leslie
Calgary, AB

DAVIDSON, James Keith
Uxbridge, ON

DAWKINS, Christopher Derek
Sarnia, ON

DE VRIES, Charles Hendrik
Petawawa, ON

DEAN, James Guthrie
Ottawa, ON

DEBICKI, Richard Edward
Hamilton, ON

DHANANI, Narendra Manilal
Secaucus, NJ

DICK, Neal Jacob
Kingston, ON

DIGNUM, Raymond
Kingston, ON

DINKOFF, Christo
North York, ON

DIXON, Donald Frank
New Westminster, BC

DONAGHY, Jack Williamson
Bath, ON

DOW, Dalton George
Kelowna, BC

DRAGAN, Ioan Gheorghe
Milton, ON

DROHAN, John Francis
Etobicoke, ON

DUNCAN, Norman M.
Bethany, ON

DUNCAN, William Todd Erskine
Toronto, ON

DWORSKI, Don K.
Toronto, ON

DYKES, Hedley Owen
Waterloo, ON

ESTILL, Don Dwight
Guelph, ON

FAZIO, Paul Palmerino
Pointe-Claire, QC

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FROATS, Allan
Renfrew, ON

FUJII, Roy Yoshio
Etobicoke, ON

GALLANT, Basil Alyre
North Rustico, PE

GERSON, Frederick
Mississauga, ON

GIBSON, Roy Michael
Orono, ON

GOURLEY, Ronald James
Kingston, ON

GREEN, Murray Abrey
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Oakville, ON

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Milton, ON

HATCH, Gerald Gordon
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HATCHER, Stanley Ronald
Terra Cotta, ON

HAYWARD, Allen George
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HURST, Lionel
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KING, David Edward Charles
Kanata, ON

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Hawkesbury, ON

LAMOUREUX, Raymond John
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Port Rowan, ON

LOUNSBURY, Thornton Bendon
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North York, ON

YOUNG, Arthur John
Kincardine, ON

YUST, Leonard John
Burlington, ON

ONTARIO ENGINEERS RECEIVE INTERNATIONAL ACCOLADES

By Nicole Axworthy

Molly Shoichet, PhD, LEL, professor, University of Toronto (U of T), has been named this year's Women in Science North American laureate from UNESCO and the L'Oreal Foundation. Shoichet is at the leading edge of innovations in the field of tissue engineering and drug delivery. The award recognizes accomplished female researchers and encourages more young women to enter science and technology careers. Each year, five women in science from all regions of the world are honoured with the $140,000 prize.

Milica Radisic, PhD, P.Eng., professor, Institute of Biomaterials and Biomedical Engineering, U of T, has been inducted into the American Institute for Medical and Biological Engineering's College of Fellows. She was nominated, reviewed and elected by peers and members of the College of Fellows to recognize her innovative research on the design and laboratory development of heart tissue.

The Natural Sciences and Engineering Research Council of Canada recently presented its 2015 awards, recognizing the work of outstanding Canadian scientists and engineers. **Chris Eliasmith, P.Eng.,** of the University of Waterloo, won the Gerhard Herzberg Canada Gold Medal for Science and Engineering. **Michael Kovacs, EIT,** of Western University, is a recipient of the Brockhouse Canada Prize for Interdisciplinary Research in Science and Engineering. **Aaron Wheeler, EIT,** of U of T, is a recipient of an E.W.R. Steacie Memorial Fellowship. **Robin Sinha, P.Eng.,** received a Synergy Award for Innovation in the two or more companies category, for work with CanmetENERGY and Natural Resources Canada.

The Engineering Institute of Canada (EIC) has announced the 2015 recipients of its honours, awards and fellowships. **Jon Jennekens, P.Eng.,** has been awarded the Sir John Kennedy Medal, the senior award of the institute, for his outstanding service to the engineering profession. **Edward Arthur McBean, P.Eng.,** has been awarded the K.Y. Lo Medal for significant engineering contributions at the international level. **Wahab Almuhtadi, P.Eng.,** has been honoured with the Canadian Pacific Railway Engineering Medal for years of leadership and service to the institute at the regional branch and section levels. The following new fellows of EIC were inducted for their exceptional contributions to engineering in Canada: **Baher Abdulhai, P.Eng., Ramachandra Achar, P.Eng., Colin Clark, P.Eng., Mark Stephen Diederichs, P.Eng., Branislav Djokic, P.Eng., Richard Hornsey, PhD, P.Eng., Amir Khajepour, P.Eng., Janusz A. Kozinski, PhD, P.Eng., Manov Sachdev, P.Eng.,** and **David Sinton, P.Eng.**

Molly Shoichet, PhD, LEL, has received a Women in Science award from UNESCO and the L'Oreal Foundation.

Milica Radisic, PhD, P.Eng., was inducted into the American Institute for Medical and Biological Engineering's College of Fellows. Photo: University of Toronto.

PEO President **Thomas Chong, P.Eng., FEC,** was awarded the 2014 ACE (Achievement, Commitment, Excellence) Award for his work as an engineer in the Ministry of Health and Long-term Care. The award recognizes and celebrates the best employee achievements in the ministry.

CALL FOR ENTRIES

Entries are sought for the 2015 James Dyson Award. The James Dyson Award is an international student design award running in 20 countries worldwide. Industrial design and engineering students, working alone or in teams of up to four, are invited to submit their best product concepts or ideas for something that solves a real problem. The international prize is $54,000 for the student(s), and $9,000 for the student's university department. Two international runners-up receive $9,000 each. National winners receive $3,600 each. Entries close on July 2, 2015. For information, visit www.jamesdysonaward.org. Σ

IS THERE A NEED FOR IMPROVED PUBLIC AND WORKER SAFETY FOR PETROLEUM REFINERIES?

By Scott Grant, P.Eng.

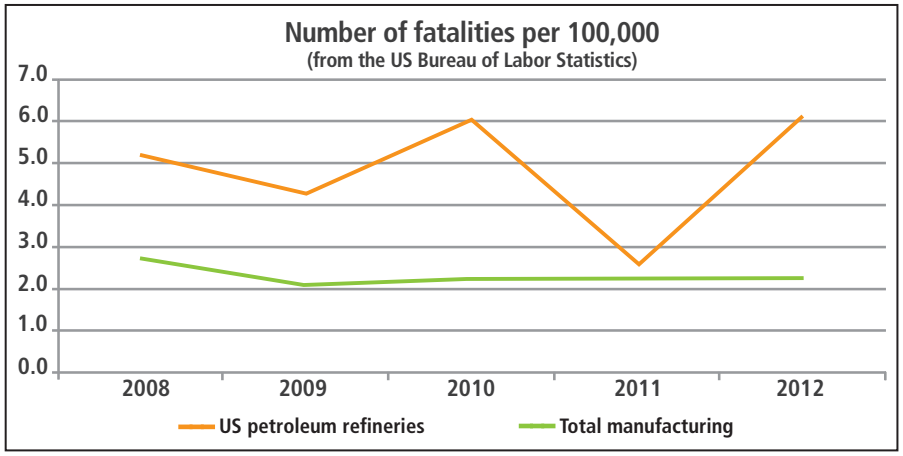
ONTARIO CENTRE FOR ENGINEERING AND PUBLIC POLICY

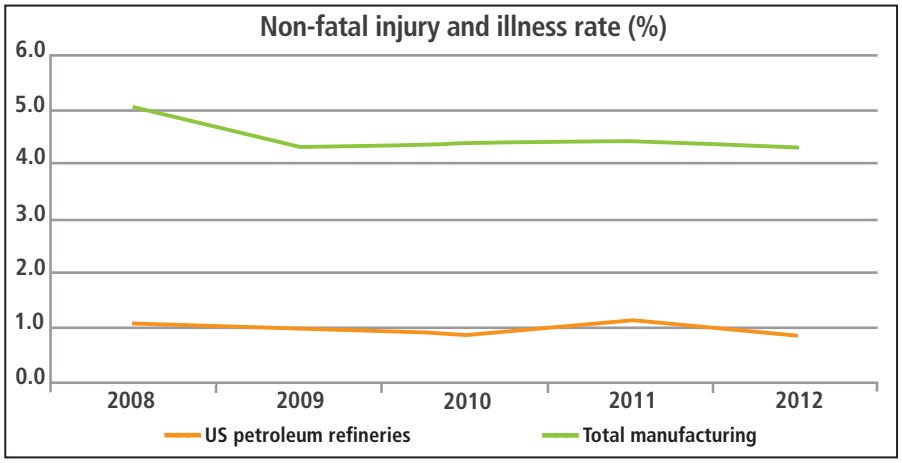
A SERIES OF incidents at petroleum refineries in the US and subsequent investigations by the United States Chemical Safety Board resulted in a review by the state of California of risks to worker and public safety from petroleum refineries.

There are six petroleum refineries in Ontario: four in the Sarnia area, one in Nanticoke and a smaller one in Mississauga. Should a similar review of worker and public safety be conducted for Ontario petroleum refineries?

INVESTING IN SAFETY

The business of refining crude oil is complex and profitability requires balancing many different factors and inputs. The varying nature of the crude oil input to a petroleum refinery and such aspects as density, sulphur content and price create both engineering opportunities and challenges.





Worker safety and minimizing risk to surrounding communities have always been important considerations for petroleum refining engineering and operations due to the inherently hazardous nature of the raw materials and fuel produced. For example, the figures presented here were developed from US Bureau of Labor Statistics data and provide an illustration of both the inherent dangers and significant workplace safety successes of the petroleum refining industry. Information from the Ontario Workplace Safety Insurance Board suggests that lost-time claims as a result of accidents or illness for 2013 are relatively low for areas of the province where petroleum refineries are located.

In both Canada and the US there are comprehensive standards for piping, pressure vessels, transportation systems and fuel safety, and they work together toward the objective of reducing risk and improving system predictability. In addition, process hazard analysis is a common and ongoing activity to ensure the safe and profitable operation of petroleum refineries. Regulatory oversight for the manufacturing and transport of fuels is provided by a number of agencies with different roles from the Ontario ministries of labour and environment; to the Technical Standards and Safety Authority; to the federal departments of transportation and environment; and the Transportation Safety Board of Canada.

However, safety is not a static concept. Managing safety risks involves keeping abreast of changes in raw materials, manufacturing processes and aging equipment, and expanding knowledge based upon experience and past incidents in the sector. Changes in the

character of the crude oil input to petroleum refineries are anticipated to be factors that affect the safety of transportation systems and refining processes.

RECENT INCIDENTS AND A CALL FOR APPLYING LESSONS LEARNED

On August 6, 2012, the Chevron petroleum refinery in Richmond, California, experienced a catastrophic pipe failure in the crude unit and there was a subsequent release of flammable hydrocarbon process fluid. Nineteen Chevron employees were engulfed by the resulting vapour cloud and serious injury was narrowly avoided when the cloud ignited. The resulting fire took a number of days to extinguish and caused approximately 15,000 people from the surrounding area to seek medical treatment for respiratory problems. The Richmond Chevron incident occurred despite the presence of legislative mechanisms designed to protect against such accidents.

The United States Chemical Safety Board (US CSB) was formed as part of the US *Clean Air Act* amendments of 1990. The US CSB is an independent federal agency charged with investigating industrial chemical accidents. Its staff includes chemical and mechanical engineers, industrial safety experts and other specialists with experience in the private and public sectors. In addition, under the same 1990 amendments, the United States Congress also empowered the following two regulatory efforts:

- The United States Environmental Protection Agency was required to promulgate regulations, eventually known as "risk management plan rules," to prevent and respond to chemical accidents; and
- Also under the US *Clean Air Act*, the United States Department of Labor was directed to develop and implement a similar occupational safety and health administration standard, known as the Process Safety Management (PSM) Regulations, as a complementary effort that focuses on preventing workplace chemical accidents.

Individual state and local authorities share the responsibility with the US federal departments in implementing the federal risk management and PSM requirements. These US requirements are at least as stringent and comprehensive as related Canadian federal and Ontario requirements. Canadian federal and provincial requirements are often based upon a subset of similar US legislation.

In October 2014, the US CSB published a regulatory report of the Chevron incident (www.csb.gov/assets/1/19/Chevron_Regulatory_Report_11102014_FINAL_-_post.pdf) and following are some of the key conclusions:

1. Tests conducted on the ruptured pipe at the Richmond Chevron refinery determined that it had experienced extreme thinning near the rupture location due to sulfidation corrosion. In 2007, a similar pipe failure occurred in the crude unit due to sulfidation corrosion and caused a fire that required the initiation of a shelter-in-place order for the surrounding community. The US CSB concluded the incidents could have been prevented by implementing improved and readily available corrosion-resistant metallurgy.
2. The US CSB investigation also concluded that Chevron metallurgists, materials engineers and piping inspectors had expertise regarding sulfidation corrosion but they had limited practical influence to implement their recommendations. For example, they did not participate in the crude unit process hazard analysis and did not affect decisions concerning control of sulfidation corrosion during a crude unit maintenance effort.
3. The US CSB investigation included a review of recordable incidents at petroleum refineries across the country and concluded there is a considerable problem with significant and deadly incidents at petroleum refineries over the last decade. The US CSB noted there are more recordable incidents for US petroleum refineries than any other industry despite the fact that US petroleum refineries comprise roughly one per cent of the 13,000 facilities the federal risk management plan requirements cover.
4. The California regulators sharing responsibility in enforcing the risk management planning and process safety management requirements lack technical staff with the necessary skills, knowledge and experience to provide direct oversight of petroleum refineries in California.
5. Under the current requirements, facility operators must control hazards when conducting a process hazard analysis but there is no requirement to reduce the risks to a specified "as-low-as-reasonably-practical" level.

The US CSB also reviewed safety practices of the US nuclear industry and the US National Aeronautics and Space Administration, as well as requirements in other jurisdictions, such as the United Kingdom, Australia and Norway. These jurisdictions were considered leaders in chemical plant and petroleum refinery safety.

The US CSB notes that major industrial incidents have been catalysts for significant regulatory reform to improve the safety of industrial facilities around the world. One such shift in the United Kingdom, Australia and Norway was towards what has become known as the "safety case regime." In this approach, a facility owner is regularly required to make a case to the regulator of the safety of its operation. The US CSB concludes that the safety case regime also represents an improvement over current US requirements for chemical plants and petroleum refineries because it requires a combination of comprehen-

sive risk management and rigorous oversight by a technically competent regulator. Independent studies of the success of the safety case regulatory regime were also noted by the US CSB in its Richmond Chevron regulatory report.

The US CSB investigation of the Richmond Chevron incident went beyond simply identifying the specific cause of the accident (i.e. sulfidic corrosion of a pipe) and conducted a root-cause analysis that resulted in a number of policy recommendations. The governor's office in California also published a report, *Improving Public and Worker Safety at Oil Refineries, February 2014* (www.calepa.ca.gov/Publications/Reports/2014/RefineryRpt.pdf), in response to the Richmond Chevron incident. This California report supports the conclusions of the US CSB report where it also recommended a shift in the safety regime, including the formation of an interagency refinery task force to carry out safety improvements and promote more coordinated agency oversight of refineries.

These recent incidents and subsequent reviews in the US are anticipated to be relevant to Ontario because there is evidence of similar problems here. For example, on October 7, 2014, the Ontario environmental commissioner published his 2013/2014 annual report, *Managing New Challenges*. In it, there is a chapter: "MOE Continues to Fail the Aamjiwnaang First Nation," where the commissioner says the Ontario Ministry of the Environment and Climate Change must do more to resolve air pollution issues that impact the First Nation community near Sarnia. The report refers to a series of incidents in 2013 that were identified as being caused by pipe failures at a nearby petroleum refinery. Community members complained of a strong rotten egg and gasoline smell that was evident for several hours, and the report says many residents experienced red eyes, headaches, nausea, throat and skin irritation, dizziness, shortness of breath and coughing. There was also concern about how the incident was managed (e.g. concerns with a delayed response from community sirens and differing information being provided by authorities during the course of the event). In the report, the environmental commissioner also concludes the Ministry of the Environment and Climate Change needs to be more proactive in ensuring adverse effects from these facilities are minimized.

Back to the original question: Should a review of worker and public safety be conducted for Ontario petroleum refineries?

Although petroleum refining operators have been successful at minimizing non-fatal injury and illness rates, incidents at petroleum refineries in other jurisdictions have triggered the need for improved assessment of worker and public safety. The results of the US CSB and State of California reviews are particularly relevant because they were completed recently and there are regulatory and commercial linkages between the two countries. In summary, based upon recent experiences with petroleum refinery incidents in both the US and Ontario, it would be reasonable to conduct a review of worker and public safety for Ontario petroleum refineries.

THE ENVIRONMENTAL COMMISSIONER ALSO CONCLUDES THE MINISTRY OF THE ENVIRONMENT AND CLIMATE CHANGE NEEDS TO BE MORE PROACTIVE IN ENSURING ADVERSE EFFECTS FROM THESE FACILITIES ARE MINIMIZED.

ENGINEERS WORKING TOGETHER

An interagency team of professional engineers from a range of disciplines, organizations and perspectives should provide a leadership role in a review of public and worker safety for Ontario petroleum refineries. Such a collaborative effort would provide the necessary credibility to communities, workers and business leaders. Σ

Scott Grant, P.Eng., has been a combustion and air pollution engineer in Ontario for over 28 years. He is also a member of the executive committee of the Professional Engineers Government of Ontario (PEGO) bargaining agent.

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INTRODUCING PEO COUNCIL 2015-2016

EXECUTIVE COMMITTEE

THOMAS CHONG, MSC, P.ENG., FEC, PMP

President

Thomas Chong earned a master's degree in mechanical engineering from University of Strathclyde, Glasgow, Scotland, in 1973. He became a fellow of Engineers Canada in 2011; International Project Management Professional (PMP) in 2009; senior member, American Institute of Industrial Engineers in 1977; Professional Engineers Ontario member in 1976; and Chartered Engineer (Britain) in 1974. Chong was recruited from London, England, by Northern Telecom Canada as a corporate engineering manager in 1976. He has been president of a 4000-member network since 2008, and currently works as system lead with the Ministry of Health and Long-term Care. Chong won the Canada Cup 2014 in dragon boating. His OPS Ride for Heart team won the Gold Wheel Award 2014 Heart and Stroke. Chong received an Amethyst Award twice, in 2014 and 2009. He won the ACE award from the Ministry of Health and Long-term Care in 2014. Chong received a Queen Elizabeth II Diamond Jubilee Medal in 2013. Since 2009, he has also won 13 other major awards. Chong has been a mentor, York University engineering design program since 2008; mentor, Chinese Professionals Association of Canada (CPAC) since 2008; Knight of Columbus and Lector, St. Agnes Tsao Church since 2011; founding member, Popular Music Club since 2007; and former board member, Legal Aid Ontario Clinic, 2004 to 2009. Chong was vice president (elected) 2014; vice president (appointed) 2013; East Central Region councillor 2006 to 2013; and director, York Chapter, 2000 to 2008; Audit Committee, 2006 to present; Discipline Committee, 2012 to present; and Government Liaison Program, 2006 to present. Chong has published many technical papers. **thomas.chong@rogers.com**

J. DAVID ADAMS, P.ENG., MBA, FEC

Past President

David Adams, PEO president, 2008-2009, 2011-2012 and 2014-2015, studied arts and science at Carleton University before earning a BEng in mechanical engineering at McGill University and an MBA in finance and marketing from Western University. Involved extensively in mechanical engineering design and production management, he developed skills in acquisition analysis and business operations. He worked at the National Research Council, in Alberta's oil fields, Canadian Industries Limited, Cockshutt Farm Equipment, Abitibi Power and Paper, and Rio Tinto Zinc (England), and held senior positions with Canadian Gypsum and Massey Ferguson, before acquiring Canada Spool & Bobbin Company. Adams has had extensive overseas experience in engineering and finance, serving with both Rio Tinto Mining and Massey Ferguson, on projects in England, France, Germany, Belgium, Italy, South Africa, Brazil and the US. Adams is now president, Maple Leaf Engineering, a consulting firm specializing in lean design and manufacturing processes, infrastructure renewal, wood product manufacturing facilities, sawmill and dry kiln design. He was twice elected a regional councillor and has over 25 years of chapter, committee and task force service. He chaired the Governance Task Force and the Audit and Finance committees. As a member of the Building Committee he was instrumental in acquiring PEO's headquarters. A past president of the Rotary Club, Adams is president of the local Gideons International and a member of the Fellowship Baptist Church. He was appointed to *Marquis Who's Who* (US) in 1984, *International Men of Achievement* in 1985 and *Canadian Who's Who* in 1989. **daveadams@wightman.ca**

GEORGE COMRIE, MENG, P.ENG., CMC, FEC

President-elect

George Comrie holds BASc and MEng degrees in industrial engineering from the University of Toronto, and has had a successful career as a software/systems engineer, management consultant, entrepreneur and business manager. As a volunteer for the profession, he is currently an executive member of PEO's Etobicoke Chapter; chair of the Licensing Committee; vice chair of the Emerging Disciplines Task Force; and a director of Engineers Canada. He was PEO president in 2004-2005, and is a past president of the Ontario Professional Engineers Foundation for Education. The founder of PEO's Engineer-in-Residence and Government Liaison programs, he was invested as an Officer in the Order of the Sons of Martha in 1982 and a Companion of PEO's Order of Honour in 2007 to recognize his contributions to PEO. A passionate advocate for our Canadian model of professional self-regulation, Comrie believes in PEO's accountability to its membership, and in strengthening its core regulatory functions. He also serves as a municipal councillor in the Municipality of Whitestone, Ontario. **gcomrie@peo.on.ca**

PATRICK QUINN, PHD (HONORIS CAUSA), P.ENG., CENG, FCAE, FEC

Vice president (elected)

Patrick Quinn is a founding partner of Quinn Dressel Associates, one of Canada's foremost structural engineering firms responsible for award-winning, landmark buildings throughout North America, Europe, the Middle East and Asia. A public activist on equality and violence issues, Quinn has contributed to TV and radio programs and presented on violence against women to the Ontario government, the Canadian Committee on Women in Engineering, and the Canadian Committee on Violence Against Women. He has published in a variety of newspapers and publications on technical and social topics. In 2007, Quinn was conferred with the Dublin Institute of Technology's Doctorate of Philosophy, honoris causa, at the faculty of engineering's graduation ceremony in St. Patrick's Cathedral, Dublin, Ireland, and was cited for outstanding personal achievements as an engineer and a model representative of the engineering profession. Elected a PEO regional councillor in 1996, and vice president in 1997, Quinn was also president in 1999 and in 2006, when he led the successful court challenge to protect PEO's jurisdiction. A Member of the Order of Honour, Quinn has been elected to the boards of the Ordre des ingénieurs du Québec and the Ontario Society of Professional Engineers, and appointed to Engineers Canada's board. He is currently serving on the boards of the Dublin Institute of Technology Foundation and Enersource Hydro Mississauga, and was appointed to the City of Mississauga Committee of Adjustment as of April 30, 2015. **pquinn@peo.on.ca**

