



CANADIAN CIVIL ENGINEER
L'INGÉNIEUR CIVIL CANADIEN

- Perspectives on BIM
- Construction Industry Innovation Symposium
- Award Winner: Milton-Madison Bridge
- Award Winner: SaskPower Carbon Capture Facility

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À l'avant-garde de
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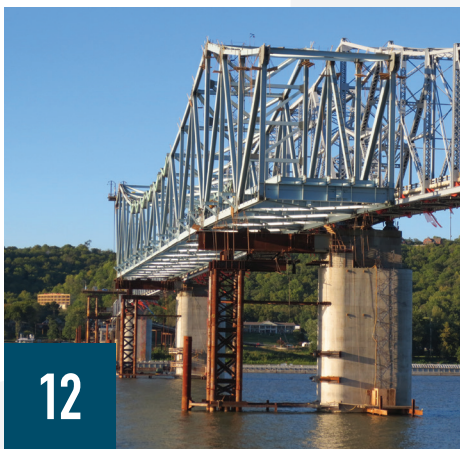
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PRESIDENT'S PERSPECTIVE | PERSPECTIVE PRÉSIDENTIELLE



Tony Bégin, P.Eng., CDP, M.A.Sc., MCSCE
PRESIDENT, CSCE/PRÉSIDENT SCGC
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Focus on Membership Growth

In order to reach our Vision 2020 objective of 10,000 members from the current total of some 4,000 members, we need a minimum growth rate of 25% per year over the next five years.

The executive