BOB DONY, PHD, P.ENG., FIET, FEC
Vice president (appointed)
Bob Dony holds BASc and MASc degrees in systems design from the University of Waterloo and a PhD in electrical and computer engineering from McMaster University. He is an associate professor in the School of Engineering, University of Guelph. Licensed by PEO in 1989, Dony was a member of PEO's Emerging Disciplines Task Group (1997-2002) and the Evolution of Engineering Admissions Task Force (2000-2005) and of Engineers Canada's Canadian Engineering Qualifications Board (2001-2004). From 2008 to 2011, Dony was co-editor-in-chief, *Canadian Journal of Electrical and Computer Engineering*, Institute of Electrical and Electronics Engineers Canada. He is currently a member (since 1998) and past chair (2011-2012) of the Academic Requirements Committee, chair of the Legislation Committee (since 2012), and PEO's representative on Engineers Canada's Canadian Engineering Accreditation Board. This is his second term as councillor-at-large, having first been elected in 2012. Dony believes that to restore the relevance of self-regulation in engineering for all its member licensees, the profession must be responsive to the concerns of the cross-section of new and existing licence holders. **bdony@peo.on.ca**

REBECCA HUANG, LLB, MBA
Rebecca Huang is a litigation partner at Fogler, Rubinoff LLP. She routinely assists corporations and business owners with commercial disputes. Huang is experienced in shareholder disputes, defamation, breach of contract claims, negligence and professional malpractice defense. On March 19, 2008, she was appointed by the Ontario government as a lieutenant governor appointee to PEO council for a three-year term. She was reappointed in 2011 and again in 2014 for a total of six more years. She is honoured to help advance the engineering profession with her legal skills.
rhuang@foglers.com

CHANGIZ SADR, P.ENG., FEC
Prior to being elected as an East Central Region councillor in 2013, Changiz Sadr held several positions with the board of executives of Willowdale/Thornhill Chapter, including vice chair (2004 to 2007), chair (2008 to 2010), past chair (2011 to 2012), and chair of the Program and GLP committees, over 14 years of service to the chapter. Sadr has also served as a member of PEO's Experience Requirements Committee (ERC) since 2003, and a member of the ERC Interviews Recommendation Ratification subcommittee since 2008. He also served PEO's Emerging Disciplines Task Force as vice chair of the Communications Infrastructure Engineering subgroup from 2008 to 2011. Sadr has participated in several engineering program accreditation visits through the Canadian Engineering Accreditation Board, representing PEO as a general visitor since 2007. Sadr has also volunteered as a mentor and coach to settlement agencies and community associations to assist newcomer engineers and professionals in adapting to their new environment. This involvement has increased awareness among international engineering graduates about PEO's licensure process. As a result of his work, Sadr has received four Ontario Volunteer Service Awards (summing up his total voluntary contribution of over 35 years). He was made a fellow of Engineers Canada in 2010 and became a Member of PEO's Order of Honour in 2011. Sadr is a telecom engineer by education, and works as an ICT/CIE consultant. **csadr@peo.on.ca**

COUNCILLORS

Councillors-at-large

BOB DONY, PHD, P.ENG., FIET, FEC
(see Executive Committee)

ROYDON FRASER, PHD, P.ENG., FEC
Roydon Fraser received a bachelor's degree in engineering physics at Queen's University, and his master's degree and doctorate in mechanical and aerospace engineering from Princeton University. He is currently a professor in the mechanical and mechatronics engineering department at the University of Waterloo. He joined PEO in 1991, serving on the executive of the Grand River Chapter (formerly the Kitchener-Waterloo and Guelph-Cambridge chapters) starting in 1993, and chairing the chapter in 1996. Fraser supervises the University of Waterloo Alternative Fuels Team (UWAFT), which competes internationally in the Advanced Vehicle Technology Competitions (AVTCs), such as the current EcoCar 3 Competition, with the goal of offering unparalleled hands-on, real-world experience to engineering students. This past year, he received the 2014 National Science Foundation Outstanding Long Term Faculty Advisor Award. Over a multi-year design and build cycle, UWAFT achieves reduced fuel consumption, reduced greenhouse gas emissions, and reduced tailpipe emissions, all while maintaining consumer acceptability in the areas of performance, utility and safety. UWAFT is proud to have built the world's first, student-built, fuel-cell vehicle to successfully complete all of AVTC's production vehicle tests. Fraser continues to lead the organization of Explorations, an evening where the University of Waterloo's faculty of engineering is open to hundreds of grades 6, 7 and 8 students to see and explore the wonders of engineering. He is a member of the Society of Automotive Engineers, the American Society of Mechanical Engineers, and the Ontario Society of Professional Engineers, and is a lifetime member of the Sandford Fleming Foundation. He serves on PEO's Academic Requirements and Discipline committees, both since 1999. **rafraser@uwaterloo.ca**

ROGER JONES, P.ENG.
Educated at Imperial College in London, England (BSc, DIC, M.Phil), and McGill University, Montreal (MBA), Roger Jones retired from George Kelk Corporation as vice president and chief engineer. His career has covered many engineering roles from design engineer to executive at several major firms, including Ferranti (UK aerospace), GEC (UK), Foxboro Canada, Cowan-Lavalin and Noranda. He has published over 35 technical papers and is a life/senior member of the Institute of Electrical and Electronic Engineers. Jones serves on several PEO committees: council (2010-12, 2013-15), Finance, Professional Standards (PSC) and the Emerging Disciplines Task Force (both the Nanotechnology and Molecular Engineering, and Communications Infrastructure Engineering subcommittees). He chairs the PSC Industry subcommittee and is a member of the Professional Engineers Foundation for Education board. A vintage radio and aviation enthusiast, Jones is a member of the Ontario Vintage Radio Association and the Canadian Warplane Heritage Museum. Until it moved from Downsview, he volunteered at the Canadian Air and Space Museum, restoring vintage avionics for the Lancaster exhibit. In the local community, he serves on the Thornhill Festival Committee and is a board member of Heintzman House, a historic building and community centre in Thornhill. With a long-time interest in economics, Jones is a member of the Queen's Park Economy Political Action Committee and in 2012 wrote its report on industry in Ontario. He is also an original member of the Society of Manufacturing Engineers' "Take Back Manufacturing" forum. **rjones@peo.on.ca**

Regional councillors

EASTERN REGION COUNCILLORS

CHARLES M. KIDD, P.ENG., FEC
Charles Kidd has served in the PEO chapter program since 1991, first in the Thousand Islands Chapter and then the Peterborough Chapter, contributing in the education, secretary, communications, and chair and vice chair roles. One of his first and more memorable involvements was as a contributing writer and player in the Thousand Islands Chapter 1992 production of *King Kilowatt and the Engineers' Quest*, an original stage play developed by the chapter and presented to an assembly of Brockville elementary school students to introduce them to the engineering profession. In 2005, he was inducted into PEO's Order of Honour. A Queen's University graduate, Charles has served for 24 years in the private sector in the steelmaking, chemical processing, nuclear, marine and building science sectors. An additional 13 years was with the CRA Scientific Research and Experimental Development tax incentive program, advising the CRA on the eligibility of work claimed as R&D. He also enjoyed serving on the board of directors for the Peterborough Utilities Group of Companies from 2005 through 2014. In this last role, Charles served as chair of Peterborough Distribution Inc., the electric distribution company, from 2011 through 2013. Charles and his wife, Carolyn, have lived in Peterborough since 1992 and have two grown children, both now living nearby. "Gramma and Grampa" are also happy to spend lots of time with their five grandchildren. Much of their summer is spent at their fifth-generation cottage on the St. Lawrence River near Gananoque. **ckidd@peo.on.ca**

DAVID BROWN, P.ENG., BDS, C.E.T.
David Brown is both a principal and practising structural engineer with TaskForce Engineering Inc., a Belleville-based design-build firm that specializes in the ICI construction sector. He is a founding partner of TaskForce and holds a diploma in civil engineering technology from St. Clair College of Applied Arts and Technology and a bachelor of applied science in civil engineering from Queen's University. Brown is a member of PEO, the Ontario Society of Professional Engineers, Canadian Society for Civil Engineering, and the Ontario Association of Certified Engineering Technicians and Technologists. Aside from his work at PEO, Brown volunteers extensively within his community and, in particular, with the United Way, where he was chair of the 2013 Campaign Committee. He is happily married to his wonderfully supportive wife, Liza, and between them have four amazing children. **dbrown@peo.on.ca**

EAST CENTRAL REGION COUNCILLORS

NICHOLAS (NICK) P. COLUCCI, P.ENG., MBA, FEC
Nick Colucci graduated from the University of Waterloo with a BASc (civil) in 1987. He joined PEO in 1989 and received his PEO Certificate of Authorization and consulting engineer designation in 1992. He is employed by the Township of Brock as the director of public works. He is a past member of PEO's Lake Ontario Chapter, which he chaired from 1995 to 2003, and vice chaired in 1991 and 1995. He was a director on the chapter executive from 1987 to 1991 and in 1994. Colucci also sits on PEO's Advisory Committee on Volunteers. He is an avid cyclist and also enjoys hiking, snowshoeing and kayaking. He has completed the Logs Rocks and Steel Adventure Race in Haliburton, which included 16-km paddle, 45-km mountain bike and 16-km trail run segments, the Horseshoe Centurion 100-km cycling event, and the Fatty Frost Cross race at Hardwood Hills, a bike race on both double- and single-track, snow-covered trails. He has also passionately participated in numerous fundraising efforts, including the Becel Heart and Stroke Ride for Heart, the World Wildlife Fund CN Tower Climb and the United Way CN Tower Climb. Last summer, Colucci participated in the Wounded Warriors Canada Battlefield Ride in France in hopes of raising $6,000 to support the Wounded Warriors programs for our ill and injured Canadian Forces members and their families. Contact Colucci directly for information about donating to any of his fundraising causes. **ncolucci@peo.on.ca**

CHANGIZ SADR, P.ENG., FEC
(see Executive Committee)

NORTHERN REGION COUNCILLORS

SERGE ROBERT, P.ENG.

Born and raised in Timmins, Serge Robert pursued his engineering technology studies at Northern College of Applied Arts and Technology in Porcupine before completing his civil engineering degree at Lakehead University in Thunder Bay in 1998. Employed in the manufacturing industry, Robert worked as a structural design engineer for MiTek Canada, Inc., based in Bradford, from graduation until 2007, when he returned to his home town to accept a position as a structural engineer at J.L. Richards & Associates' Timmins office. Shortly after returning to the north, he began his involvement with the local PEO chapter and joined its executive. Serving as vice chair and then chair of the Porcupine/Kapuskasing Chapter, Robert discovered a new passion for his profession's governance. Recognizing the importance of every member's involvement, he decided to run for regional councillor for the first time last year. A firm believer in continuing education and maximizing one's exposure to other trains of thought, he participates in and encourages others to participate in all forms of professional development, from association events, to supplier presentations, online courses, webinars, Engineers Without Borders events, and everything in between. "We must be out there building on our knowledge and being seen!," he says. Robert continues to participate and volunteer in local events, such as school outreach programs, the local science fair, local sporting events, and chapter fundraisers and events, such as the annual baseball tournament, technical tours and National Engineering Month events. **srobert@peo.on.ca**

DAN PRELEY, P.ENG.

Dan Preley was born and raised in Thunder Bay. He received a bachelor of civil engineering degree from Lakehead University in 1981. He has completed several advanced alternative dispute resolution courses with the University of Windsor. Preley has been a PEO member since 1983. Since joining the Lakehead Chapter executive in 2004, he has served as the chair, past chair, vice chair and treasurer. He is an associate value specialist with the Society of American Value Engineering. Preley is currently a senior project engineer and regional value engineering co-ordinator with the Ontario Ministry of Transportation. He has also worked for R.V. Anderson Consulting Engineers, Wardrop Consulting Engineers, Public Works Canada and Ontario First Nations Technical Services Corporation. Preley was a board member with the Canadian Society of Value Engineering and National Development Centre, Thunder Bay. He is an avid cross-country skier, hiker, cyclist and sea kayaker. His priority as a councillor is to implement the 2015-2017 Strategic Plan. By following the strategic objectives with respect to the goal areas, PEO shall perform to its full potential. **dpreley@peo.on.ca**

WESTERN REGION COUNCILLORS

LEN C. KING, P.ENG., FEC

After earning his BEng in civil engineering from McMaster University in 1972, Len King began a career in the building sector spanning over 25 years. King was chief plan examiner and deputy building commissioner, building department, City of Hamilton from 1975 to 1989. He became building commissioner in the same department in 1989 and retired from the post in 1999. He has been a consultant with NAL Engineering since his retirement. Licensed since 1974, King was treasurer of the Brantford Chapter from 2000 to 2004 and chair from 2004 to 2006. Over the years, he has had numerous professional affiliations: vice chair, Ontario Building Code Commission (2000-2006); vice president and director, Ontario Building Officials Association (1984-1991); member, National Building Code's Standing Committee on Structural Design (1985-1994); member, Engineers, Architects and Building Officials Committee (1987-1993); director, Building Officials and Code Administrators International, Chicago (1990-1996); member, Underwriters Laboratories of Canada's fire council (1989-2000); member of several CSA committees; member, National Fire Protection Association (1989-1999). He has also served as Western Region councillor on council since 2008 and as chair of the Regional Councillors Committee since 2013. **lking@peo.on.ca**

EWALD KUCZERA, MSC, P.ENG.

Having graduated from Queen's University with bachelor of science and master of science degrees in civil engineering, Kuczera obtained his licence in January 1980. Shortly after, he joined the Municipal Engineers Association. His career touched on most areas of municipal engineering. He has served in various roles on work-related and volunteer committees, ranging from chair to technical advisor. He chaired the resolutions committee of the Ontario Traffic Conference in the early '80s. At the start of his career, he was on the executive of the Eastern Chapter (since renamed). Kuczera was a warden for Camp #3 Ritual of the Calling of an Engineer for a decade, before moving to Niagara in 1998. He chaired the Niagara-on-the-Lake task force on traffic safety from its inception in 2005 until 2014. Since being elected to council in 2013, he served on PEO's Audit Committee, Regional Councillors Committee and Volunteer Expense Claims Appeal subcommittee. He currently resides in Thorold (Niagara Chapter), where the municipal council appointed him to the Thorold Active Transportation Advisory Committee. In June 2014, he retired after serving over 16 years as director of public works for the Town of Niagara-on-the-Lake, but retains his interest and membership with the Municipal Engineers Association. He and his wife of 37 years, Wanda Gora, have three grown children and five grandchildren. He is passionate about his religious faith, his family's heritage and his calling to the profession. This spring, Kuczera will be entering his second, two-year term as a Western Region councillor. He feels privileged to be able to continue to represent the constituents of Western Region on council. **ekuczera@peo.on.ca**

WEST CENTRAL REGION COUNCILLORS

DANNY CHUI, P.ENG., FEC

Danny Chui received his BSc in civil engineering in 1984. He has been in the position of manager of capital works for Toronto's Exhibition Place since 1991. He was a member of the owner project implementation team for the construction of the then National Trade Centre (now Direct Energy Centre), Ricoh Coliseum, BMO Field and Allstream Centre. He undertook many innovative energy projects, such as photovoltaic, trigeneration, geothermal and back pressure steam turbine. He completed on time and within budget in 2011 the Infrastructure Stimulus Fund's $27.3 million program in 18 months, for which he received a citation from the Board of Exhibition Place. Chui was a member of PEO's Mississauga Chapter executive from 1986 to 1995, serving in all officer positions and was elected as West Central Region councillor from 1995 to 2003. He was again elected to PEO council in 2012 and has begun serving his fourth year. While on council, he served on various committees, including Executive Committee member, appointed vice president, and Finance Committee chair. He was invested as a Member of the Order of Honour in 2002 and fellow of Engineers Canada in 2009. He received a 15-year Volunteer Service Award from the Ontario government and a 25-year volunteer service certificate from PEO. Chui is also a past member of APEGA, ASCE, AAET, OACETT and served one term as a Mississauga Public Library board member. He has been a member of the Ontario Construction Users Council for 20 years, serving on its board in many executive capacities, and remains a board member. **dchui@peo.on.ca**

WARREN TURNBULL, P.ENG.

Warren Turnbull is a retired senior executive with over 33 years of engineering and senior sales management experience. He holds a BASc (electrical) from the University of Waterloo. Turnbull's career included involvement in and management of many multi-disciplinary teams related to instrumentation, product design, maintenance, marketing and sales. Turnbull moved from successful assignments in engineering, customer technical service and new product development to senior marketing and sales management roles. His career included assignments at Du Pont Canada Inc., Continental Group of Canada Ltd., Fabrene Inc., Flexia Corporation and Intertape Polymer Group. Turnbull is currently providing technical sales, market consulting and distribution management services. Turnbull was actively involved in PEO's North Bay Chapter executive up to and including the position of chapter chair. In the past five years, he has held various positions on the Oakville Chapter executive, including event coordinator, event chair, chapter chair for two years and past chair. While with Oakville Chapter, Turnbull led implementation of its first all-day symposium, entitled "The Future of Energy in Ontario," which resulted in an ongoing partnership with the Oakville Chamber of Commerce for future symposiums and other events. As well, the chapter initiated programs with local businesses and the town to encourage innovation in Oakville and Halton Region. Turnbull was a board member of the Glen Abbey Residents Association and served two, one-year terms as president. He chaired the Group Homes Advisory Committee for the Town of Oakville. **wturnbull@peo.on.ca**

Appointed councillors

ISHWAR BHATIA, MENG, P.ENG.

Ishwar Bhatia completed his BEng at BHU, Indian Institute of Technology (IIT) in 1970, and his MEng (civil) at Dalhousie University in 1972. After working with McNeely and Northland Engineering, Bhatia joined the City of Ottawa in 1974 as head of sewer maintenance. As a senior project leader in infrastructure, Bhatia supervised project managers, conducted environmental assessments, hired consultants, and managed multi-million-dollar complex construction projects. He worked for GENIVAR from May 2009 to June 2011 to set up its municipal group. He is a past president (twice) of Ottawa's Civic Institute of Professional Personnel. Bhatia continues to serve on council, is a past member of the executive and chair of the Audit Committee, past chair of the 40 Sheppard Renovation Task Force and vice chair of the Finance Committee, and continues to serve on the Discipline Committee and its panels. He is also an active member of the Government Liaison Committee and council liaison for both the Discipline and Government Liaison committees. **ibhatia@peo.on.ca**

SANTOSH GUPTA, PHD, MENG, P.ENG., FEC

Santosh Gupta earned a bachelor of science (engineering) in 1961 and a master of engineering in 1962. He obtained a PhD from the University of Waterloo in 1974 and became a member of PEO in 1976. Gupta worked for Hydro One/Ontario Hydro in several management and professional engineering positions from 1981 to 2000. Prior to this, he worked in Montreal, Kenya and India on a variety of engineering projects and as a professor. Currently, Gupta serves on PEO's Experience Requirements Committee (ERC) as chair, the Audit, Licensing and Discipline committees, the National Framework Task Force, and the Academic Requirements Committee/ERC subcommittee. He is also the executive secretary of the Council of Ontario Deans of Engineering, and participates on Canadian Engineering Accreditation Board engineering program accreditation teams at Ontario universities. Gupta served on PEO's Professional Engineers Awards Committee until December 2011 and has served on the Finance and Legislation committees in the recent past. Prior to his current appointment to PEO council by the lieutenant governor of Ontario, Gupta sat on council as an East Central Region councillor for two years and was vice chair of the Scarborough Chapter for two years. **sgupta@peo.on.ca**

RICHARD J. HILTON, P.ENG.

Richard Hilton worked for over 30 years in the Canadian mining industry, mostly in the environment, health and safety (EHS) area. In his job, he travelled to many parts of the world to deal with operational and governmental issues. He has been on the cusp of the development of forward-thinking EHS programs and legislation. Hilton retired from full-time work in 2005. He is now a part-time consultant in environment, health and safety, most recently undertaking to co-author EHS requirements for base metal smelters for the World Bank and conducting an EHS survey of an exploration camp in the Northwest Territories. **rhilton@peo.on.ca**

REBECCA HUANG, LLB, MBA

(see Executive Committee)

VASSILIOS (BILL) KOSSTA

Bill Kossta graduated with a bachelor of administrative studies from York University and a business administration, marketing management, diploma from Centennial College. He has 38 years of sales and management experience with leading companies in consumer packaged goods, including Seagram Company distillers, Carling O'Keefe Breweries, Molson Breweries and Great Lakes Brewing Company. He is sales manager at Cool Beer Brewing Company in Toronto. Kossta was appointed to PEO council in November 2006 and is a member of the Complaints, Registration, Audit and Legislation committees, and the Volunteer Expense Appeals subcommittee. **vkossta@peo.on.ca**

MARY LONG-IRWIN

Mary Long-Irwin is the executive director of Northern Ontario Angels, an organization that matches entrepreneurs with investors. Prior to this, she was the president/CEO of the Thunder Bay Chamber of Commerce for 10 years. She worked closely with member businesses and three levels of government to ensure the growth of business and economic development opportunities throughout northwestern Ontario. She was also the CEO for the Northwestern Ontario Associated Chambers of Commerce. Long-Irwin began her career as a self-employed businesswoman in Thunder Bay. In 1988, she accepted a position with Confederation College, Northwest Enterprise Centre, as a small business advisor and instructor. In 1990, she joined Superior North Community Futures Development Corporation (a FedNor community development initiative) as the general manager, lender and business consultant to over 500 businesses, and continued in the position for 10 years. Born, raised and educated in Thunder Bay, she continues to provide business advisory services and remains a strong advocate for business and industry. Long-Irwin continues to serve on many boards and non-profit organizations and is active in her community. She is the current president of the Cystic Fibrosis Foundation, Thunder Bay chapter, and is also involved with fundraising, awareness, public speaking and education for many non-profit and charitable organizations. **mirwin@peo.on.ca**

SHARON REID, C.TECH

Sharon Reid graduated from the electronics engineering technician program at Fleming College. She is currently employed as a senior technician at Canadian Instrumentation Services Group, Peterborough, where her responsibilities include the calibration and verification of electronic and electromechanical test equipment, maintenance of medical equipment and assistance with acceptance and efficiency testing of hydro generators in Canada and abroad. Reid's community service has included work with Girl Guides of Canada, regional and Canada-wide science fairs, Engineering Month activities and over a decade of involvement with the Ontario Association of Certified Engineering Technicians and Technologists (OACETT). Reid is a certified member of OACETT and has served OACETT as chapter director, chair of the Women in Technology committee, regional secretary/treasurer and eastern regional councillor. She currently sits on OACETT's Women in Technology task force. Sharon was a delegate to the OACETT technology exchange in China in 2008 and was an OACETT representative with the Applied Science Technicians and Technologists of BC (ASTTBC) on the BC/Canada and India Mutual Recognition Agreement site visit in 2014. She was inducted to the Klaus Woerner Skilled Trades Hall of Fame in 2010 and was a recipient of OACETT's Women in Technology Award for 2012. Reid is a lieutenant governor appointee to PEO council and sits on PEO's Equity and Diversity, Discipline, and Legislation committees. **sreid@peo.on.ca**

RAKESH SHREEWASTAV, P.ENG., AVS, FEC

Rakesh Shreewastav obtained his MSc degree in civil engineering from Moscow State University, Russia, and works for the Ontario Ministry of Transportation (MTO). Previously, he worked for Ontario Power Generation and multi-disciplinary engineering companies and government sectors in Russia and Nepal. Shreewastav has actively participated on several PEO chapter committees, Conference for Internationally Educated Professionals engineering panels, and been involved in other professional organizations, such as the Ontario Society of Professional Engineers, the Canadian Society for Civil Engineering, the Canadian Society of Value Analysis and the Value Society SAVE International. Dedicated to science awareness and community involvement, Shreewastav has served on judging panels in FIRST Robotics Canada competitions and regional science fairs and also on the board of directors of the Rotary Club of Nipissing and London South. Shreewastav was selected among thousands as one of 17 people in Canada to be featured in the video vignette *Potential to Prosperity*, a project sponsored by the Canadian Foundation for Economic Education. Shreewastav is also a member of PEO's Discipline, Equity and Diversity, and Awards committees, board member of Engineers Canada and a past member of the Sustaining the Ontario Centre for Engineering and Public Policy Task Force. **rshreewastav@peo.on.ca**

MARILYN SPINK, P.ENG.

Marilyn Spink's 30-year engineering career began in Northern Ontario's mining and pulp and paper industries and then moved to steelmaking operations in both the US and Canada. After working on capital engineering projects with Dofasco, she moved into the consulting engineering EPCM world, executing large, complex mining and minerals projects around the world. At Hatch, SNC-Lavalin, Wardrop (now Tetra Tech) and Golder Associates, as a multi-discipline engineering manager and a process engineer at heart, she led and supported teams of professional engineers and designers. She is now mentoring younger engineers and project managers with Isherwood Associates. Spink continues to fulfil her passion for education through Humber College's School of Applied Technology as their industrial liaison, and with Scientists in School, a Canadian science outreach not-for-profit, where she has served on the board for six years. Giving back to the engineering profession is also important to Spink via her appointment as lieutenant governor-appointed councillor to PEO. She has been a licensed professional engineer since 1995, a member of the Ontario Society of Professional Engineers since its inception, and a long-time member of several mining industry associations. Her long-term goals are to build board/directorship experience to feed her strong interest in corporate governance and to ensure the voice of engineering is heard at the boardroom table. Spink is married to Jamie Gerson, also a professional engineer, who is extremely supportive of all her interests and a wonderful father to their three boys. **mspink@peo.on.ca**

REGULATORY PROBLEM SOLVING AND THE ROLE OF EVIDENCE

By Jordan Max

IN MY ARTICLE last issue, I discussed the introduction of the provincial government's new evidence-based approach to regulatory policy development–Preliminary Regulatory Impact Assessment (PRIA)–and how it's being adopted by PEO. This article will address ways to improve our capacity to identify, define and validate a regulatory policy problem and how evidence, both quantitative and qualitative, can be used (or misused) to support regulatory policy development.

WHOSE PROBLEM IS IT ANYWAY?

Engineers are well versed in problem identification and solving for engineering projects. Understanding an initially perceived problem, key drivers and variables, and other shaping factors (and tradeoffs) are the starting points for good engineering design. However, information should never be taken at face value, but must be challenged and validated. PEO's challenge is to apply those same skills and rigour to making regulatory policies for the practice of professional engineering and the governance of its licence holders. So, in some senses, evidence-based policy design should be a natural extension from the practice of professional engineering to its regulation.

PEO's regulatory challenge is to properly understand a proposed issue or problem presented to it, validate it with evidence to determine if it is within PEO's statutory authority to address (i.e. the *Professional Engineers Act*), consider whether it should be addressed and, if so, how. If it is determined by council that a solution is desirable and possible, we turn our attention to the mechanism–in other words, how to solve the problem.

What the government is increasingly telling us is that even if we are willing and able to act to solve a problem, we should consider many different approaches other than just writing a regulation, which ultimately is a rule that must be enforced, monitored, reported on and evaluated for efficacy.

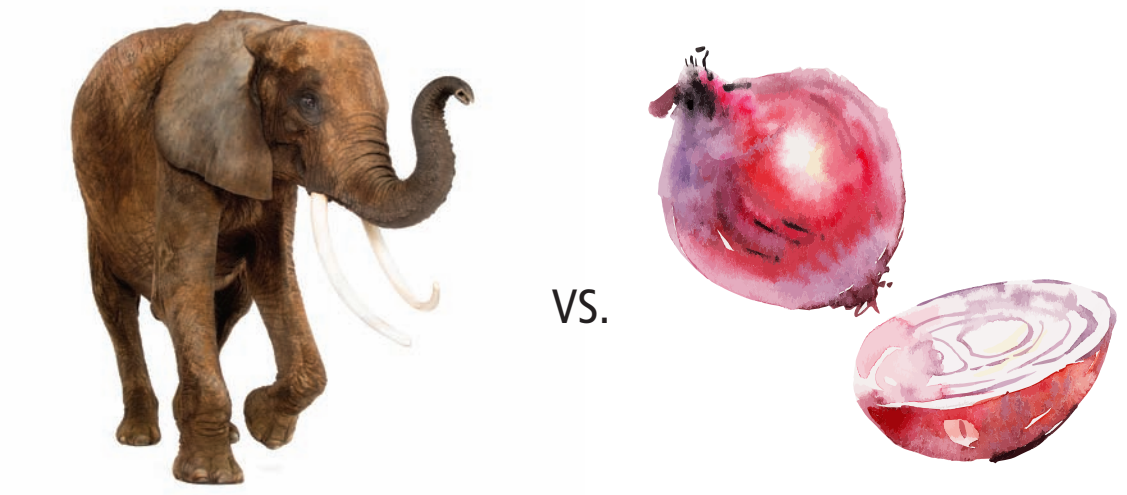
At its core, evidence-based policy-making presumes that an issue or problem must be well understood within the system in which it arises and documented with qualitative and quantitative evidence. Once we understand the system in which an issue or problem resides, we can begin to understand the influences and influencers and, in so doing, determine the desired objectives and outcomes. Having a well understood system allows us to develop a change model to reduce or eliminate the issue/problem, and why we think a particular approach will actually work. There may be many different ways to achieve the same objective; the challenge is to choose the available solution that is the most effective and efficient use of limited resources.

Sometimes PEO receives bottom-up solutions or proposals from committees, councillors, members, the media, engineering clients or the public that address a specific problem, or are proposed from a particular vantage point. These require further exploration to determine if PEO has the authority to deal with them.

As well, PEO works on top down, macro level, regulatory problems. These typically include:

- private interest (profession capture) trumping public interest;
- non-alignment between act/regulation and operations;
- uneven compliance with rules or processes;
- non-alignment of act/regulations with public interest;
- negative/unintended outcomes or products/services;
- focus on the wrong actor/influencer or instrument;
- over- or under-regulated, or improperly regulated, areas of professional practice;
- inefficient regulatory processes/practices;
- ineffective regulatory tools/instruments; or
- no mechanism for evaluating outcomes.

EVEN IF WE ARE WILLING AND ABLE TO ACT TO SOLVE A PROBLEM, WE SHOULD CONSIDER MANY DIFFERENT APPROACHES OTHER THAN JUST WRITING A REGULATION, WHICH ULTIMATELY IS A RULE THAT MUST BE ENFORCED, MONITORED, REPORTED ON AND EVALUATED FOR EFFICACY.



PROBLEMS: NEGATIVE AND POSITIVE VIEWS

Most people know the philosophical joke about whether a half-filled glass of water is half empty or half full (and the engineer's analysis that there is twice as much glass as is necessary). The answer depends on your perspective and attitude. So it is with the word "problem." The conventional approach sees a problem in a negative manner, representing something that is wrong or unexpected; a deficit, gap, shortcoming, or unmet need; the result of something that doesn't quite fit or that creates difficulties or adverse impacts for someone or a group. And since knowing about a problem ethically compels you to act to address it, the natural human instinct is to avoid looking for problems. Even regulators can justify not looking for problems as they struggle to keep up with the current demands and problems they already know about. This idea is best summed up by the adages "Don't go looking for trouble or it will find you" and "If it ain't broke, don't fix it."

However, innovators and innovative organizations choose to look at problems as opportunities. They can represent a reflection/indicator of a paradigm shift or transition, an opportunity for improvement or repurposing (see, for example, Post-it Notes), an unmet need, or a suggestion of a shortcoming in the understanding of a system. The resulting action is, therefore, opposite; an innovator will actively seek out problems and ask questions to see if things are working or changing, or think about how things might change in the future by asking "What if…?" questions.

PROBLEM DEFINITION: ELEPHANT OR ONION?

Sometimes, problems are like elephants; sometimes they are like onions. When you look at a problem, it depends on your vantage point around the elephant. One person will see the tusks, another the trunk, a third person a leg, a fourth an ear, a fifth a tail. Practitioners, clients, producers, technicians, employers, suppliers, distributors, teachers and students will each see their reality from their point of contact. If you see only one part, you're missing the whole elephant. It's therefore important to combine all of the different vantage points to get a complete picture and see how others are impacted or involved.

Problems can also be like onions. There are layers of information; what appears at first glance, on the surface, may be only a symptom or effect. We have to peel back the layers to get to the real, underlying causes. A good tool to use is to keep asking "Why is that?" when encountering a description of a situation. It yields significant information about the underlying causes and connections between different parts. Evidence can play a major part in clarifying a problem.

PEO INTEGRATION

PEO staff advisors to regulatory function committees (Academic Requirements, Experience Requirements, Consulting Engineer Designation, Complaints, Complaints Review Councillor, Discipline, Enforcement, Fees Mediation, Legislation, Professional Standards, and Registration) have now been trained to identify, define and validate problems to assist their respective committee volunteers when they wish to develop or revise regulatory policies. As the first part of preparing a PRIA, those committees must now clarify a problem's cause, incidence, solution intention and its rationale up front. Briefing notes for council decisions have now been revised to add the PRIA questions. It is hoped that as a committee works through the PRIA questions, it will ensure problems are well-defined and validated against PEO's statutory and regulation-making authority. Council also plays a key role in ensuring that a problem has been properly understood and validated with evidence before considering (or even proposing) any solution. Σ

Jordan Max is PEO's manager, policy.

GAZETTE

REGULATION 941/90 AMENDED

Regulation amendments will enable some pending 2010 amendments to *Professional Engineers Act* to be proclaimed.

On April 2, 2015, the registrar of regulations filed long-awaited amendments to Regulation 941/90. The amendments change the requirements to obtain a limited licence; permit limited licence holders to be responsible for the engineering services provided to the public under a PEO Certificate of Authorization; create the licensed engineering technologist (LET) class of limited licence; and set out the academic requirements to be an engineering intern and engineering interns' rights and privileges. These amendments will be effective on July 1, 2015.

Other amendments, effective April 2, require the Academic Requirements and Experience Requirements committees to specify the academic or experience requirements to be met for applicants the committees determine do not meet the requirements for licensure; and change the requirements to obtain a temporary licence to harmonize them with those for obtaining a professional engineer licence, while streamlining the list of exceptions for temporary licence holders to work with a collaborator. The amendments effective on filing also include changes to avoid a perceived conflict of interest should a P.Eng. PEO staff member seek election to PEO council; ensure some time away from the highest council offices for a retiring past president; update regional boundaries to reflect road name changes; and authorize PEO's registrar to send notices electronically to practitioners and applicants to submit applications and supporting documents electronically through PEO's website. There are also several minor housekeeping amendments to correct or clarify previous wording.

The pending 2010 *Professional Engineers Act* (PEA) amendments connected to the regulation amendments coming into effect on July 1, 2015 will be proclaimed into effect on July 1. To view Regulation 941/90 and the PEA, as amended, visit www.peo.on.ca/index.php?ci_id=1812&la_id=1. To view PEO's media release on the changes and answers to frequently asked questions about them, visit: www.peo.on.ca.

CHANGES TO REGULATION 941 EFFECTIVE APRIL 2.

1. ....
"register" means a register maintained by the Registrar under section 21 of the Act. R.R.O. 1990, Reg. 941, s. 1; O. Reg. 13/03, s. 1; O. Reg. 143/08, s. 1; O. Reg. 71/15, s. 1.

3. (2) If the president is incapacitated or resigns, the office of president shall be filled by the president-elect, failing that by the vice-president elected by the members, failing that by the vice-president appointed by the Council, or failing that by a member of the Council who the Council shall appoint. R.R.O. 1990, Reg. 941, s. 3(2); O. Reg. 71/15, s. 2.

5. The area of each Region is the area described in Schedule 1. R.R.O. 1990, Reg. 941, s. 5; O. Reg. 143/08, s. 3; Reg. 71/15, s. 3.

7. A Member who is employed by the Association is not eligible for election to the Council unless the Member,
(a) takes an unpaid leave of absence that takes effect no later than the day after he or she is nominated for election; and
(b) submits to the Registrar his or her resignation in writing, to take effect at the time he or she would take office. O. Reg. 71/15, s. 4.

10. (2) A member of Council who has been appointed by the Lieutenant Governor in Council and who is also a Member is not eligible for election unless the member's term of office will have expired by the time the member would take office for a new term, or unless the member submits his or her resignation in writing, to take effect at the time the member would take office for the new term, to the Lieutenant Governor

in Council prior to nomination for election. R.R.O. 1990, Reg. 941, s. 10(2); O. Reg. 71/15, s. 5.

12. (1) The Council shall appoint a Central Election and Search Committee each year composed of,
(a) the penultimate past-president;
(b) the immediate past-president;
(c) the president; and
(d) two or more other Members. R.R.O. 1990, Reg. 941, s. 12(1); O. Reg. 157/07, s. 3(1); O. Reg. 71/15, s. 6.

13. (2) The Junior Regional Councillor in each Region shall act as chair of the Regional Election and Search Committee for that Region and shall be entitled to vote only to break a tie. R.R.O. 1990, Reg. 941, s. 13(2); O. Reg. 157/07, s. 4(1); O. Reg. 71/15, s. 7(1).

(3) If the Junior Regional Councillor is unable to act, the Regional Election and Search Committee shall select a chair from among its members and the chair shall be entitled to vote only to break a tie. R.R.O. 1990, Reg. 941, s. 13(3); O. Reg. 157/07, s. 4(1); O. Reg. 71/15, s. 7(2).

14. (4) A Member is not eligible to be nominated for election to the Council as president-elect if the Member held the office of president within the last two years. O. Reg. 71/15, s. 8.

15.1 (2.1) A Member is not eligible to be appointed under subsection (1) to the office of president-elect if the Member held the office of president within the last two years. O. Reg. 71/15, s. 9.

32.2 (2) The Registrar shall accept as a member of the engineer student class any person who registers for membership on-line through the Association's website in the form provided by the Association for the purpose and is enrolled in,
(a) the Association's student program; and
(b) an engineering program offered by a Canadian university and accredited to the Council's satisfaction or for which accreditation from the Canadian Engineering Accreditation Board is being sought. O. Reg. 205/09, s. 2; O. Reg. 71/15, s. 11.

40. (2) Where an application for the issuance of a licence, temporary licence or limited licence is referred to the Academic Requirements Committee pursuant to the Act, the Committee shall,
(a) assess the academic qualifications of the applicant;
(b) determine whether the applicant meets the academic qualifications prescribed by this Regulation and so advise the Registrar; and
(c) if the Committee determines that the applicant does not meet the academic requirements, specify the academic requirements that the applicant must meet, for the purposes of the notice referred to in subsection 14(6) of the Act. R.R.O. 1990, Reg. 941, s. 40(2); O. Reg. 71/15, s. 12(1).

41. (2) Where an application for the issue of a licence, temporary licence or limited licence is referred to the Experience Requirements Committee pursuant to the Act, the Committee shall,
(a) assess the experience qualifications of the applicant;
(b) determine whether the applicant meets the experience requirements prescribed by this Regulation and so advise the Registrar; and
(c) if the Committee determines that the applicant does not meet the experience requirements, specify the experience requirements that the applicant must meet, for the purposes of the notice referred to in subsection 14(6) of the Act. R.R.O. 1990, Reg. 941, s. 41(2); O. Reg. 71/15, s. 13.

43. The requirements for the issuance of a temporary licence are payment of the fee prescribed by this Regulation for the temporary licence and one of the following:

...

3. Not less than 10 years of experience in the practice of professional engineering that is relevant to the work to be undertaken under the temporary licence, and wide recognition in relation to the practice. R.R.O. 1990, Reg. 941, s. 43; O. Reg. 71/15, s. 14.

52. (4) Every holder of a limited licence shall have a seal of a design approved by the Council, the impression of which shall include,

(a) the surname and initials of the holder of the limited licence;

(b) the words "Limited Licensee" and "Association of Professional Engineers of Ontario";

(c) the limited licence number;

(d) a statement that the limited licence is limited to the services within the practice of professional engineering mentioned in the limited licence; and

(e) Revoked: O. Reg. 13/03, s. 15(3).

(f) a statement of the limitations on the limited licence that may affect the public. R.R.O. 1990, Reg. 941, s. 52(4); O. Reg. 13/03, s. 15(3); O. Reg. 71/15, s. 19(3).

58. The Registrar, upon the granting or refusing of an application for a designation or redesignation shall mail or send electronically forthwith to the applicant a notice stating,

(a) that the applicant has or has not been granted a designation or redesignation as a consulting engineer, as the case may be; and

(b) in the case of a refusal to grant the designation or redesignation, the reasons therefor. R.R.O. 1990, Reg. 941, s. 58; O. Reg. 71/15, s. 21.

65. The Registrar upon the granting or refusing of an application for reconsideration of an application for designation or redesignation shall mail or send electronically forthwith to the applicant a notice stating,

(a) that the prior refusal of designation or redesignation as a consulting engineer has been confirmed or that the application for designation or redesignation as a consulting engineer has been granted, as the case may be; and

(b) In the case of a confirmation of a refusal to grant the designation or redesignation, the reasons therefor. R.R.O. 1990, Reg. 941, s. 65; O. Reg. 71/15, s. 22.

74. (1) Subject to subsection (2), a holder of a certificate of authorization must be insured against professional liability under a policy of professional liability insurance which complies with the following minimum requirements:

...

(3) The notice under clause 2(d) shall be in the form provided by the Association for the purpose, and shall be signed by,

(a) in the case of a holder who is a natural person, the person;

(b) in the case of a holder that is a corporation, an officer or director of the corporation;

(c) in the case of a holder that is a partnership, a partner in the partnership; or

(d) in the case of a holder that is a partnership of corporations, an officer or director of a partner in the partnership. O. Reg. 71/15, s. 23.

77. The following is the Code of Ethics of the Association:

1. It is the duty of a practitioner to the public, to the practitioner's employer, to the practitioner's clients, to other members of the practitioner's profession, and to the practitioner to act at all times with,

(i) fairness and loyalty to the practitioner's associates, employer, clients, subordinates and employees,

(ii) fidelity to public needs,

(iii) devotion to high ideals of personal honour and professional integrity,

(iv) knowledge of developments in the area of professional engineering relevant to any services that are undertaken, and

(v) competence in the performance of any professional engineering services that are undertaken. O. Reg. 71/15, s. 24(1).

...

3. A practitioner shall act in professional engineering matters for the practitioner's employer as a faithful agent or trustee and shall regard as confidential information obtained by the practitioner as to the business affairs, technical methods or processes of an employer and avoid or disclose a conflict of interest that might influence the practitioner's actions or judgment. O. Reg. 71/15, s. 24(2).

78.2 If a document is submitted under this Regulation to the Registrar on-line through the Association's website, a statement or information contained in the document that is required to be certified as true and correct by a person is deemed to have been so certified once the application is submitted. O. Reg. 71/15, s. 25.

TABLE 1 Revoked: O. Reg. 71/15, s. 26

SCHEDULE 1

1. The Western Region includes that part of Ontario lying south and west of a line drawn as follows:
Beginning at the Canada-United States border at the Town of Fort Erie on the Niagara River, north along the Niagara River to the Town of Niagara-on-the-Lake on the shoreline of Lake Ontario; then west along the shoreline of Lake Ontario to the boundary between the City of Burlington and the Town of Oakville; then north along that boundary to its northern end; continuing north along the same line to Highway 407; then west on Highway 407 to Halton Regional Road 5; continuing west along Halton Regional Road 5 to the western boundary of The Regional Municipality of Halton; then north along that boundary to Highway 401; then east on Highway 401 to Halton Regional Road 25; then north on Halton Regional Road 25, which becomes Wellington County Road 125, to Wellington County Road 124; then west on Wellington County Road 124 to Wellington County Road 26; then north on Wellington County Road 26 to Wellington County Road 18; then east on Wellington County Road 18, which becomes Dufferin County Road 3, to Dufferin County Road 24; then north on Dufferin County Road 24 to Dufferin County Road 109; then west on Dufferin County Road 109 to Dufferin County Road 25; then north on Dufferin County Road 25 to Highway 89; then east on Highway 89 to Dufferin County Road 124; then north on Dufferin County Road 124 to the northern boundary of the County of Dufferin; then north along the eastern boundary of the County of Grey to Grey County Road 19; then northwest on Grey County Road 19 to Nottawasaga Bay.

2. The West Central Region includes that part of Ontario lying within a line drawn as follows:
Beginning at Lake Ontario at the boundary between the City of Burlington and the Town of Oakville, north along that boundary to its northern end; continuing north along the same line to Highway 407; then west on Highway 407 to Halton Regional Road 5; continuing west along Halton Regional Road 5 to the western boundary of The Regional Municipality of Halton; then north along that boundary to Highway 401; then east on Highway 401 to Halton Regional Road 25; then north on Halton Regional Road 25, which becomes Wellington County Road 125, to Wellington County Road 124; then west on Wellington County Road 124 to Wellington County Road 26; then north on Wellington County Road 26 to Wellington County Road 18; then east on Wellington County Road 18, which becomes Dufferin County Road 3, to Dufferin County Road 24; then north on Dufferin County Road 24 to Dufferin County Road 109; then west on Dufferin County Road 109 to Dufferin County Road 25; then north on Dufferin County Road 25 to Highway 89; then east on Highway 89 to Dufferin County Road 124; then north on Dufferin County Road 124 to the northern boundary of the County of Dufferin; then east along the northern boundary of the County of Dufferin to its eastern boundary; then south along the eastern boundary of the County of Dufferin to the northern boundary of The Regional Municipality of Peel; then east on the northern boundary of The Regional Municipality of Peel to the eastern boundary of The Regional Municipality of Peel; then south along the eastern boundary of The Regional Municipality of Peel to the southern boundary of The Regional Municipality of York; then east along the southern boundary of The Regional Municipality of York to the West Don River; then south and southeast along the West Don River to Yonge Street; then south on Yonge Street to Yorkville Avenue; then west on Yorkville Avenue to Bay Street; then south on Bay Street to College Street; then east on College Street to Yonge Street; then south on Yonge Street to Lake Ontario; then west along the shoreline of Lake Ontario, but including the Toronto Islands, to the boundary between the City of Burlington and the Town of Oakville.

3. The East Central Region includes that part of Ontario lying within a line drawn as follows:
Beginning at Georgian Bay at the eastern end of the northern boundary of The District Municipality of Muskoka, east along that boundary to the western boundary of Algonquin Provincial Park; then south along the western boundary of Algonquin Provincial Park to the northern boundary of the County of Haliburton; then west and then south and then west and then south along the northern boundary of the County of Haliburton to the central portion of the northern boundary of the City of Kawartha Lakes; then west and then south and then

west and then south along the northern boundary of the City of Kawartha Lakes to the northern boundary of The Regional Municipality of Durham; then west along the northern boundary of The Regional Municipality of Durham to its western boundary; then south along the western boundary of The Regional Municipality of Durham to York Regional Road 32; then northeast following a line to the junction where Highway 7 and Highway 12 meet; then east on Highway 7 to the western boundary of the City of Kawartha Lakes; then south and then east and then south along the western boundary of the City of Kawartha Lakes to the northern boundary of The Regional Municipality of Durham; then east along the northern boundary of The Regional Municipality of Durham to its eastern boundary; then south along the eastern boundary of The Regional Municipality of Durham to Lake Ontario; then west along the shoreline of Lake Ontario to Yonge Street; then north on Yonge Street to College Street; then west on College Street to Bay Street; then north on Bay Street to Yorkville Avenue; then east on Yorkville Avenue to Yonge Street; then north on Yonge Street to the West Don River; then north and northwest along the West Don River to the southern boundary of The Regional Municipality of York; then west along the southern boundary of The Regional Municipality of York to its western boundary; then north along the western boundary of The Regional Municipality of York to the southern boundary of the County of Simcoe; then west and then north and then west and then north along the western boundary of the County of Simcoe to Grey County Road 19; then northwest on Grey County Road 19 to Nottawasaga Bay.

4. The Eastern Region includes that part of Ontario lying within a line drawn as follows:
Beginning at Lake Ontario at the western boundary of the County of Northumberland, north along that boundary to the southern boundary of the City of Kawartha Lakes; then west along the southern boundary of the City of Kawartha Lakes to its western boundary; then north and then west and then north along the western boundary of the City of Kawartha Lakes to Highway 7; then west on Highway 7 to the junction where Highway 7 and Highway 12 meet; then southwest following a line to the eastern end of York Regional Road 32; then north along the western boundary of The Regional Municipality of Durham to its northern boundary; then east along the northern boundary of The Regional Municipality of Durham to the western boundary of the City of Kawartha Lakes; then north and then east and then north and then east along the western boundary of the City of Kawartha Lakes to the western boundary of the County of Haliburton; then north and then east and then north and then east along the northern boundary of the County of Haliburton to the western boundary of Algonquin Provincial Park; then north along the western boundary of Algonquin Provincial Park to its northern boundary; then east along the northern boundary of Algonquin Provincial Park to the western boundary of the County of Renfrew; then north along the western boundary of the County of Renfrew to the Ottawa River.

5. The Northern Region includes that part of Ontario lying north of a line drawn as follows:
Beginning at the Ottawa River at the western boundary of the County of Renfrew, south along that boundary to the northern boundary of Algonquin Provincial Park; then west along the northern boundary of Algonquin Provincial Park to its western boundary; then south along the western boundary of Algonquin Provincial Park to the southern boundary of the Territorial District of Parry Sound; then west along the southern boundary of the Territorial District of Parry Sound to Georgian Bay; then northwest following a line through Georgian Bay to the mid-point in the main channel between the Bruce Peninsula and Manitoulin Island; then west following a line to the Canada-United States border. O. Reg. 71/15, s. 27.

CHANGES TO REGULATION 941 EFFECTIVE JULY 1

32.1 (1) For the purposes of clause 20.1(1)(c) of the Act, in order to be accepted as an engineering intern, an applicant for a licence must meet the academic requirements for a licence prescribed by this Regulation or be in the process of completing the examinations required by the Academic Requirements Committee in order to meet those requirements. O. Reg. 71/15, 10.

(2) Engineering interns have the following privileges:

1. An engineering intern is a member of the Chapter in the Region in which he or she resides and,
   i. may vote in the Chapter's elections, and
   ii. subject to the Chapter's by-laws, may serve as a member of the Chapter executive.
2. An engineering intern may attend annual meetings of Members and meetings of the Council, but is not entitled to vote at an annual meeting.

3. An engineering intern may be appointed to a committee established by the Council, except as otherwise provided in the Act, the regulations or the by-laws.

4. An engineering intern is entitled to receive from the Association,
   i. notice of annual meetings of Members,
   ii. notice of the results of elections held under the Act,
   iii. issues of the Association's official publication, and
   iv. any other notice, document or information provided by the Association and intended for members of the class.

5. An engineering intern is entitled to receive from the executive of the Chapter in which he or she is a member any notice, document or information provided by the executive and intended for engineering interns. O. Reg. 71/15, s. 10.

40. (4) For the purposes of clause 14(4)(b) of the Act, the Registrar shall refer to the Academic Requirements Committee every application for a limited licence made on or after the day section 16 of Ontario Regulation 71/15 comes into force. O. Reg. 71/15, s. 12(2).

44. (1) It is a term and condition of every temporary licence that the holder of the temporary licence must collaborate with a Member in the practice of professional engineering in respect of the work undertaken under the temporary licence, unless the holder provides evidence of one of the following:
1. At least 12 months of experience in the practice of professional engineering that is relevant to the work to be undertaken under the temporary licence and that was acquired in a Canadian jurisdiction under the supervision of one or more persons who are legally authorized to engage in the practice of professional engineering in a Canadian jurisdiction.
2. Wide recognition in the practice of professional engineering that is relevant to the work to be undertaken under the temporary licence and that the holder is knowledgeable about all codes, standards and laws relevant to that work. O. Reg. 71/15, s. 15.

(1.1) Experience acquired outside Canada satisfies the requirements of paragraph 1 of subsection (1) if it meets the criteria set out under subsection 33(2). O. Reg. 71/15, 15.

46. (1) The following are prescribed as requirements and qualifications for the issuance of a limited licence:
1. The applicant shall demonstrate that he or she holds a three-year degree or diploma in an engineering, technology or science program or has equivalent educational qualifications, and possesses the knowledge base corresponding to the scope of services within the practice of professional engineering to be provided under the limited licence.
2. The applicant shall demonstrate at least eight years of experience in the practice of professional engineering that meets the criteria set out in the document titled "Guide to the Required Experience for a Limited Licence in Ontario" and dated March 2014, published by and available from the Association, with at least six years of the experience corresponding to the scope of services within the practice of professional engineering to be provided under the limited licence and at least four of those six years' experience being acquired in a Canadian jurisdiction under the supervision of one or more persons who are legally authorized to engage in the practice of professional engineering in a Canadian jurisdiction.
3. The applicant shall pass the Professional Practice Examination.
4. The applicant shall demonstrate that he or she is of good character.
5. The applicant shall submit to the Registrar a completed application in the form titled "Limited Licence Application", dated November 2013 and available from the Association.
6. The applicant shall pay the applicable fees prescribed by this Regulation. O. Reg. 71/15, s. 16.

(2) This section, as it read immediately before the day section 16 of Ontario Regulation 71/15 comes into force, continues to apply in respect of every application for a limited licence that is made but not finally dealt with before that day. O. Reg. 71/15, s. 16.

46.0.1. (1) The engineering technologist class of limited licence is established. O. Reg. 71/15, s. 17.

(2) The Registrar shall issue an engineering technologist class of limited licence to any person who, in addition to meeting the requirements for a limited licence set out in section 46, demonstrates that he or she is a certified member in good standing with the Ontario Association of Certified Engineering Technicians and Technologists and holds a Certified Engineering Technologist title with that body. O. Reg. 71/15, s. 17.

(3) A reference in this Regulation to the holder of a limited licence includes reference to the holder of an engineering technologist class of limited licence, unless the context requires otherwise. O. Reg. 71/15, s. 17.

(4) If the holder of an engineering technologist class of limited licence indicates in an annual renewal form under section 50 or a notice of a change under section 50.1 that he or she is no longer a certified member in good standing with the Ontario Association of Certified Engineering Technicians and Technologists and no longer holds a Certified Engineering Technologist title with that body, the Registrar shall reissue the holder's engineering technologist class of limited licence as a limited licence. O. Reg. 71/15, s. 17.

(5) If the Registrar otherwise discovers that the holder of an engineering technologist class of limited licence is no longer a certified member in good standing with the Ontario Association of Certified Engineering Technicians and Technologists and no longer holds a Certified Engineering Technologist title with that body, the Registrar shall, after giving 60 days notice to the holder, reissue the holder's engineering technologist class of limited licence as a limited licence. O. Reg. 71/15, s. 17.

(6) No fee is payable by the holder for the reissuance of a limited licence under this section. O. Reg. 71/15, s. 17.

(7) The holder of a limited licence issued under this section shall forthwith deliver to the Registrar his or her engineering technologist class of limited licence, together with the related seal. O. Reg. 71/15, s. 17.

(8) The Registrar shall reissue a limited licence issued under this section as an engineering technologist class of limited licence, if the holder,

(a) demonstrates that he or she has been reinstated as a certified member in good standing with the Ontario Association of Certified Engineering Technicians and Technologists and holds a Certified Engineering Technologist title with that body; and

(b) pays the fee prescribed by this Regulation for the issuance of the seal described in subsection 52(5). O. Reg. 71/15, s. 17.

(9) Subsections (4), (5) and (8) apply only if the holder continues to meet the requirements for a limited licence. O. Reg. 71/15, s. 17.

47. The following are prescribed as requirements and qualifications for the issuance of a certificate of authorization:

1. The applicant shall designate as the person or persons who will assume responsibility for and supervise the services within the practice of professional engineering to be provided under the certificate of authorization one or more holders of,
   i. a licence,
   ii. a temporary licence, or
   iii. a limited licence, if the application for the limited licence was made on or after the day section 16 of Ontario Regulation 71/15 came into force.
2. The applicant shall submit to the Registrar a completed application in the form titled "Application for Certificate of Authorization", dated November 2013 and available from the Association.
3. The applicant shall pay the application fee and the annual fee prescribed by this Regulation. O. Reg. 71/15, s. 18.

48. Every certificate of authorization that is issued by the Registrar shall contain a description of any terms and conditions to which it is subject under the Act. O. Reg. 71/15, s. 18.

49. (1) If a holder of a temporary licence is the only person

assuming responsibility for and supervising the services within the practice of professional engineering to be provided under a certificate of authorization, the certificate of authorization expires on the date on which the holder's temporary licence expires. O. Reg. 71/15, s. 18.

(2) If two or more holders of a temporary licence are the only persons assuming responsibility for and supervising the services within the practice of professional engineering to be provided under a certificate of authorization, the certificate of authorization expires on the date on which the last of the temporary licences expires. O. Reg. 71/15, s. 18.

50. Every year, every holder of a certificate of authorization shall, on or before the anniversary of the date on which the certificate was issued,

(a) submit to the Registrar a completed annual renewal form, provided by the Association for the purpose, indicating whether the information contained in the registers in respect of the certificate is current and correct and providing information respecting any necessary changes or corrections; and

(b) pay the annual fee prescribed by this regulation. O. Reg. 71/15, s. 18.

50.1(1) Every holder of a licence, temporary licence, provisional licence, limited licence or certificate of authorization shall give to the Registrar notice, in the form provided by the Association for the purpose, of any change in the information contained in the registers relating to the holder. O. Reg. 71/15, s. 18.

(2) The notice of a change shall indicate the date on which the change occurred and be submitted no later than 30 days after that date. O. Reg. 71/15, s. 18.

52. (4) Subject to section (5), every holder of a limited licence shall have a seal of a design approved by the Council, the impression of which shall include,

(a) the surname and initials of the holder of the limited licence;

(b) the words "Association of Professional Engineers of Ontario" and one or more of the following:

(i) "Limited Engineering Licensee";

(ii) "titulaire de permis restreint d'ingénieur";

(iii) "LEL";

(iv) "PRI";

(c) the limited licence number;

(d) a statement that the limited licence is limited to the services within the practice of professional engineering mentioned in the limited licence; and

(e) Revoked: O. Reg. 13/03, s. 15(3).

(f) a statement of the limitations on the limited licence that may affect the public. R.R.O. 1990, Reg. 941, s. 52(4); O. Reg. 13/03, s. 15(3); O. Reg. 71/15, s. 19(3).

(5) In the case of a holder of an engineering technologist class of limited licence, clause 4(b) does not apply, and the holder's seal shall instead include the words "Association of Professional Engineers of Ontario" and one or more of the following:

1. "Licensed Engineering Technologist".
2. "technologue en ingénierie titulaire de permis".
3. "LET".
4. "TITP." O. Reg. 71/15, s. 19(4).

55.1 (3) The following are the titles and abbreviations that may be used in the practice of professional engineering by the holder of an engineering technologist class of limited licence:

1. "Licensed Engineering Technologist" or "technologue en ingénierie titulaire de permis".
2. "LET" or "TITP." O. Reg. 71/15, s. 20.

PENDING AMENDMENTS TO THE *PROFESSIONAL ENGINEERS ACT* BEING PROCLAIMED JULY 1, 2015

Regulations

7. (1) Subject to the approval of the Lieutenant Governor in Council and with prior review by the Minister, the Council may make regulations,

...

8. governing persons as engineering interns under section 20.1, including setting out the academic requirements necessary for acceptance as an engineering intern and the rights and privileges of engineering interns, and prescribing and governing other classes of persons whose interests are related to those of the Association; 2010, c. 16, Sched. 2, ss. 5(9), 6(2).

When licences or certificates required

EXCEPTIONS

12. (3) Subsections (1) and (2) do not apply to prevent a person,

...

(b) from doing an act that is within the practice of professional engineering where a professional engineer or limited licence holder assumes responsibility for the services within the practice of professional engineering to which the act is related; 2010, c. 16, Sched. 2, ss. 5(18), 6(2).

Issuance of certificate of authorization

SAME

15. (4.1) Where a holder of a limited licence assumes responsibility for and supervises the practice of professional engineering related to the services provided by the holder of a certificate of authorization, the certificate of authorization is subject to the same terms and conditions prescribed by the regulations that apply to the limited licence. 2010, c. 16, Sched. 2, s. 5(26).

SUSPENSION OF EFFECT OF CERTIFICATE OF AUTHORIZATION

(5) A holder of a certificate of authorization ceases to be entitled to offer to the public or to provide to the public services that are within the practice of professional engineering as soon as there is no holder of a licence, temporary licence or limited licence who assumes responsibility for and supervises the practice of professional engineering provided by the holder of the certificate of authorization. R.S.O. 1990, c. P.28, s. 15(5); 2010, c. 16, Sched. 2, ss. 5(27), 6(2).

NOTICE TO REGISTRAR BY HOLDER OF CERTIFICATE OF AUTHORIZATION

(6) The holder of a certificate of authorization must give notice to the Registrar when there ceases to be a holder of a licence, temporary licence or limited licence who assumes responsibility for and supervises the practice of professional engineering by the holder of the certificate of authorization and when the holder of the certificate of authorization designates another holder of a licence, temporary licence or limited licence to assume such responsibility and carry out such supervision. R.S.O. 1990, c. P.28, s. 15(6); 2010, c. 16, Sched. 2, ss. 5(28), 6(2).

NOTICE TO REGISTRAR BY PERSON IN POSITION OF PROFESSIONAL RESPONSIBILITY

(7) A holder of a licence, temporary licence or limited licence who ceases to be responsible for and to supervise the practice of professional engineering by a holder of a certificate of authorization as the person so designated by the holder of the certificate of authorization shall give notice of the cessation forthwith to the Registrar. R.S.O. 1990, c. P.28, s. 15(7); 2010, c. 16, Sched. 2, ss. 5(29), 6(2).

Supervision under certificate of authorization

17. (1) It is a condition of every certificate of authorization that the holder of the certificate shall provide services that are within the practice of professional engineering only under the personal supervision and direction of a holder of a licence, temporary licence or limited licence. R.S.O. 1990, c. P.28, s. 17(1); 2010, c. 16, Sched. 2, ss. 5(30), 6(2).

PROFESSIONAL RESPONSIBILITY OF SUPERVISING ENGINEER

(2) A holder of a licence, temporary licence or limited licence who personally supervises and directs the providing of services within the practice of professional engineering by a holder of a certificate of authorization or who assumes responsibility for and supervises the practice of professional engineering related to the providing of services by a holder of a certificate of authorization is subject to the same standards of professional conduct and competence in respect of the services and the related practice of professional engineering as if the services were provided or the practice of professional engineering was engaged in by the holder of a licence, temporary licence or limited licence. R.S.O. 1990, c. P.28, s. 17(2); 2010, c. 16, Sched. 2, ss. 5(31), 6(2).

Engineering interns

20.1(1) The Registrar shall accept as an engineering intern any applicant for a licence, if,

(a) in submitting the application for a licence, the applicant requests in writing to become an engineering intern;

(b) the applicant is enrolled in the Association's engineering intern training program; and

(c) the applicant meets the academic requirements prescribed by the regulations. 2010, c. 16, Sched. 2, s. 5(40).

REVOCATION FOR NON-PAYMENT

(2) The Registrar may revoke a person's status as an engineering intern for non-payment of any fee that is payable by the person under this Act. 2010, c. 16, Sched. 2, s. 5(40).

TERMINATION

(3) Subject to a revocation under subsection (2), a person ceases to be an engineering intern on the earlier of the day that his or her application for a licence is finally dealt with or the day that he or she withdraws the application. 2010, c. 16, Sched. 2, s. 5(40).

Registers

21. (1) The Registrar shall maintain one or more registers containing the following information:

1. Every holder of a licence, certificate of authorization, temporary licence, provisional licence or limited licence.
2. The terms, conditions and limitations attached to every licence, certificate of authorization, temporary licence, provisional licence and limited licence.
3. Every revocation, suspension and cancellation or termination of a licence, certificate of authorization, temporary licence, provisional licence or limited licence.
4. Every person who is an engineering intern under section 20.1.
5. Any other information that the Registration Committee or Discipline Committee directs. 2010, c. 16, Sched. 2, s. 5(41).

Offences and penalties

OFFENCE, USE OF TERM "LICENSED ENGINEERING TECHNOLOGIST", ETC.

40. (3.1) Every person who is not the holder of the engineering technologist class of limited licence prescribed under subparagraph 9v.2 of subsection 7(1) and who uses the title "Licensed Engineering Technologist" or "technologue en ingénierie titulaire de permis" or the initials "LET" or "TITP" in a manner that will lead to a belief that the person is the holder of the engineering technologist class of limited licence is guilty of an offence, and on conviction is liable for the first offence to a fine of not more than $10,000 and for each subsequent offence to a fine of not more than $25,000. 2010, c. 16, Sched. 2, s. 5(64).

OFFENCE, USE OF TERM "ENGINEERING INTERN", ETC.

(3.2) Every person who is not an engineering intern under section 20.1 and who uses any of the following terms, titles or descriptions in a manner that will lead to a belief that the person is an engineering intern under that section is guilty of an offence, and on conviction is liable for the first offence to a fine of not more than $10,000 and for each subsequent offence to a fine of not more than $25,000:

1. The title "engineering intern" or "stagiaire en ingénierie" or any abbreviation or variation of the title.
2. The initials "EIT" or "SI".
3. Any other term, title or description that will lead to the belief that the person is an engineering intern under section 20.1. 2010, c. 16, Sched. 2, s. 5(64).

LIABILITY OF PARTNERS

(6) Where a person who is guilty of an offence under subsection (1), (2), (3), (3.1), (3.2) or (4) is a member or an employee of a partnership, every member of the partnership who authorizes, permits or acquiesces in the offence is guilty of an offence and on conviction is liable to a fine of not more than $50,000. R.S.O. 1990, c. P.28, s. 40(6); 2010, c. 16, Sched. 2, ss. 5(65), 6(2).

LIMITATION

(7) Proceedings shall not be commenced in respect of an offence under subsection (1), (2), (3), (3.1), (3.2), (4), (5) or (6) after two years after the date on which the offence was, or is alleged to have been, committed. R.S.O. 1990, c. P.28, s. 40(7); 2010, c. 16, Sched. 2, ss. 5(66), 6(2).

MARASIGAN ORDERED BY SUPERIOR COURT TO CEASE COPYING PROFESSIONAL ENGINEERING SEALS

DANILO "DAN" MARASIGAN of Toronto, Ontario, operating as DANMAR DESIGNS consented to a Superior Court order under s. 39 of the *Professional Engineers Act* on March 6, 2015, that he cease possessing or copying seals of professional engineers. PEO sought the order based on allegations that Marasigan had copied the seals of four different professional engineers onto drawings and documents that had neither been prepared by nor reviewed by a licence holder. Further charges under s. 40 of the act seeking a fine for illegal seal use are currently pending in the Ontario Court of Justice.

CHHANIYARA FINED $10,000 BY ONTARIO COURT FOR ILLEGAL USE OF SEAL

On April 7, the Ontario Court of Justice fined DILIP CHHANIYARA of Brampton $10,000 for copying a professional engineer's seal. In assessing the fine, His Worship R.J. Cotter considered the need to deter other unlicensed people from this action because of the risk of harm to the public. Chhaniyara was convicted of breaching the *Professional Engineers Act* for copying the seal of a professional engineer onto seven different drawings for two building projects in 2013.

Chhaniyara has never been licensed as an engineer by PEO.

The matter came to PEO's attention after a professional engineer became aware of drawings that carried an engineer's seal had been filed with two building departments, but that the engineer in question had not created or sealed. The drawings were part of building permit applications for a restaurant in Brampton and a catering business in Mississauga and included proposed sprinkler head locations and a proposed drainage layout. An investigation by PEO found the seals on the drawings to be fake. Nick Hambleton, student-at-law, represented PEO in this matter.

Please report any person or company you suspect is violating the act. Call the PEO enforcement hotline at 416-224-9528, ext. 1444 or 800-339-3716, ext. 1444. Or email your questions or concerns to enforcement@peo.on.ca.

Professional Engineers Ontario

Order form is online at www.peo.on.ca

PUBLICATIONS ORDER FORM

	$	No.	Total
The Professional Engineers Act, R.S.O. 1990, Chapter P.28	N/C		
Ontario Regulation 941/90	N/C		
Ontario Regulation 260/08	N/C		
By-law No. 1	N/C		
Practice Guidelines			
Acting as Contract Employees (2001)	10.00		
Acting as Independent Contractors (2001)	10.00		
Acting Under the Drainage Act (1988)	10.00		
Acoustical Engineering Services in Land-Use Planning (1998)	10.00		
Building Projects Using Manufacturer-Designed Systems & Components (1999)	10.00		
Commissioning Work in Buildings (1992)	10.00		
Communications Services (1993)	10.00		
Conducting a Practice Review (2014)	10.00		
Developing Software for Safety Critical Engineering Applications (2013)	10.00		
Engineering Evaluation Reports for Drinking Water Systems (2014)	10.00		
Engineering Services to Municipalities (1986)	10.00		
Environmental Site Assessment, Remediation & Management (1996)	10.00		
General Review of Construction as Required by Ontario Building Code (2009)	10.00		
Geotechnical Engineering Services (1993)	10.00		
Guideline to Professional Engineering Practice (2012)	10.00		
Human Rights in Professional Practice (2009)	10.00		
Land Development/Redevelopment Engineering Services (1994)	10.00		
Mechanical & Electrical Engineering Services in Buildings (1997)	10.00		
Professional Engineer as an Expert Witness (2011)	10.00		
Professional Engineer's Duty to Report (1991)	N/C		
Project Management Services (1991)	10.00		
Reports on Mineral Properties (2002)	10.00		
Reports for Pre-Start Health and Safety Reviews (2001)	10.00		
Reviewing Work Prepared by Another Professional Engineer (2011)	10.00		
Roads, Bridges & Associated Facilities (1995)	10.00		
Selection of Engineering Services (1998)	10.00		
Solid Waste Management (1993)	10.00		
Structural Engineering Services in Buildings (1995)	10.00		
Temporary Works (1993)	10.00		
Transportation & Traffic Engineering (1994)	10.00		
Use of Agreements Between Clients & Engineers (2000) (including sample agreement)	10.00		
Use of the Professional Engineer's Seal (2008)	10.00		
Using Software-Based Engineering Tools (2011)	10.00		
Business Publications			
Agreement Between Prime Consultant & Sub-Consultant (1993) per package of 10	10.00		
Licensing Guide & Application for Licence (2012)	N/C		
Required Experience for Licensing in Ontario (2013)	N/C		

Fax to: 416-224-8168 or 800-268-0496
Phone: 416-224-1100 or 800-339-3716
Mail to: Professional Engineers Ontario
40 Sheppard Ave. W., Suite 101
Toronto, ON M2N 6K9
Attn: Margaret Saldanha

Name

Address

City

Province

Postal Code

Tel

Fax

Shipping and handling is included. Please allow 10 days for delivery.

Subtotal

13% HST

Total

❑ Please charge to VISA number

(please list all numbers on card) Expiry Date

Signature

❑ I have enclosed a cheque or money order made payable to Professional Engineers Ontario.

Membership #

December 2014

[DATEPAD]

MAY 2015

MAY 21-22
14th Global Joint Seminar on Geo-Environmental Engineering,
Montreal, QC
csce.ca

MAY 25-27
4th Climate Change Technology Conference,
Montreal, QC
www.cctc2015.ca

MAY 27-30
Canadian Society for Civil Engineering Annual Conference,
Regina, SK
www.csce2015.ca

MAY 31-JUNE 3
Canadian Engineering Education Association Annual Conference,
Hamilton, ON
https://ceea.ca/en/conferences

MAY 31-JUNE 5
34th International Conference on Ocean, Offshore & Arctic Engineering,
St. John's, NL
www.asmeconferences.org/omae2015

JUNE 2015

JUNE 2-4
Canada Green Building Council National Conference & Expo,
Vancouver, BC
www.cagbc.org

JUNE 15-17
Western Manufacturing Technology Show,
Edmonton, AB
wmts.ca

JUNE 15-19
ASME Turbo Expo 2015,
Montreal, QC
www.asmeconferences.org/TE2015

JUNE 16-19
7th International Conference on Recent Advances in Space Technology,
Istanbul, Turkey
www.rast.org.tr

JUNE 22-26
AIAA Aviation & Aeronautics Forum & Exposition,
Dallas, TX
www.aiaa-aviation.org

JUNE 28-JULY 2
ASME Power & Energy 2015,
San Diego, CA
www.asmeconferences.org/powerenergy2015

JUNE 29-JULY 1
ASME Applied Mechanics & Materials Conference,
Seattle, WA
www.asmeconferences.org/McMat2015

JULY 2015

JULY 6-9
ASME 13th International Conference on Nanochannels, Microchannels & Minichannels,
San Francisco, CA
www.asmeconferences.org/interpackicnmm2015

JULY 12-16
International Conference on Environmental Systems,
Bellevue, WA
www.depts.ttu.edu/ceweb/ices

JULY 15-17
ASME International Pipeline Geotechnical Conference,
Bogota, Columbia
www.asmeconferences.org/ipg2015

JULY 26-29
American Society for Agricultural and Biological Engineering Annual International Meeting,
New Orleans, LA
asabemeetings.org

JULY 26-30
IEEE Power & Energy Society General Meeting,
Denver, CO
www.pes-gm.org/2015

JULY 27-29
AIAA/SAE/ASEE Joint Propulsion & Energy Forum 2015,
Orlando, FL
www.aiaa-propulsionenergy.org

TAKE YOUR MPP TO WORK DAY CONTINUES TO GROW IN POPULARITY WITH CHAPTERS

By Howard Brown

Sophie Kiwala, MPP, Kingston and the Islands (in grey jacket), participated in Kingston Chapter's first Take Your MPP to Work Day, which was hosted at the Bombardier Transportation Systems engineering site in Kingston on March 13. With Kiwala are, from left to right, Frederick Bourgoin, P.Eng., manager, test and commissioning, Bombardier Transportation; Sangeeta Shakrawar, EIT; Bruce Anderson, P.Eng.; Chris Van Der Vyver, director of engineering, Bombardier; Florentin Blejdea, general manager and head of operations, Bombardier; Doug Hamilton, P.Eng., Kingston Chapter chair; Darla Campbell, P.Eng., PEO Government Liaison Committee chair; Harald Muller-Scholten, EIT, Kingston Chapter secretary; Charles Kidd, P.Eng., PEO Eastern Region councillor; Doug Hatfield, P.Eng., Kingston Chapter treasurer; Susan Clancy, finance manager, Bombardier; and Marko Kroenke, director of product development, Bombardier. Missing from the photo is Kingston Chapter GLP Chair Hafiz Bashir, P.Eng.

IN THE TWO YEARS since PEO first launched its Take Your MPP to Work Day, it has become one of PEO's most successful Government Liaison Program initiatives.

On March 13, Sophie Kiwala, the new MPP for Kingston and the Islands, participated in the program.

Kiwala, who is also the parliamentary assistant to the minister of tourism, culture and sport, spoke in the legislature on March 30 to describe her experience:

"Mr. Speaker, I rise to acknowledge our province's world-class engineers. Recently, I was asked by Professional Engineers Ontario to take part in their 'Take Your MPP to Work program.'

"I would like to thank Darla Campbell, P.Eng., and Hafiz Bashir, P.Eng., the government liaison chairs [provincially and locally], for putting the event together.

"The good work done by our diligent engineers largely takes place behind the scenes, but one major aspect of their work–safety–affects us all every day.

"I commend PEO for their leadership in developing standards that prioritize the safety of Ontarians and, furthermore, I would like to recognize them for encouraging female participation in engineering.

"We still have a ways to go, but with their strong support, and three of the last five presidents being women, including Annette Bergeron [P.Eng., FEC] from my riding of Kingston and the Islands, PEO has established positive, inspiring female role models for the engineers of tomorrow.

"Going to the 'front lines' (in my community) is a priority for me, so I was thrilled that my visit took me to Bombardier's state-of-the-art light rail transit design, testing and manufacturing facility just outside Kingston.

"Their 450-plus highly skilled employees are, right now, building rail transit for cities around the globe literally from the ground up for delivery to South Africa, Brazil, Kuala Lumpur and Vancouver.

"Mr. Speaker, at a time when governments are focusing on environmental stewardship and fiscal responsibility, it is very exciting that rail transit optimized to these requirements is being produced right here in Ontario."

Bashir is the GLP chair for PEO's Kingston Chapter and a member of the PEO Government Liaison Committee, which is chaired by Campbell.

Based on a similar initiative by the Registered Nurses Association of Ontario, PEO's Take Your MPP to Work Days have attracted the following MPPs at events across the province:

- Kevin Flynn, MPP (Oakville), minister of labour, visited Siemens Canada with PEO's Oakville Chapter. At the time, he was the parliamentary assistant to the minister of transportation;

- Cindy Forster, MPP (Welland), NDP labour critic and caucus chair, visited Niagara College with PEO's Niagara Chapter. At the time, she was NDP municipal affairs and housing critic;
- Bob Bailey, MPP (Sarnia-Lambton), PC natural resources critic, visited Shell Canada's refinery facility in Sarnia with PEO's Lambton Chapter;
- Mike Colle, MPP (Eglinton-Lawrence), parliamentary assistant to the minister of labour, visited the Toronto Rehabilitation Institute with PEO's West Toronto Chapter. At the time, he was the parliamentary assistant to the minister of transportation;
- Teresa Armstrong, MPP (London-Fanshawe), NDP critic for citizenship, immigration and international trade and seniors' affairs, visited the Upper Thames Valley Conservation Authority with PEO's London Chapter; and
- Arthur Potts, MPP (Beaches-East York), parliamentary assistant to the minister of agriculture, food and rural affairs, visited the R. C. Harris Water Treatment Plant with PEO's East Toronto Chapter.

"This initiative has taken on a life of its own," says Jeannette Chau, P.Eng., PEO's manager, student and government liaison programs. "Chapters are coming forward and volunteering to host the Take Your MPP to Work Days. MPPs are excited to be involved and so are the companies invited. It is an excellent way for PEO chapters and professional engineers to build a relationship with their local MPPs, and for MPPs to learn about the contributions engineers and engineering companies make to their local communities through their work, and the mandate of PEO to regulate professional engineering to protect public safety."

"The success of the initiative is largely a result of the enthusiasm of PEO chapter GLP representatives working closely with their MPPs," says Chau.

"Each one is so unique," says Campbell, who has participated in four of the Take Your MPP to Work Days. "I think we have found a way to really connect with our elected officials." Σ

Howard Brown is president of Brown & Cohen Communications & Public Affairs Inc. and is PEO's government relations consultant.

Inspiring Innovators

By Sharon Aschaiek, Nicole Axworthy, Jennifer Coombes and Michael Mastromatteo

Innovation and entrepreneurship are continually emphasized as avenues for professional engineers to make lasting contributions to the development of safer, sustainable, resilient and more robust communities. Engineers, in turn, are encouraged to tell better stories to celebrate the profession and demonstrate the ongoing relevance of the P.Eng. licence. The outstanding examples of engineering featured here are just a small sampling of vital innovation in action.

Cutting edge takes on new meaning with safety system

At first blush, it's difficult to see how a cutting device with precisely angled, multiple blades slicing through an aluminum frame would enhance human safety. But for William Altenhof, PhD, P.Eng., the proof is all there on the drawing board.

Altenhof is a professor of mechanical, automotive and materials engineering at the University of Windsor, who has made car passenger safety and child restraint systems the hallmark of his research.

The winner of an Engineering Medal in the young engineer category at the Ontario Professional Engineers Awards in 2008, Altenhof recently scored another triumph with the development of his axial cutting device system, which better protects vehicle passengers from the often devastating forces unleashed from collisions and high-speed impacts.

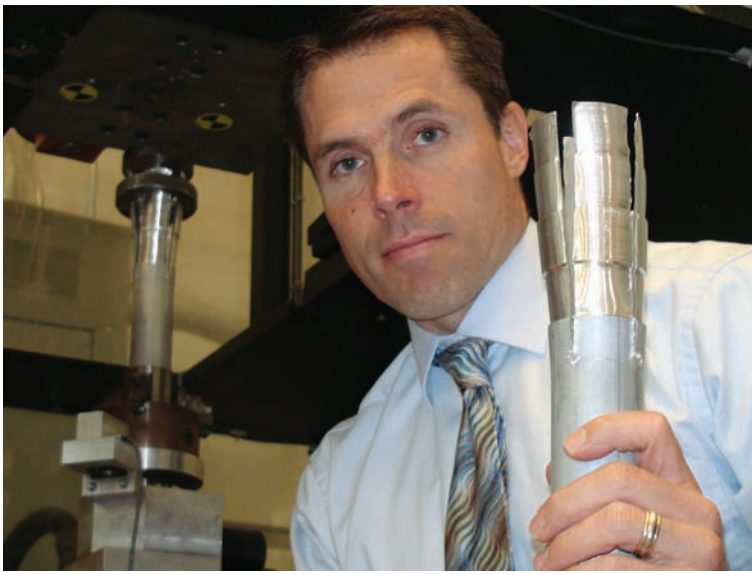
A product of materials engineering research, the device is an energy dissipating system that eliminates much of the guesswork about how materials crush and deform under strain.

In some ways, the axial cutting device is an enhancement of the crumple-zone passenger protection system developed by Mercedes Benz in the 1950s, and adopted by most auto manufacturers since. But where the crumple-zone technology dissipates energy more or less randomly, Altenhof's system adds an element of predictability to the process.

"We observed that some materials would fracture and then would actually cut through each other," Altenhof says. "And while they were cutting, we noticed that the load was quite constant. We said, 'Well, that's actually what you want. You want a constant force during the deformation.' So we came up with this whole concept of, rather than buckling a tube or folding it, we are slicing through it. And once we saw that, we opened the door to an incredible field."

Altenhof and his research team further experimented to reveal that cutting forces tend to proceed at constant rates, rather than haphazardly as with traditional energy dissipation. The discovery allows Altenhof to control more variables, such as thickness of the material, blade geometry and other factors, in designing the system to withstand specific loads.

"So, now the beauty is, if you come to me with a certain application and you say, 'I have this situation where I know that the force can be no greater than 20 kN,' I can design an energy absorber where the load will never exceed 20 kN, and will generally remain constant throughout all the deformation," he says.



William Altenhof, PhD, P.Eng., holds a cut aluminum extrusion illustrating the deformation of his energy absorber. Variation in the wall thickness of the extrusion is one method of "programming" the force/displacement and energy absorbing characteristics of the device.

Furthermore, if the thickness or other system parameters are wisely adjusted, a desired force/displacement or energy-dissipation response can be "programmed" into the system. This represents a passive, adaptive, energy-dissipation system.

Another benefit of the system, Altenhof adds, is that it's "strain rate insensitive," meaning that whatever the rate of the cutting action, the forces remain generally the same. Current energy-dissipation systems in automobiles are the opposite, or strain rate sensitive. "If you hit them at 100 kilometres an hour, or 50 km an hour or 20 km an hour, the actual force response will vary," Altenhof says. "And that's a problem because the designers need to know how to design the system. They know forces are going to change as a function of the impact velocity." Eliminating this variation in system performance is also appealing in dynamic loading conditions.

The axial cutting system was patented in January 2013 and Altenhof is negotiating with suppliers and the University of Windsor to commercialize the product.

Although its primary appeal is in the automotive sector, Altenhof sees how his device can be used in personal protective equipment, fall-arrest mechanisms, even sporting equipment.

He is especially enthusiastic about the breakthrough's potential as an active energy absorber/dissipation system, especially for the next generation of automobiles. Altenhof foresees ways to integrate the axial cutting device into all aspects of a vehicle's operation.

"For example, as you're driving, the vehicle will sense your speed," he says. "It will acknowledge what's around you. It will sense other conditions and the (safety) system will change as your driving conditions change. Envision your vehicle transforming and behaving in a certain way that's optimal for your kind of crash conditions." He believes an active, adaptive energy absorber could become the next generation of the system he is rolling out right now.

Given his track record of research into better protective devices, it's no surprise Altenhof sees safety as within the purview of innovative engineers. "It's amazing how we take safety for granted," he says. "The simplest activities in life really require engineering innovation to mitigate or completely eliminate the possibility of physical harm resulting from the chaos associated with these common daily activities–traveling in a car, working at heights, skating on ice, riding a bike, competing or playing in sporting activities, and so on."

He says innovation is key to ensuring engineers understand and identify mechanisms that would compromise safety and then develop devices to mitigate or eliminate such conditions "…so that we can all return home just as we left, in the same or better state."

Says Altenhof: "I think this is critically important as the fundamental role associated with our profession–to protect and enhance our society and its safety–is simply the purpose of these devices by ensuring safer environments during transit, work, employment, or other living and leisure activities."

Seeing is believing in image processing enhancement

There was once an advertisement for stereo speakers claiming the speakers' sound reproduction quality was "as good as you hear." A related advertising campaign might have described the image quality of cameras, TV screens, videos or computer monitors as "as good as you see."

The notion of exploiting technology to better approximate how the human eye perceives and appreciates image clarity is of special interest to Zhou Wang, PhD, P.Eng., associate professor of engineering at the University of Waterloo and the recipient of an EWR Steacie Memorial Fellowship from the Natural Sciences and Engineering Research Council of Canada.

The Steacie award recognizes Wang's work predicting "human visual perception" of image quality and providing more sensory-based ways of improving image quality in image processing and signal transmission applications.

The key plank of Wang's work is his development of the Structural Similarity Index (SSIM), described as a method for measuring the similarity between two images.

Wang can be considered a true innovator because his work initialized a paradigm shift in how to predict perceptual quality of images.

Zhou Wang, PhD, P.Eng., is working on how the human eye perceives the quality of digital images and video.

A member of the Institute of Electrical and Electronics Engineers' (IEEE's) Multimedia Signal Processing Technical Committee, Wang can be considered a true innovator because his work initialized a paradigm shift in how to predict perceptual quality of images.

In essence, the SSIM sheds more light on how the human eye perceives the quality of digital images and videos, based on how the data captured in the image is recorded and reassembled.

"It shows it's possible to have a conceptually and computationally simple model that can provide accurate predictions of image quality across a wide range of image content and distortion types," Wang says. "It also has a number of desirable mathematical features that allow researchers to use it in the design and optimization of various image-processing algorithms and systems."

Wang's work is considered an advance in the kinds of image-quality measurement systems used previously. "Most people in the field typically use mathematically convenient approaches, such as mean squared error, to measure image quality," he says. "Starting in the 1970s or earlier, a number of researchers realized the importance of developing perceptually meaningful measures for image quality, but existing measures were not widely adopted in practice due to low accuracy and high complexity."

Wang says SSIM helps identify the distortions or defects at every location in an image and predicts how annoying these defects are to the human visual system. "Repairing" an image is not what SSIM does, but the literature indicates significant follow-up work to design SSIM-motivated approaches to repair problematic images and better process,

enhance, compress and transmit images so as to avoid or reduce perceptual quality degradations.

"Since almost all images are eventually meant to be viewed by humans, perceived image quality is a critical issue in almost all image processing applications," Wang adds. "Therefore, a better perceptual quality predictor like SSIM can penetrate to essentially all such applications. It explains why our original paper has been cited more than 9000 times and accelerating in the past 10 years.

"Naturally, a number of large organizations, including Google, Netflix, Intel and Comcast, have exploited SSIM in their work, and its impact has spread into industries such as Internet TV, HDTV, video sharing, video conferencing, mobile video and image reproduction in the social media, entertainment, educational and even health sciences areas."

Among the innovator's upcoming objectives is improving the public's visual experience when watching videos transmitted via multiple networks and channels. "One particular application we are currently trying to push very hard on is to stabilize and improve the quality of network transmissions of video content, which will occupy over 80 per cent of Internet traffic in a few years," Wang says. "We have already developed an even more advanced tool named SSIMplus, and we believe it will make a major impact in the industry in the next few years."

A side view of one of Thermalfrost's chillers, which uses heat to generate cooling. It's currently being used for industrial and commercial purposes like fishing vessels and refrigerated trucks and could one day replace mechanical vapour compression refrigeration, which consumes electricity and uses pollution-causing refrigerants.

Electricity-free, thermally activated cooling technology has potential to revolutionize refrigeration

By harnessing waste heat that would otherwise pollute the atmosphere, Ottawa-based Thermalfrost International Inc. has developed and commercialized a cooling and refrigeration technology that its founders consider the world's most efficient thermal chiller.

Using heat to cool results in an approximately 90 per cent reduction in energy consumption for that cooling and is changing the way people and industry think about cooling. Waste heat, solar, biomass, geothermal and so on can all be used to provide freezing, air conditioning or refrigeration for industrial processes, commercial and residential buildings, or transportation applications. In fact, Thermalfrost's technology could be modified to satisfy most of the world's refrigeration needs, from fish refrigeration to running refrigerated trucks.

"We're striving to eliminate energy consumption for cooling, which accounts for 15 per cent of the world's energy," explains Thermalfrost President and CEO Steven Donaldson. "Lack of cooling greatly impacts food availability in developing countries where, in some cases, more than 30 per cent of food is lost due to spoilage."

These new systems are designed to replace mechanical vapour compression refrigeration systems that consume electricity and use pollution-causing refrigerants. The most compelling advantage of Thermalfrost's technology is the system's capability to harness low-grade heat (as low as 70 C) to generate low-temperature cooling (as low as -30 C) with unprecedented COP (coefficient of performance)–a ratio of cooling provided to energy consumed.

Developed by Carleton University engineering professor Junjie Gu, PhD, P.Eng., Thermalfrost's technology uses absorption refrigeration processes. With a good foundation of work from previous engineers and refrigeration experts to build upon, Gu's research focuses on the chemical bonding of the technology's unique sorptive pair (NH_3 and salts) and then on creating prototypes with improvements to the heat exchangers, design of the circulation system and efficiencies within the generator. "Doing so required research on each component of the chiller, and to improve the system by better understanding the heat and mass transfer within," Gu explains. His team's work at Carleton led to commercial potential for the company, where Gu remains as a senior technical advisor.

Since its inception in 2007, Thermalfrost has operated according to the philosophy that collaborating and consolidating new ideas and technology can improve the outcome of common market-driven goals. "Thermalfrost is a small company with a big vision," Donaldson says. "We recognized early that in order to reach our goals, we needed to collaborate with many to succeed and accelerate our time to market."

The Ontario Centres of Excellence and the Ontario Power Authority invested in early-stage research that enabled Thermalfrost to develop the technology and create a prototype. The company has also received investments from the National Sciences and Engineering Research Council of Canada and Sustainable Development Technology Canada, and has partnered with numerous fishing companies, yacht and ship builders, manufacturers like Hyundai Mechatec and Hyundai Industrial Machinery, renewable energy companies, engine manufacturers, utility companies, and governments.

While Thermalfrost must still obtain certification and regulatory approval to sell its products to various markets, it is well on its way to revolutionizing refrigeration worldwide. Donaldson says the company is always looking to improve upon its current designs to stay ahead of the competition. Although mainly focused on building better products for its industrial partners, the company last year created an Ottawa-based subsidiary to focus on product development for commercial and residential applications, which demand lower cost, smaller form factors and versatility to harness different forms of heat and air cooling. New products from this initiative include highly efficient air-conditioners and refrigerators. "We never seem to have enough resources to keep up with demand, so we are always looking for money and ways to stretch our dollar," he says.

The company's ultimate aims, Donaldson says, are to curtail climate change by reducing energy consumption and to create a billion-dollar, Canadian-headquartered clean energy company: "I want to see our competition try to provide a similar solution. As they do, it will force us to innovate faster. Collectively, these efforts will bring better solutions to the marketplace, reducing energy consumption for cooling, thereby reducing green house gas emissions and bringing cooling to where it is otherwise unavailable."

Nationwide warning system to strengthen Canada's response to flooding

It may surprise you to learn that, unlike the US, UK and some other developed countries, Canada has no national flood warning system. But that's about to change, thanks to a bold new strategy being championed by hydrologic modelling and forecasting expert Paulin Coulibaly, P.Eng. Coulibaly is the principal investigator behind FloodNet, a comprehensive nationwide strategy that is bringing together the most advanced expertise and tools in the field to improve how floods are handled in Canada.

"With FloodNet, our main desire is to enhance the Canadian capacity for dealing with floods, in terms of forecasting and estimating, and in terms of their impact, and that any decisions made will be based on sound science," says Coulibaly, a professor in McMaster University's department of civil engineering and school of geography and earth sciences.

In Canada, floods are the most common and largely distributed hazard to life, property, the environment and the economy. The flood of June 2013 in southern Alberta, which cost approximately $1.7 billion in damage, is now considered the costliest natural disaster in Canadian history and that's only the worst of several examples of the high economic cost of flooding, which has been increasing in frequency and intensity over the last 20 years, mainly because of climate change.

"Our main desire is to enhance the Canadian capacity for dealing with floods, in terms of forecasting and estimating, and in terms of their impact, and that any decisions made will be based on sound science."

Paulin Coulibaly, P.Eng.

Forecasting and managing floods is a provincial responsibility, and so the infrastructure and techniques to do so vary widely from province to province. This patchwork approach makes it difficult for provinces to coordinate their flood response if the need arises. What's more, individual provinces typically lack the resources to access the most sophisticated tools and knowledge in flood forecasting, which can result in less-than-optimal success rates. For example, Coulibaly says, most provincial systems don't have the ability to consider how specific landscape features affect flooding in their regions.

Paulin Coulibaly, P.Eng., is the principal behind FloodNet, Canada's first national flood warning system.

Coulibaly is confident that with its emphasis on studying and implementing best practices, and using state-of-the-art tools in the field, FloodNet can go a long way in addressing Canada's flood woes. Because it draws on diverse expertise from both engineering and science, and leverages flood-related experience, knowledge, equipment and facilities at universities, industry and government all across Canada, the network will make it easier to proactively address the threat of flooding, he says.

FloodNet is funded by a five-year (2014-2019), $5-million grant from the Natural Sciences and Engineering Research Council of Canada through its Strategic Network Program, which supports projects in which researchers partner with companies over the long term in areas of importance to Canadians. It is being facilitated by 30 public and private partners, including agencies from all levels of government, 12 universities, provincial hydro companies, engineering firm SNC Lavalin, and Deltares, a Netherlands-based company that is a leading expert in flood forecasting.

A primary component of the initiative is knowledge generation through research initiatives that are investigating the processes and impact of floods in Canada. The research is being conducted by a multi-disciplinary team of 21 academic investigators and more than 30 engineers or scientists. The resulting information will be used to make improvements in such areas as infrastructure design, flood forecasting, and minimizing the impact of floods on people, society and the environment.

A key objective of the researchers is to develop a Canadian flood forecasting and early warning system that will deliver accurate and reliable forecasts with an appropriate lead time, to allow for better flood mitigation in the country's flood-prone regions. For this initiative, Coulibaly and some of his partners are evaluating and comparing current flood forecasting tools in Canada's provinces, and in other jurisdictions, such as the US and Europe. Use of the resulting system will be optional, meaning provinces can choose whether to use it exclusively or in parallel with their own systems.

FloodNet research will also yield new methods for updating the intensity-duration-frequency (IDF) curves of heavy rainfall. These insights will be used to develop a standard flood estimation manual and software, which Coulibaly says will be useful to engineers involved in designing such hydraulic infrastructure as bridges, urban drainage systems and culverts. As well, engineers will learn how to improve operation of hydropower reservoirs to reduce incidents of downstream flooding.

Says Coulibaly: "Floodnet will provide engineers with access to well-researched and widely agreed-upon guidelines, so that when they are designing new structures, they will be based on the best information out there regarding flood prevention."

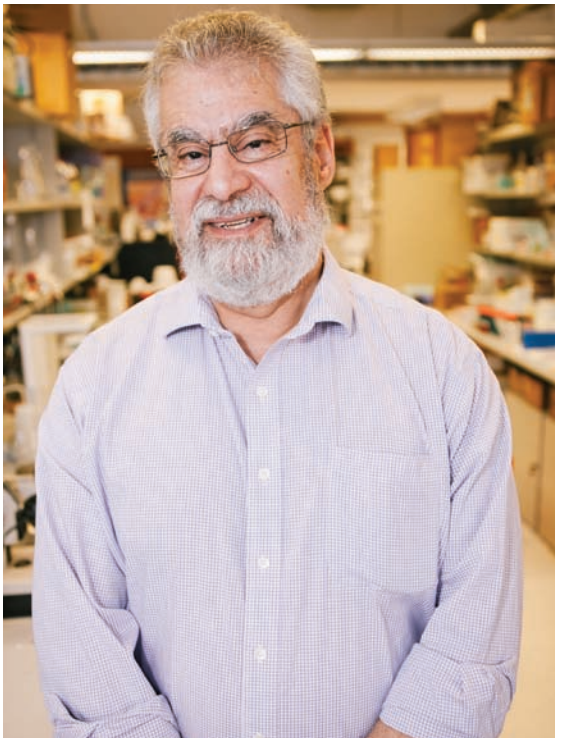
Will organ donations soon be a thing of the past?

University of Toronto (U of T) biomedical engineer Michael Sefton, ScD, P.Eng., believes so. For over 40 years, he has been working toward a single goal: to one day grow replacement organs and other body parts to treat a host of human diseases and conditions.

One of the world's foremost authorities in tissue engineering, regenerative medicine and biomaterials, Sefton was the first to recognize the potential of combining living cells and synthetic polymer materials to create new tissue structures that could one day act as functional equivalents of the body's organs and tissues.

Part of his research at U of T's Institute of Biomaterials and Biomedical Engineering involves taking live cells–pancreatic insulin-producing cells, for example–encapsulating them in collagen gel modules coated in endothelial cells and implanting them under the skin of test animals. Each module's ingenious membrane protects the fragile cells from the body's response, while allowing two-way diffusion: oxygen and nutrients needed for cell metabolism in, and waste products out.

The goal is to have these collections of cells take over the function of the organ they're intended to replace. Sefton's team is looking at



Michael Sefton, ScD, P.Eng., an award-winning biomedical engineer, was the first to combine living cells and materials to create new tissue structures that could one day act as functional equivalents of human organs and tissues.

Photo: Calvin Thomas

producing solutions that are functionally equivalent but not necessarily structurally equivalent to a particular organ like a liver or pancreas.

"What's promising is, at this point, when we put islets [insulin-producing cells] in these modules they are able to stay alive and are able to maintain normal blood sugars in a diabetic mouse," he says. In the not-so-far future, this approach is expected to be applicable to whatever organ or tissue requires replacement.

Implanting the cells is one thing. Keeping them alive is the challenge. One of the limiting factors to the viability of these cellular implants is vascularization. For cells to live they must be within 100 microns of a blood vessel, so a major focus of Sefton's research is getting blood vessels to grow to supply these implanted cell modules with oxygen and other necessities for cellular metabolism.

One of Sefton's most exciting discoveries was the observation about 15 years ago that a particular polymer–based on methacrylic acid (MAA)–almost magically promoted the growth of new blood vessels. "If there are blood vessels, the cells will work. We know that's the limiting step," says Sefton. "With MAA, we know we get blood vessels, but now we're trying to understand why. What is it about this material? What is it about the biological response of the material that causes blood vessels?"

In the intervening years, these mysteries, for the most part, have remained unsolved. "It's like a 1000-piece jigsaw puzzle and we have, maybe, 15 pieces identified. The question is always whether we have pieces in the sky or pieces in the actual picture. We never know whether they are important pieces or are things that are just happening anyway. We don't have anywhere near a complete picture yet."

It's Sefton's hope that within the next decade he and his team will have more answers, which will allow them to develop tissues with strong vascular functions. This, in turn, will bring his research a few steps closer to the goal of making replacement organs readily available.

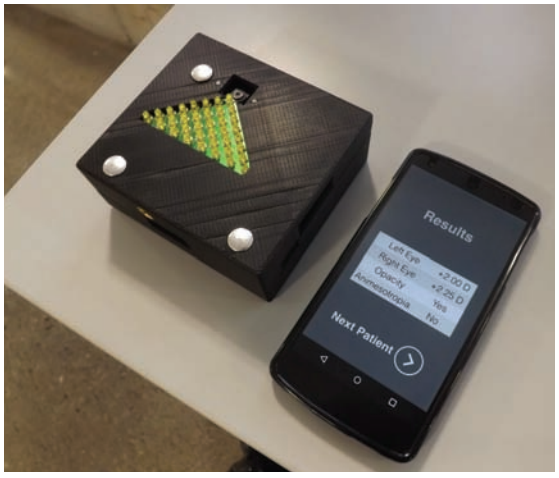
Sefton's tremendous contributions to the field of tissue engineering have not gone unnoticed. He has received a long list of awards and accolades in his four decades of research, including the Killam Prize in Engineering from the Canada Council for the Arts in 2008, the Ontario Professional Engineers Gold Medal in 2013, and the Engineers Canada Gold Medal in 2014. In 2003, he was named a University Professor, a rare status at U of T that recognizes unusual scholarly achievement and pre-eminence in a particular field of knowledge. Sefton's most recent honour, in October 2014, was one very few Canadians have received–an induction into the United States Institute of Medicine (IOM), the health arm of the National Academy of Sciences, which advises the US government on scientific and medical matters.

Apart from the considerable advancements he has made to tissue engineering over his long career, Sefton says he is also particularly proud of the department he has built at U of T. Included among the world-class researchers he has helped recruit are Molly Shoichet, PhD, LEL, who is the tier 1 Canada research chair in tissue engineering, and an expert in the study of polymers for drug delivery and regeneration, and Milica Radisic, PhD, P.Eng., a cardiac tissue engineering and regenerative medicine specialist. "It's a lead department now in medicine and engineering and there are often many initiatives that get built out of biomedical engineering now because of the kinds of people we have here," says Sefton.

Student start-up brings vision care to the developing world

Two recent University of Waterloo engineering grads, Daxal Desai and Ashutosh Syal, are building a fast and easy way for people in developing countries to have their eyes checked–in hopes of providing accessible, low-cost vision care to millions of people currently underserved by care in their regions.

EyeCheck was born out of an idea to create a smartphone app that could be used to replace traditional equipment for eye exams and make exams quicker and easier than ever before. During their third year at the University of Waterloo, Desai's and



The EyeCheck two-stage solution for eye exams is portable and easy to use.

Ashutosh Syal (not pictured) and Daxal Desai demonstrate how the EyeCheck camera is used.

An EyeCheck-equipped smartphone takes a quick picture of a person's face and tells the user right away whether they are nearsighted or farsighted.

Syal's professor of systems design engineering, John Zelek, PhD, P.Eng., challenged them to come up with a mobile phone-based solution to assess myopia (near-sightedness) in the developing world.

In these regions, temporary "eye camps" are held, where hundreds of people line up to get their vision checked by volunteers. It takes time to examine each individual, and the very young and elderly are often excluded because they can't make it to the camps or wait in the long lines. Knowing that so many people remain only a prescription away from clear vision and a new level of comfort, the co-founders resolved to find a solution.

In fall 2013, the students decided to make the problem the focus of their fourth-year design project. "This time, the project goals were more grand, with an aim to build a complete solution to be used in a mobile eye-care setting," explains Syal. "By the end of the capstone project, our team had set up the groundwork for the mobile screening app."

Their vision soon turned into a two-stage solution. As they learned through their research, the smartphone app is a valuable tool for screening a large number of people quickly, but a hardware component, such as a standalone camera, is also necessary because it allows doctors to take a detailed image of the eye for a more accurate prescription. The two devices work by shining different light into the eyes and analyzing the reflections coming back.

The benefits of the EyeCheck equipment are that it is automatic, portable and easy to use.

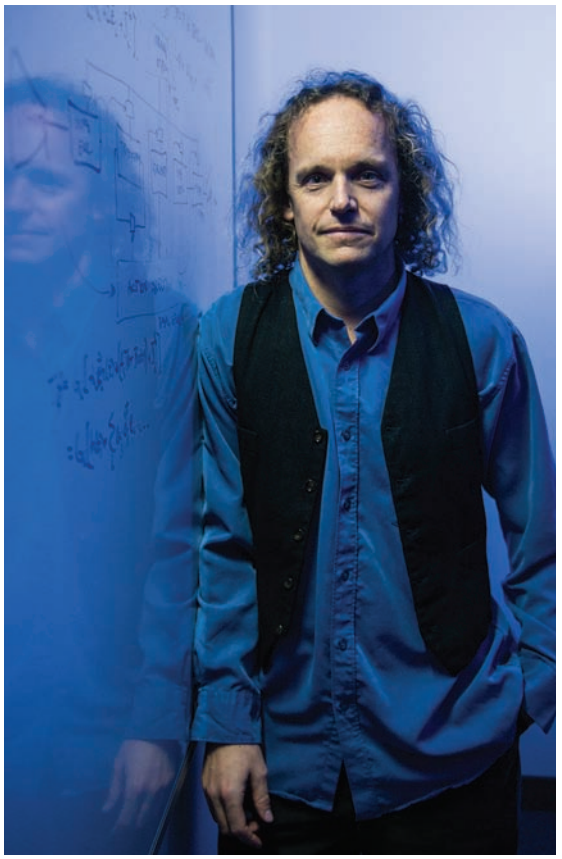
The exam process is simple: an EyeCheck-equipped smartphone takes a quick picture of a person's face and tells the user right away whether they are nearsighted or farsighted, and whether they have an opacity–a more serious problem like glaucoma or cataracts–in their eyes. If the app detects vision problems, the EyeCheck stand-alone camera takes a new image and provides a prescription for eyeglasses. According to Syal, the prescription is surprisingly accurate: "In a small experiment to determine how accurate our software was in identifying where a refractive error was present, the accuracy was well over 90 per cent," he says. "Based on early results, we are very excited and optimistic for this summer's testing."

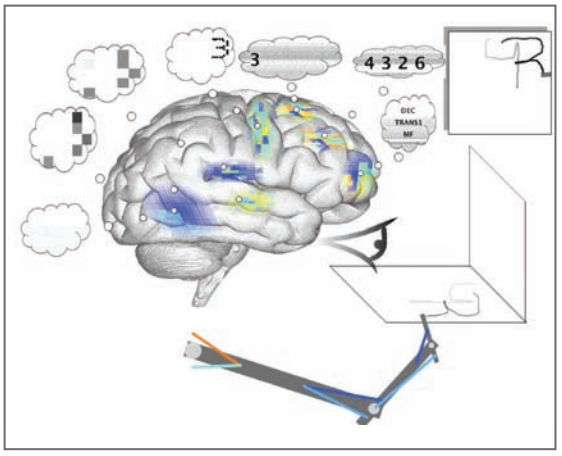
Based in the Velocity Foundry in downtown Kitchener, a free co-working space where University of Waterloo students and alumni can develop, test and implement their start-up ideas, EyeCheck is working on developing a field-ready app and validating both its technology and business model. It is funding research and development efforts with the $50,000 the students have received from various awards and sources, including University of Waterloo Engineers of the Future Trust, Velocity Fund Finals competition, CDMN Soft Landing program, Communitech Business Development Fund, and the University of Waterloo alumni pitch night event, and hopes to be generating revenue within six months.

Last year, EyeCheck was named one of the top 20 inventions of the year by the James Dyson Foundation. "They are very determined and have invested their own time at their own cost over the last two years trying to make this work," says Professor Zelek, who has been involved in the project since the very beginning. "They probably need some investment to get them over the next hurdle. I think if they can get the interest of a large corporation, they will be successful. Without investment and a large corporation helping, the process will be slower; however, I admire their stamina and sticking to their cause."

Being a member of the Velocity program has granted Desai and Syal access to mentorship from other teams in the program, as well as alumni powerhouses like Kik, Thalmic Labs, Viyard, MappedIn and BufferBox. "This powerful group has guided us through countless obstacles, while also preventing us from succumbing to some amateur start-up pitfalls," says Syal. "The Velocity program has also given us access to coaches who support the teams... and a fixed place for development, complete with a well-stocked workshop."

Today, EyeCheck has a working prototype of both hardware and software solutions, with an immediate priority of developing the smartphone app to be field-ready by June. Says Syal: "Taking lessons from our last trip [to India], we are confident that we can get the data we need to create a market-ready solution."





Professor Chris Eliasmith, PhD, P.Eng., has combined engineering, neuroscience and philosophy to design the world's largest computer model of the human brain.

SPAUN is illustrated as a single eye with a mechanical arm attached. The eye absorbs information, the brain processes it and, in turn, triggers the arm to write out its findings or solutions.

Virtual neurons used as building blocks for model of functional brain

Perhaps it's not surprising that an educator with a specialty in systems design engineering *and* philosophy would have insights into how the brain works and how data is perceived, transmitted, thought about and stored.

But it's that sort of approach that animates the work of Chris Eliasmith, PhD, P.Eng. A University of Waterloo professor of systems design engineering and computer science, with a joint appointment to the philosophy department, Eliasmith is in the midst of potential-laden research about neurons and their relationship to brain function, and how these can be simulated by computer modeling.

The Canada research chair in theoretical neuroscience is also head of the university's Computational Neuroscience Research Group and director of the Centre for Theoretical Neuroscience, all within the University of Waterloo. He is also author of the engaging and accessible 2013 publication *How to Build a Brain*.

In February, Eliasmith was named the winner of the Natural Sciences and Engineering Research Council of Canada John C. Polanyi Award for outstanding achievement in natural sciences or engineering.

His key achievement to date is the Semantic Pointer Architecture Unified Network or SPAUN–the world's largest functional model of the human brain. Although similar models exist in various research centres throughout the world, SPAUN, with its 2.5 million "virtual neurons," is the first to replicate some of the flexibility of human behaviour.

"Our project is the first large-scale, brain-level simulation that was able to reproduce a lot of behaviours all within one model," Eliasmith says.

Having biologically realistic neurons interconnected is important to the project's success, Eliasmith says: "In the [human] brain, the data and memory are stored in the same location where the processing is occurring, so it's a very different kind of structure, but, nevertheless, it's a lot of simple

components that are hooked up in some sophisticated manner to give rise to something much more complicated than what you'd be able to get out of one simple component."

Central to SPAUN is its assembly of virtual neurons. Natural neurons, between 86 and 100 billion in a normal human brain and nervous system, are what transmit electrical and chemical signals throughout the body to allow movement, sensing and other sentient activity. By building and connecting a large number of virtual neurons in SPAUN, Eliasmith and his team are gaining insights into the relationship between neural activity and brain function.

"The brain is for controlling a body, so it's really important to understand how neurons, which seem like things we can understand, are organized to give rise to the sort of control and behaviour we observe in people and animals," he says.

Although SPAUN is the world's largest model of the functional brain, it doesn't have a physical size. "Effectively, it's a computer program," Eliasmith says. "We write down some equations that simulate how each neuron works and then we write equations that describe how any two neurons communicate with each other and then we run it in a computer."

SPAUN is illustrated as a single eye with a mechanical arm attached. The eye absorbs information, and then the brain processes it and triggers the arm to write out its findings or solutions.

SPAUN's accomplishment lies in the combination of millions of neurons working together to perform more complex tasks. Eliasmith and his team have shown that SPAUN can solve problems like those on standard intelligence tests, with the same accuracy as a person with an average IQ. In addition, SPAUN uses biologically realistic neurons to think about patterns it encounters to make things happen in its environment.

While SPAUN's functionality is impressive, it's still a far cry from what a real brain can accomplish. Nevertheless, it works more like a brain than most digital computers.

"It's actually a fairly different kind of story you have in the case of a brain than in the case of a digital computer," Eliasmith says, "because with the brain, each of the components is sort of wired uniquely in the circuit, but in the case of digital components, they are often generic. They can hold any data or any program, or do multiple [things] depending exactly on what's been demanded by the user."

Eliasmith believes SPAUN-related work will further the efforts of "neuromorphic (brain-like) hardware" designers who develop computer chips to mimic human brain function. And as SPAUN and its complementary hardware grow in sophistication, it could yield new insight into how the human brain works, and how neural activity is affected by brain injury or diseases such as Alzheimer's.

Eliasmith and his team have shown that SPAUN can solve problems like those on standard intelligence tests, with the same accuracy as a person with an average IQ.

Although it's rare that NSERC would award its Polanyi prize to a philosopher (albeit one who is a P.Eng.), Eliasmith notes a certain logic between the two disciplines.

"I did engineering first and it gave me lots of useful technical tools. I went more into the philosophical issues to try to understand how people theorized about how the brain works at the cognitive level," Eliasmith recalls. "I wrote my PhD on the semantics of mental representations. When I came to the University of Waterloo, I was hired as a philosopher and later jointly appointed to systems design engineering. I'm also cross-appointed to computer science. All of these are relevant disciplines for trying to build mechanistic, biologically plausible models that actually address human cognition."

Paralysis treatment taps into the power of electricity

A new engineering innovation that uses the power of electricity to fight paralysis is transforming patients' lives.

MyndMove harnesses the capabilities of functional electrical stimulation (FES) to promote recovery and restore voluntary movement in people experiencing upper-limb paralysis as a result of a stroke or spinal cord injury. This non-invasive neurorehabilitation therapy stimulates the entire arm in a way that allows for the return of such functions as reaching, grasping and pinching. The mind behind MyndMove is Milos Popovic, PhD, P.Eng., a Toronto-based mechanical engineer who says the technology will help patients live more independently.

MyndMove therapy has the potential to recover a full range of voluntary motion in patients suffering from upper limb paralysis.

"The more you can recover, the less you need to rely on others for help with things such as tying your shoes, opening your wallet or going to the bathroom. It's about improving people's quality of life," says Popovic, the Toronto Rehab chair in spinal cord injury research, and a professor at the University of Toronto's Institute of Biomaterials and Biomedical Engineering.

MyndMove is the first therapy to harness FES in a way that can revive the ability of muscles to perform functional movements. The treatment involves a physiotherapist or occupational therapist guiding a patient to try to engage their upper-limb muscles in a desired movement. As that happens, the MyndMove device delivers electrical stimulation to these muscles, which then sends a signal to the brain. This coordinated effort leads to the creation of a new pathway between the muscles and undamaged motor control regions of the brain, which lets patients improve voluntary control of their movement.

MyndMove therapy evolved after more than a decade of scientific and clinical research led by Popovic, and with support from partners such as University Health Network, University of Toronto, Ontario Centres of Excellence and the federal government. Developing the technology involved accessing the expertise of biomedical, electronic, software and systems engineers. One challenge they faced was creating a device that could quickly and easily program different muscle movement protocols. In the beginning, it took weeks to program these protocols, but they've now shortened that process to minutes.

This coordinated effort leads to the creation of a new pathway between the muscles and undamaged motor control regions of the brain.

They also had to build hardware that could match the device's software capabilities, with an electric stimulator that could produce the right mix of electrical amplitudes and frequencies. Another key task was eliminating the pain caused by the level of electricity the device delivered. Popovic and his team eventually learned how to manage that problem by changing the shape of the electrical pulses.

"Designing a system that allows you to do complicated movements of the body, and do that using simple programming tools, was not trivial," says Popovic about overcoming the technical obstacles.

The resulting machine can elicit more than 30 different

Popovic says a large majority of patients who receive the therapy experience clinically significant improvements, and a substantial number achieve full recovery.

reaching and grasping movements, and features an eight-channel stimulator that can target up to eight different muscle groups in a single stimulation protocol. In numerous clinical studies, including randomized controlled trials in both stroke and spinal cord injury populations, the device was found to significantly help patients improve their ability to perform such tasks as picking up an object, and reaching forward or sideways. Popovic says a large majority of patients who receive the therapy experience clinically significant improvements, and a substantial number achieve full recovery.

MyndTec, the medical technology company Popovic co-founded in Mississauga, and which now has eight, full-time employees, launched MyndMove in October, and the therapy is being delivered at several physiotherapy clinics in Ontario. The company is now trying to further expand into the neurorehabilitation market across Canada and, eventually, the US.

Popovic sees big possibilities for MyndMove, and his optimism is borne out by statistics from the Heart and Stroke Foundation, which reports that about 50,000 people in Canada have a stroke each year. In the US, the figure is about 800,000 a year, according to the Centers for Disease Control and Prevention, and, according to recent international studies, stroke rates among younger people (ages 24 to 64) will double in the next 15 years. In Canada, strokes cost the Canadian economy $3.6 billion a year in physician services, hospital costs, lost wages and decreased productivity.

"If a person recovers their hand function, they don't have to have an attendant or need long-term care, which saves them and the health-care system a lot of money. Second, they may go back to work, which means they will pay taxes, which is good for everybody," Popovic says. "So this technology is not only good for patients, but for society."

Professor's FES invention sparks student's idea

U of T student Kramay Patel used Milos Popovic's FES technology as a jumping-off point for his own invention.

A breakthrough by Milos Popovic, PhD, P.Eng., in using functional electrical stimulation (FES) to reverse upper-limb paralysis inspired one of his students to invent a new technology that uses the technique to promote trunk stability in people with spinal cord injuries (SCIs).

SCI patients who use power wheelchairs lack the ability to control their trunk muscles, which requires them to wear belt straps and chest harnesses to avoid being jerked back and forth by their chair's movements. But such restraints can interfere with their ability to perform the tasks of daily living.

Kramay Patel, who is entering his fourth year of the biomedical systems engineering program at U of T, conducted research under the supervision of Popovic and a PhD student to investigate how FES might improve trunk posture among members of this population. The result was a first-of-its-kind, wheelchair-based, neural prosthetic device that achieved promising results in clinical tests and, earlier this year, won the Sunnybrook Research Prize.

Patel, 20, who also does engineering research for Toronto Rehabilitation Institute and last year established Kreaate Corp., his own design engineering company, plans to further test and refine his innovation with the goal of commercializing it in the near future.

"We're hoping this can become a useful rehabilitative tool that can improve the quality of life of SCI patients," Patel says.

Lindsay Brock (second from right) and capstone project team members (from left) Ioana Craiciu, Roy Lee and Farzi Yusufali have developed a thermally reflective roof coating material that they plan to commercialize.

Nano-based initiative uses light reflection to better heat and cool roofs

One of the earliest science lessons imparted to elementary school students is that lighter colours reflect light while dark colours absorb it. Countless kids over the years have tested it out on sunny days, placing their hands on the roofs of black or white cars, and taking note of the temperature difference.

But a University of Waterloo engineering graduate has combined this basic property of light reflection with nano-materials to come up with a roof coating material that could save home- and commercial building owners big money in heating and cooling costs.

Lindsay Brock, a graduate of Waterloo's nanotechnology engineering program, was a member of a capstone project team that developed a two-phase, thermally reflective roof coating material, alternatively known as "roof coating with a temperature dependent reflectance."

The resulting company, Grayscale Coatings, was one of the winners in the university's 2014 Norman Esch Entrepreneurship Awards for Capstone Design.

"The idea for Grayscale Coatings came when we were brainstorming ideas for our capstone project at the University of Waterloo," Brock says. "We came across the idea of energy-efficient reflective roofs, and wondered if that could be tailored to the Canadian climate. Our background in nanotechnology engineering provided us with a solid understanding of both the fundamental science and engineering design principles we ended up basing our final design on."

Hany Aziz, PhD, P.Eng., a professor at the university's Waterloo Institute for Nanotechnology, is not surprised with the success of former student Brock and her capstone project team. He says the Grayscale Coatings effort showed true innovative and entrepreneurial spirit by taking a well-known principle of light movement, and combining it with chemical and electrical engineering, nano-materials, nano-electronics, nano-biotechnology, and nano-instruments to create a new product specially suited for use in Canadian climates.

Brock says previously developed roof coatings have been unstable at lower outside temperatures.

"The idea is novel and it can certainly have some energy-saving advantages," Aziz said in an interview. "Lindsay and her team's work is quite interesting and worth at least examining to see if it can be commercialized."

The coating consists of small particles inside a polymer matrix, Brock explains. By studying the refractive indices of two different components, the research team came up with a coating material permitting absorption of sunlight when it's cold and the reflection of sunlight when it's hot.

"At low temperatures, the coating looks clear," she says. "When we put it on a dark surface, such as roofing shingles, light can pass through the coating and be absorbed. As the temperature increases, the refractive indices of the component materials start to diverge. This means at high temperatures, light will hit particles with a different refractive index than the rest of the coating and scatter, resulting in a white coating with increased reflectivity."

The tricky part is finding the best application method for the roof coating, whether the material should be sprayed on, brushed, painted, or applied by some other cost-effective method.

Brock says previously developed roof coatings have been unstable at lower outside temperatures and lack overall robustness. In fact, robustness and a firm appreciation of Canadian weather conditions were top of mind to Brock and her team in developing Grayscale Coatings.

"The innovative part of our work was in creating a design that was more robust and easier to integrate with current roofing solutions. A large part of this was selecting our materials carefully," she says.

Brock and her team are already involved with potential partners to bring their innovative product to market. "We're at the prototype stage and entering into commercialization," she says. "We're currently looking for partners interested in helping us further develop the product. In terms of commercialization, the next big challenge I see is figuring out the best manufacturing path to take and adapting the product to work with existing coating processes. Ideally, we would also like to further increase the reflectance at high temperatures because we think it's possible to improve upon our current prototype." Σ

COUNCIL CLARIFIES PEO'S FUNDAMENTAL ACADEMIC ADMISSION PRINCIPLES

499TH MEETING, MARCH 26, 27, 2015

By Jennifer Coombes

COUNCIL HAS affirmed the fundamental academic principles for PEO licensure, in response to a request to do so from the Academic Requirements Committee (ARC). ARC was prompted to the move by its concerns about Engineers Canada's application to perform educational credential assessments for international engineering graduates under Citizen and Immigration Canada's (CIC's) Federal Skilled Worker Program.

PEO currently confirms academic depth and breadth of a P.Eng. applicant by verifying that he or she has done at least one of: passed PEO exams; graduated from a CEAB-accredited engineering program that institutes a minimum path requirement linked to courses and is independent of institution-reviewed exams; passed an Experience Requirements Committee interview/oral exam; or graduated with a master's and/or PhD degree that includes relevant, graded engineering courses.

ARC is concerned that Engineers Canada, in the committee's opinion, lacks the expertise to conduct an academic evaluation beyond authenticating documents submitted by international applicants and that, as a result, several of PEO's fundamental admissions principles may be threatened. ARC is also concerned that any document issued by Engineers Canada stating that an immigrant's degree is equivalent to a Canadian engineering degree, no matter the wording used, may harm PEO's licensing process and interfere with PEO's ability to protect the public. It would like CIC to take its concerns into consideration when evaluating Engineers Canada's application to be designated to perform educational credential assessments.

Accordingly, council considered and approved a motion at the March meeting that affirms the following fundamental academic principles for PEO licensure:

1. Individuals, not programs or institutions, are assessed for the purposes of determining P.Eng. licence qualifications;
2. All P.Eng. licensees must meet PEO's standards for academic depth and breadth;
3. All P.Eng. licensees must pass PEO-approved examinations to confirm their academics, a principle that is also referred to as "exams for all"; and
4. The minimum path requirement of accreditation is essential to meeting the PEO-approved examinations assessment of an individual applicant (where the minimum path means the minimum requirements for a program with electives).

Engineers Canada, the Canadian Engineering Accreditation Board and the Canadian Engineering Qualifications Board are to be informed of PEO council's support of these fundamental academic principles for licensure.

During the council discussion, Bob Dony, PhD, P.Eng., councillor-at-large and past chair of ARC, said: "We need to be sure that every individual has met the criteria, which is a cornerstone of our [licensing] process. Until we have first-hand knowledge of the programs overseas, we assign exams to ensure the same rigour is exercised in our process."

REPORTING SAFETY CONCERNS

Council has approved steps to be taken by the registrar when information about a possible public safety concern arising from the conduct of the holder of an Ontario engineering licence or Certificate of Authorization (C of A) comes to the attention of PEO from media, or through a complaint investigation.

In the case of information communicated to PEO that is already in the public domain, the registrar is to report the safety concern to the appropriate regulatory authority.

When the information is not in the public domain and comes to PEO's attention some other way, through a complaint investigation, for example, the process is not as straightforward because all parties in a PEO investigation are entitled to considerations of confidentiality under the *Professional Engineers Act*. PEO's discipline process has the authority to assign punitive and rehabilitative penalties to licence or C of A holders found to have committed professional misconduct or been shown to be incompetent, but lacks the authority to address and remedy deficient engineering work for which a member or holder may be responsible.

At this meeting, council approved pursuing an external legal opinion concerning whether a report that comes to PEO in confidence in the course of a complaint or registrar's investigation may be disclosed to a third-party regulatory authority without contravening the confidentiality provisions of section 28 of the act.

APTIFY DATABASE UPDATE

Council has approved a budget increase of just over $600,000 to complete phase one of the Aptify licensing database and get the project to a go-live stage. The funds have been diverted from the second phase of the Aptify project, which was expected to start in 2015, as well as from 2015 IT projects that have been put on hold. Aptify previously went live in December 2014; however, problems were identified almost immediately and PEO reverted to its former database, LicenseEase. LicenseEase has exceeded its lifespan and is no longer supported by its vendor.

Council was told application development and staff training is on track to enable a relaunch of the Aptify database in late fall 2015. Σ

TO THE MEMBERS OF THE ASSOCIATION OF PROFESSIONAL ENGINEERS OF ONTARIO

We have audited the accompanying financial statements of the Association of Professional Engineers of Ontario, which comprise the balance sheet as at December 31, 2014, and the statement of revenue, expenses and changes in net assets and of cash flows for the year then ended, and a summary of significant accounting policies and other explanatory information.

Management's responsibility for the financial statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with Canadian accounting standards for not-for-profit organizations, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditor's responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with Canadian generally accepted auditing standards. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Opinion

In our opinion, the financial statements present fairly, in all material respects, the financial position of the Association of Professional Engineers of Ontario as at December 31, 2014, and the results of its operations and its cash flows for the year then ended in accordance with Canadian accounting standards for not-for-profit organizations.

Deloitte.

Chartered Professional Accountants
Chartered Accountants
Licensed Public Accountants
March 27, 2015

[FINANCIAL STATEMENTS]

STATEMENT OF REVENUE AND EXPENSES AND CHANGES IN NET ASSETS

year ended December 31, 2014

		2014	(Restated–Note 2) 2013
REVENUE	P.Eng. revenue	$ 14,840,457	$ 14,630,128
	Application, registration, examination and other fees	5,884,172	5,788,072
	Building operations (Note 5)	2,083,065	2,937,867
	Advertising income	355,572	426,567
	Investment income	219,885	183,296
		23,383,151	23,965,930
EXPENSES	Staff salaries and benefits/retiree and future benefits	10,303,016	10,849,476
	Building operations (Note 5)	2,362,885	2,383,229
	Purchased services	1,090,528	1,069,658
	Amortization	978,437	950,980
	Engineers Canada	901,420	867,094
	Computers and telephone	773,951	644,523
	Volunteer expenses	761,264	852,302
	Occupancy costs (Note 5)	732,760	902,378
	Chapters (Note 14)	722,121	610,795
	Contract staff	666,368	506,580
	Legal (corporate, prosecution and tribunal)	649,465	461,735
	Transaction fees	508,034	487,760
	Postage and courier	424,151	357,372
	Consultants	240,431	353,962
	Recognition, grants and awards	187,667	187,326
	Printing	161,002	152,244
	Office supplies	121,723	121,376
	Professional development	109,170	156,409
	Insurance	97,304	98,600
	Staff expenses	91,355	85,283
	Advertising	90,348	198,040
		21,973,400	22,297,122
Excess of revenue over expenses before the undernoted		1,409,751	1,668,808
Council discretionary reserve expenses (Note 9)		60,515	233,912
Excess of revenue over expenses		1,349,236	1,434,896
Re-measurement and other items		390,900	6,533,200
Net assets, beginning of year		13,791,341	5,823,245
Net assets, end of year		$ 15,531,477	$ 13,791,341

BALANCE SHEET
as at December 31, 2014

			(Restated–Note 2) 2014	2013
ASSETS	CURRENT	Cash in interest-bearing accounts	$ 1,739,886	$ 3,052,243
		Marketable securities at fair value	6,331,704	5,350,515
		Accounts receivable	498,159	379,240
		Prepaid expenses and deposits	204,332	173,193
		Other assets	443,952	285,412
			9,218,033	9,240,603
	Capital assets (Note 4)		37,062,729	36,729,079
	TOTAL ASSETS		46,280,762	45,969,682
LIABILITIES	CURRENT	Accounts payable and accrued liabilities (Note 16)	1,385,054	1,660,977
		Fees in advance and deposits	8,843,131	8,919,164
		Current portion of long-term debt (Note 6)	901,000	878,000
			11,129,185	11,458,141
	LONG TERM	Long-term debt (Note 6)	8,467,000	9,368,000
		Employee future benefits (Note 7)	11,153,100	11,352,200
	TOTAL LIABILITIES		30,749,285	32,178,341
	Net assets (Note 8)		15,531,477	13,791,341
	Total liabilities and net assets		46,280,762	45,969,682

On behalf of council: David Adams, P.Eng., FEC, president; Thomas Chong, MSc, P.Eng., FEC, PMP, president-elect.

STATEMENT OF CASH FLOWS
year ended December 31, 2014

			(Restated–Note 2) 2014	2013
	OPERATING	Excess of revenue over expenses	$ 1,349,236	$ 1,434,896
		Add (deduct) items not affecting cash		
		Amortization	1,790,891	1,761,531
		Amortization–other assets	56,323	32,896
		Employee future benefits expensed	1,418,300	2,579,200
		Change in unrealized losses on marketable securities	(68,450)	(17,415)
		Loss (gain) on disposal of marketable securities	37,612	12,322
			4,583,912	5,803,430
		Change in non-cash working capital items (Note 11)	(502,014)	588,271
			4,081,898	6,391,701
	FINANCING	Repayment of mortgage	(878,000)	(854,000)
		Contributions to employee future benefit plans	(1,226,500)	(1,418,300)
			(2,104,500)	(2,272,300)
	INVESTING	Proceeds of disposal of marketable securities	4,083,963	1,857,745
		Acquisition of marketable securities	(5,034,314)	(2,005,587)
		Additions to capital assets	(2,124,541)	(2,023,542)
		Additions to other assets	(214,863)	(259,448)
			(3,289,755)	(2,430,832)
	(Decrease) increase in cash		(1,312,357)	1,688,569
	Cash, beginning of year		3,052,243	1,363,674
	Cash, end of year		$ 1,739,886	$ 3,052,243

NOTES TO THE FINANCIAL STATEMENTS

DECEMBER 31, 2014

1. NATURE OF OPERATIONS

The Association of Professional Engineers of Ontario (PEO) was incorporated by an act of the legislature of the Province of Ontario. Its principal activities include regulating the practice of professional engineering, and establishing and maintaining standards of knowledge, skill and ethics among its members to protect the public interest. As a not-for-profit professional membership organization it is exempt from tax under section 149(1) of the *Income Tax Act*.

2. CHANGE IN ACCOUNTING POLICY

In fiscal 2014, PEO adopted the provisions of the *CPA Canada Handbook* (handbook), *Part III Accounting for Not-for-profit organizations*, section 3463–Reporting Employee Future Benefits by Not-for-profit Organizations (section 3463). In accordance with the transitional provisions of section 3463, PEO retrospectively applied the revised standard. The 2013 corresponding figures and notes have been restated.

Section 3463 eliminated the deferral and amortization method as a policy choice for accounting for defined benefit plans and the three-month window for measuring plan assets and obligations. The standard requires that changes in the fair value of plan assets and in the measurement of the plan obligation, including past service costs, actuarial gains and losses, and curtailment/settlement gains and losses (re-measurements and other items), be recognized as a component of net assets. As a result, the defined benefit asset or liability on the balance sheet reflects the defined benefit obligation, net of the fair value of any plan assets, adjusted for any valuation allowance as of the balance sheet date. Further, section 3463 requires that re-measurements and other items be presented as a separately identified line item in the statement of changes in net assets.

Additionally, the expected return on plan assets is no longer applied to the fair value of the assets to calculate the benefit cost. Under section 3463, the same discount rate must be applied to the benefit obligation and the plan assets to determine the finance cost. The discount rate will continue to be determined by reference to market interest rates on high-quality debt instruments with cash flows that match the timing and amount of expected benefit payments or the interest rate inherent in the amount at which the defined benefit obligation could be settled. PEO has elected to use a funding valuation to determine its defined benefit obligation related to its pension plans, but will continue to use an accounting valuation for the purposes of determining its non-pension defined benefit obligations.

The retrospective application of the new standard resulted in a decrease to opening net assets at January 1, 2013, of $9,791,900 with an additional decrease to opening net assets of $159,500 at January 1, 2014.

3. SIGNIFICANT ACCOUNTING POLICIES

These financial statements have been prepared in accordance with Canadian accounting standards for not-for-profit organizations and reflect the following accounting policies:

(a) Financial instruments

PEO initially recognizes financial instruments at fair value and subsequently measures them at each reporting date, as follows:

Asset/liability	Measurement
Cash and marketable securities	Fair value
Accounts receivable	Amortized cost
Accounts payable and accrued liabilities	Amortized cost
Long-term debt	Amortized cost

Financial assets measured at amortized cost are assessed at each reporting date for indications of impairment. If such impairment exists, the asset shall be written down and the resulting impairment loss shall be recognized in the statement of revenue and expenses and changes in net assets for the period.

Transaction costs are expensed as incurred.

(b) Hedge accounting

PEO entered into an interest rate swap to reduce the impact of fluctuating interest rates on its long-term debt. The policy of PEO is not to enter into interest rate swap agreements for trading or speculative purposes.

The interest rate swap held by PEO is eligible for hedge accounting. To be eligible for hedge accounting, an instrument must meet certain criteria with respect to identification, designation and documentation. In addition, the critical terms of the derivative financial instrument must match the specific terms and conditions of the hedged item. The fair value of derivative instruments eligible and qualifying for hedge accounting is generally not recognized on the balance sheet. Gains and losses on such instruments are recognized in income in the same period as those of the hedged item.

Interest on the hedged item is recognized using the instrument's stated interest rate plus or minus amortization of any initial premium or discount and any financing fees and transaction costs. Net amounts receivable or payable on the interest rate swap are recorded on the accrual basis of accounting and are recognized as an adjustment to interest on the hedged item in the period in which they accrue.

PEO may only discontinue hedge accounting when one of the following situations arises:

(i) The hedged item or the hedging item ceases to exist other than as designated and documented; or
(ii) The critical terms of the hedging item cease to match those of the hedged item, including, but not limited to, when it becomes probable that an interest-bearing asset or liability hedged with an interest rate swap will be prepaid.

When a hedging item ceases to exist, any gain or loss incurred on the termination of the hedging item is recognized as an adjustment of the carrying amount of the hedged item.

When a hedged item ceases to exist, the critical terms of the hedging item cease to match those of the hedged item, or it is no longer probable that an anticipated transaction will occur in the amount designated or within 30 days of the maturity date of the hedging item, any gain or loss is recognized in net income.

(c) Revenue recognition

Licence fee revenue, excluding the portion related to the building fund, is recognized as income on a monthly basis over the licence period. Building fund revenue is recognized into income at the commencement of the licence period. Other revenues are recognized when the related services are provided.

(d) Donated services

The association receives substantial donated services from its membership through participation on council and committees and as chapter executives. Donations of services are not recorded in the accounts of the association.

(e) Employee future benefits

Pension plans

The cost of PEO's defined benefit pension plans are determined periodically by independent actuaries using the projected benefit method prorated on service. PEO uses the most recently completed actuarial valuation prepared for funding purposes (but not one prepared using a solvency, wind-up, or similar valuation basis) for measuring its defined benefit pension plan obligations. A funding valuation is prepared in accordance with pension legislation and regulations, generally to determine required cash contributions to the plan.

Other non-pension plan benefits

The cost of PEO's non-pension defined benefit plan is determined periodically by independent actuaries. PEO uses an accounting actuarial valuation performed every three years for measuring its non-pension defined benefit plan obligations. The valuation is based on the projected benefit method prorated on service.

For all defined benefit plans PEO recognizes:

(i) The defined benefit obligation, net of the fair value of any plan assets, adjusted for any valuation in the statement of changes in net assets; and
(ii) The cost of the plan for the year.

(f) Capital assets

Capital assets are recorded at cost. Amortization is calculated on the straight-line basis at the following annual rates.

Building	2%
Building improvements	5%
Building improvements–common area	3.3% to 10%
Computer hardware and software	33%
Furniture, fixtures and telephone equipment	10%
Audio visual	20%

The association's investment in capital assets is included as part of net assets on the balance sheet.

(g) Use of estimates

The preparation of financial statements in conformity with Canadian accounting standards for not-for-profit organizations requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenue and expenses during the reporting period. Actual results could differ from those estimates. Accounts requiring significant estimates and assumptions include capital assets, accrued liabilities, and employee future benefits.

4. CAPITAL ASSETS

	Cost $	Accumulated amortization $	2014 Net book value $	2013 Net book value $
Building	**19,414,667**	**2,254,607**	**17,160,060**	17,548,355
Building improvements	**8,208,586**	**1,488,305**	**6,720,281**	6,419,567
Building improvements–common area	**6,461,870**	**1,437,408**	**5,024,462**	5,168,252
Land	**4,366,303**	**-**	**4,366,303**	4,366,303
Computer hardware and software	**2,580,324**	**2,297,294**	**283,030**	475,130
Furniture, fixtures and telephone equipment	**1,393,289**	**660,224**	**733,065**	836,601
Audio visual	**974,252**	**465,362**	**508,890**	644,992
Work in progress	**2,266,638**	**-**	**2,266,638**	1,269,879
	45,665,929	**8,603,200**	**37,062,729**	36,729,079

5. BUILDING OPERATIONS

PEO maintains accounting records for the property located at 40 Sheppard Avenue West, Toronto, ON as a stand-alone operation for internal purposes. The results of the operation of the building, prior to the elimination of recoveries and expenses related to PEO, are as follows:

	2014 $	2013 $
Revenue		
Rental	**802,831**	1,295,119
Operating cost recoverable–tenants	**1,045,263**	1,410,533
Parking	**136,950**	156,150
Miscellaneous	**98,021**	76,065
	2,083,065	2,937,867
Operating cost recoverable–PEO	**720,125**	819,374
Total revenue	**2,803,190**	3,757,241
Recoverable expenses		
Utilities	**493,924**	452,586
Property taxes	**452,923**	479,628
Amortization	**424,161**	422,258
Payroll	**245,526**	218,299
Janitorial	**219,356**	251,908
Repairs and maintenance	**121,885**	201,377
Property management and advisory fees	**80,878**	78,797
Road and ground	**32,552**	31,620
Administrative	**25,009**	20,915
Security	**20,276**	19,217
Insurance	**17,674**	21,826
	2,134,164	2,198,431
Other expenses		
Interest expense on note and loan payable	**484,986**	527,834
Amortization of building	**388,293**	388,293
Amortization of deferred costs	**56,323**	32,896
Other non-recoverable expenses	**19,244**	55,149
	948,846	1,004,172
Total expenses	**3,083,010**	3,202,603
Excess of revenue over expenses	**(279,820)**	554,638

For purposes of the statement of revenue, expenses and changes in net assets, the operating cost reimbursements from PEO have been eliminated. The portion of costs allocated to PEO is reallocated from building operations and is included in occupancy costs.

	2014	2013
	$	$
Building revenue per above	**2,803,190**	3,757,241
Eliminated PEO portion	**(720,125)**	(819,374)
	2,083,065	2,937,867
Building expenses per above	**3,083,010**	3,202,603
Eliminated PEO portion	**(720,125)**	(819,374)
	2,362,885	2,383,229

6. BUILDING FINANCING

In 2009, the association financed $14,100,000 of the cost of its building acquisition with a credit facility from the Bank of Montreal, Capital Markets Division. The facility is secured by a first mortgage on the property located at 40 Sheppard Avenue West, a general security agreement, and a general assignment of tenant leases. The facility is repayable in monthly installments of principal plus interest maturing on March 11, 2019, and bears a floating interest rate based on variable bankers' acceptances. The balance outstanding at December 31, 2014 is $9,368,000.

Principal repayments are due as follows:

	$
2015	901,000
2016	928,000
2017	952,000
2018	980,000
2019	5,607,000
	9,368,000

The association has entered into a swap agreement related to this loan, whereby the floating rate debt is swapped for a fixed rate debt with an interest rate of 4.95 per cent and settled on a net basis. The notional value of the swap is $14,100,000. The start date of the swap was March 11, 2009, with a maturity date of March 11, 2019.

7. EMPLOYEE FUTURE BENEFITS

The association's pension plans and post-retirement benefits plan covering participating employees (full time and retirees) are defined benefit plans as defined in section 3463 of the *CPA Canada Handbook*. The pension plans provide pension benefits based on length of service and final average earnings. The post-retirement benefits plan provides hospitalization, extended health care and dental benefits to active and retired employees. Participation in the pension plans and benefits plan (for post-retirement benefits) has been closed to all new employees as of May 1, 2006. All employees joining after this date have the option of participating in a self-directed RRSP (registered retirement savings plan). During the year, the association recorded $181,383 (2013–$134,919) in employer contributions to the self-directed RRSP.

The funded status of the association's pension plans and post-retirement benefit plan using actuarial assumptions as of December 31, 2014 was as follows:

	Basic pension plan	Supplemental pension plan	Other non-pension benefit plan	Total
	$	$	$	$
Accrued benefit obligation	(21,671,300)	(1,563,500)	(11,810,300)	**(35,045,100)**
Plan assets at fair value	22,081,200	1,810,800		**23,892,000**
Funded status–plan surplus (deficit)	409,900	247,300	(11,810,300)	**(11,153,100)**
Valuation allowance	-	-	-	**-**
Defined benefit asset, net of valuation allowance	409,900	247,300	(11,810,300)	**(11,153,100)**

The funded status of the association's pension plans and post-retirement benefit plan using actuarial assumptions as of December 31, 2013, was as follows:

	Basic pension plan	Supplemental pension plan	Other non-pension benefit plan	Total
	$	$	$	$
Accrued benefit obligation	(22,309,800)	(1,180,800)	(9,712,000)	**(33,202,600)**
Plan assets at fair value	20,098,000	1,752,400		**21,850,400**
Funded status–plan surplus (deficit)	(2,211,800)	571,600	(9,712,000)	**(11,352,200)**
Valuation allowance	-	-	-	**-**
Defined benefit asset (obligation), net of valuation allowance	(2,211,800)	571,600	(9,712,000)	**(11,352,200)**

PEO measures its defined benefit obligations and the fair value of plan assets for accounting purposes as at December 31 each year. The most recently completed actuarial valuation of the pension plans for valuation purposes was as of December 31, 2014. The most recent completed actuarial valuation of the non-benefit plan for accounting purposes was as of December 31, 2014.

8. NET ASSETS

The net assets of the association are restricted to be used at the discretion of council and includes the association's investment in capital assets of $27,694,729 (2013–$26,483,079).

9. COUNCIL DISCRETIONARY RESERVE

The council discretionary reserve is an internal allocation from the operating reserve used at the discretion of council to fund expenses related to special projects approved by council. Expenses from the discretionary reserve were as follows

	2014	2013
	$	$
Legal reserve–Elliot Lake/other	**3,339**	177,362
Experienced Practitioners Task Force	**4,110**	30,381
Emerging Discipline Task Force	**4,324**	9,612
Overlapping Practices Committee	**-**	6,755
Building Development Committee	**-**	5,865
National Frame Work Task Force	**2,829**	2,382
Licensure Engineering Task Force	**-**	1,555
Privacy policy review	**45,913**	-
	60,515	233,912

10. FULL-TIME SALARIES AND BENEFITS

During the year, the association incurred a total of $10,367,673 (2013–$11,001,016) for salary and benefits costs for its full-time staff, of which $64,657 (2013–$151,540) was directly attributable to special projects approved by council and disclosed under Note 9.

11. CHANGE IN NON-CASH WORKING CAPITAL ITEMS

	2014	2013
	$	$
Accounts receivable	**(118,919)**	(44,286)
Prepaid expenses and deposits	**(31,139)**	30,295
Accounts payable and accrued liabilities	**(275,923)**	590,173
Fees in advance and deposits	**(76,033)**	12,089
	(502,014)	588,271

12. CUSTODIAL ACCOUNT

The association maintains a separate bank account for the Council of Ontario Deans of Engineering. Cash totaling $128,207 in this account (2013–$127,695) is not reported on the association's balance sheet, as it is held in trust for the Council of Ontario Deans of Engineering.

13. COMMITMENTS

The association has obligations under non-cancelable operating leases for various service agreements. The payments to the expiry of the leases and agreements are as follows:

	$
2015	968,638
2016	64,810
2017	5,312
	1,038,760

14. CHAPTERS OF THE ASSOCIATION

The financial information of the 36 chapters of the association is individually not material and, therefore, has not been consolidated in these financial statements. Furthermore, management believes that the effort and cost required to prepare financial statements for each chapter for consolidation purposes far exceed the benefits of doing so.

During the year, the association paid chapter expenses totaling $722,121 (2013–$610,795), including $500,000 (2013–$392,945) in chapter allotments and $222,121 (2013–$217,850) in other disbursements to individual chapters. In 2014, the association also incurred additional costs of $502,351 (2013–$525,924) related to chapter operations, including staff salaries and benefits, and for various support activities. These amounts have been included in the various operating expenses reported on the statement of revenue and expenses and changes in net assets.

15. FINANCIAL INSTRUMENTS AND RISK MANAGEMENT

Interest rate risk

PEO is exposed to interest rate risk, which is the risk that the fair values or future cash flows associated with its investments will fluctuate as a result of changes in market interest rates. Management addresses this risk through use of an investment manager to monitor and manage investments.

Liquidity risk

PEO's objective is to have sufficient liquidity to meet its liabilities when due. PEO monitors its cash balances and cash flows generated from operations to meet its requirements. As at December 31, 2014, the most significant financial liabilities are: accounts payable and accrued liabilities and long-term debt.

16. GOVERNMENT REMITTANCES

Accounts payable and accrued liabilities include $225,477 (2013–$198,219), with respect to government remittances payable at year end.

REGISTRAR'S FINANCIAL REPORT

FOR THE YEAR ENDED DECEMBER 31, 2014

PEO GENERATED an excess of revenue over expenses of $1,409,751 before council discretionary reserve expenses for the 2014 fiscal year, as compared to a budgeted surplus of $328,097. The result was achieved by having expenses of $1,790,179 less than budgeted, as management continued to control costs in light of economic conditions, offset by a decrease in revenues of $708,525, primarily attributable to vacant space in the building as a major tenant downsized.

Council discretionary reserve expenses reduced the excess of revenue over expenses by $60,515. The investment in capital assets for the year was $2,124,541 ($2,023,542 in 2013), with PEO incurring no additional debt for these expenditures in 2014, since they were funded from PEO's cash reserves.

The closing balance in cash/investments was $8,071,590 at the end of the year and PEO's net assets increased to $15,531,477.

REVENUE

Total revenue was $23,383,151, which is 3 per cent below budget, due to lower than budgeted building operations revenue as a major tenant downsized, and leasing of the vacant space was delayed so that HVAC renovations could be completed. Approximately 63 per cent of revenue comprised P.Eng. licence revenue, which is consistent with budget expectations.

COST MANAGEMENT

Total expenses were $21,973,400, which is $1,790,179 or 8 per cent lower than budget. Major expense variances from budget are:

- Staff salaries and benefits/retiree and future benefits were $1,151,740 lower than planned, with the saving offset by expenses for contract staff, which were $453,916 above budget;
- Costs for purchased services were $215,682 lower than budget;
- Amortization costs were $204,451 lower than budget;
- Volunteer expenses were $153,806 lower than budget;
- Computer and telephone expenses were $133,374 lower than budget;
- Building operations costs were $119,391 lower than budget; and
- Professional development costs were $98,480 lower than budget.

2014 BUDGET VARIANCES BY BUSINESS UNIT

Corporate Services

Expenditures were $1,740,383 or 16 per cent under budget. The key variances within the department include lower than planned staff salaries and benefits, and retiree and future benefits ($1,139,772), due to a change in accounting standards that had a positive impact on the future benefits expense; lower amortization costs ($204,451), due to the timing in completing approved budgeted capital projects; lower than budgeted costs for computers and telephone-related expenses ($132,281) by way of lower software and hardware maintenance contracts; lower than planned costs for building operations ($119,392), largely due to lower amortization and non-recoverable expenses; lower than planned printing, postage and management costs for council elections ($111,104); a decrease in professional development costs across all departments ($109,139); lower than planned expenses for the Engineering Internship Program ($86,093), Student Membership Program ($79,613), and Government Liaison Program ($67,059). The lower than budgeted expenses were offset by higher than budgeted costs for IT contract staff ($424,563).

Executive

Expenditures were $100,836 or 14 per cent above budget, as a result of higher than budgeted employment and corporate legal matters ($161,092). These higher than budgeted expenses were offset by lower than budgeted expenses for consultants ($42,677) and staff business expenses ($17,506) for attending PEO meetings and events.

Licensing and Finance

Expenditures were $306,064 or 6 per cent above budget, as PEO continued to process applications from the initial proclamation of the repeal of the industrial exception. Salaries and benefits costs were higher than budgeted ($157,591); postage and courier costs for mailing billings and issuing licences, etc., were higher than planned due to an increase in postal rates ($47,296); transaction costs were higher than budgeted ($43,613); committee and task force volunteer-related expenses were higher than budgeted ($27,398); and scanning costs were higher than budgeted, due to an increase in the volume of licence applications ($22,956).

Regulatory Compliance

Expenditures were on budget in 2014. Salaries and benefits were lower than budgeted

($212,838), due to unfilled positions, with the saving offset by higher than budgeted costs for contract staff ($27,268) and legal costs for discipline prosecution, registration hearings and discipline and registration appeals ($200,000).

Tribunals and Regulatory Affairs
Expenditures were $456,509 or 15 per cent below budget. The key variances include lower than planned independent legal counsel and volunteer expenses ($135,062) related to discipline hearings; below budget costs ($91,478) for production, printing and mailing of *Engineering Dimensions*; lower than budgeted salaries and benefits ($70,400); lower than planned committee and task force expenditures ($31,645); and lower than planned policy development costs ($29,836), as anticipated consultant and legal reviews were not required.

COUNCIL-DIRECTED INITIATIVES

For 2014, net expenditures for the projects approved by council amounted to $60,515. This figure includes $45,913 for a review of PEO's privacy policy; $4,324 for costs associated with the Emerging Disciplines Task Force; $4,110 for the Experienced Practioners Task Force; $3,339 for legal costs associated with the Elliot Lake Commission of Inquiry/other; and $2,829 for the National Framework Task Force.

BUILDING OPERATIONS

The building generated $2,803,190 in revenue, including PEO's share of recoverable expenses, but excluding base rent PEO would have paid if it paid market rent for its space. Total recoverable expenses of $2,134,164 and other expenses of $948,846 combined to create a deficiency of revenue over expenses of $279,820 (after all expenses, including loan interest), as compared to a budgeted surplus of $264,214. Total revenues were lower than budget by $587,284 or 21 per cent, as a major tenant downsized and leasing the vacant space was delayed so HVAC renovations could be completed. Total expenses were under budget by 1.4 per cent. PEO's share of recoverable expenses was $720,125. These costs were reclassified from building operations to occupancy costs in the financial statements. Since PEO is a not-for-profit organization, it received a preferred property tax rate (residential rate instead of commercial rate), thereby reducing PEO's overall occupancy cost. Total occupancy costs for 2014 were $732,760, which included storage and other occupancy costs. PEO's total accommodation expense (including interest) was $1,217,746.

PEO occupied 38,113 square feet at December 31, 2014. The market rent of this space is approximately $20 a square foot and operating costs are $20.80 a square foot. Therefore, PEO's equivalent costs for rent and operating costs would be $1,555,010 for 2014, leading to a net value to PEO of $337,264 for 2014.

CAPITAL EXPENDITURES

Capital expenditures for the year were $2,124,542, compared to $2,023,542 in 2013.

Building improvements, which are improvements made to PEO's space, totalled $723,188 for the year. Projects initiated in 2013 that were closed in early 2014 include the relocation of staff from the second floor to the sixth ($516,111), the seventh floor tribunal door relocation ($51,073) and the relocation of the computer room from the second floor to the fifth floor ($156,004).

Base building improvements totalled $280,372, which is recoverable from tenants. This includes window coverings replacement ($99,180), elevator upgrade ($64,460), precast exterior walls ($52,635), and some smaller improvements.

PEO invested $77,096 in computer hardware and software during 2014, which included such projects as desktop computer replacement and Engineers Canada national membership database.

Spending on audiovisual and furniture upgrades totalled $47,127.

The $996,759 in 2014 spending for work in progress includes the replacement of LicenseEase with the Aptify licence management software ($628,745), replacement of the fourth floor HVAC ($839,996), and several smaller projects ($111,657), reduced by $583,639 for projects completed in 2014 and transferred from work in progress to building improvements.

PEO's capital expenditures in 2014 were funded from PEO's cash reserves.

CONCLUSION

The association has managed its affairs responsibly and has produced a sizable surplus for the year, leaving 2014 with a healthy reserve to carry out its regulatory mandate in the public interest. Σ

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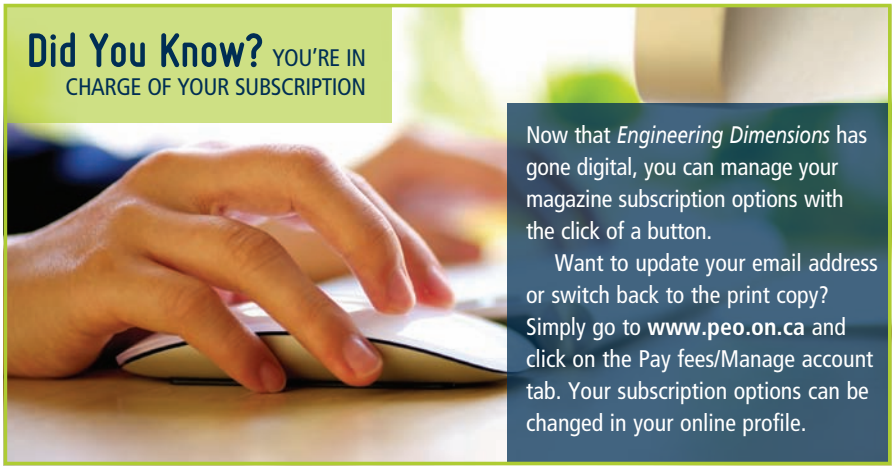

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Manager, enforcement Marisa Sterling, P.Eng.	647-259-2260
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Manager, policy Jordan Max	1065
Manager, standards & practice José Vera, P.Eng., MEPP	647-259-2268
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DEADLINE FOR SEPTEMBER/OCTOBER 2015 IS JULY 27, 2015.
DEADLINE FOR NOVEMBER/DECEMBER 2015 IS SEPTEMBER 21, 2015.

[LETTERS]


[NEWS]

EFFORTS CONTINUE TO SEEK COMMON GROUND ON BUILDING CODE ACT

By Michael Mastromonaco

AN EASIER SOLUTION?

I read your article on "Efforts continue to seek common ground on *Building Code Act*" (p. 8) in the March/April 2015 issue of *Engineering Dimensions* magazine. Can you take an "end run" around this impasse by requiring that all chief building officials be professional engineers? In other words, instead of trying to get agreement on the interpretation of the act, why not try to change the qualifications of the chief building officials to be licensed as P.Engs? Problem solved?

Harry Nagata, P.Eng., North York, ON

Letters to the editor are welcomed, but must be kept to no more than 500 words, and are subject to editing for length, clarity and style. Publication is at the editor's discretion; unsigned letters will not be published. The ideas expressed do not necessarily reflect the opinions and policies of the association, nor does the association assume responsibility for the opinions expressed. Emailed letters should be sent with "Letter to the editor" in the subject line. All letters pertaining to a current PEO issue are also forwarded to the appropriate committee for information. Address letters to jcoombes@peo.on.ca.

SIZE MATTERS

I could not agree more that the present composition of council is totally unwieldy (ref. the axiom "...the effectiveness of a decision-making body is inversely proportional to its size...") (*Engineering Dimensions*, President's Message, March/April 2015, p. 3). At the moment there are, I believe, a total of 27 seats (as per the staff listing), with 10 LGAs. Of the latter, currently five are also P.Engs, who, primarily, are supposed to protect the public interest. The non-P.Eng. members, if carefully selected, can bring a lot of outside expertise to council, such as valuable legal input.

As a former LGA P.Eng., my own modest proposal is for a council of 19: four executives, expanding the number of councillors-at-large to five, five regional councillors, and five LGAs (all non-engineers). The rationale is we aim for a more reasonable size, expand on more general viewpoints vs. possibly parochial regional ones (chapters being well-represented in other symposia) and remove LGA P.Engs, as they appear redundant. I recommend, in addition, that we could do away with the elected vice president position altogether, as being of such a short-term nature. I know all of this would require a major upheaval (council, government approval, act change, etc.), but I do not believe we can continue to kick the can down the road as politicians do. Could council strike a task group to investigate alternatives to the present council makeup and recommend alternatives? In parallel with this reset, council has to tackle the surely worrying challenge of appallingly low electorate returns of members (currently about 11 per cent). Why does the vast majority seem to feel voting for council is irrelevant?

James Dunsmuir, P.Eng., Brampton, ON

CORRECTION

The President's Message in the print edition of the March/April 2015 issue incorrectly mentions Engineers Canada as having been designated to perform preliminary credential assessments of applicants for engineering work under the federal government's Express Entry Program. In fact, Engineers Canada is still in the process of applying to be designated by Citizenship and Immigration Canada to perform educational credential assessments for international engineering graduates under the Federal Skilled Worker Program.

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*Average based on the home and auto premiums for active policies on July 31, 2014 of all of our clients who belong to a professional or alumni group that has an agreement with us when compared to the premiums they would have paid with the same insurer without the preferred insurance rate for groups and the multi-product discount. Savings are not guaranteed and may vary based on the client's profile.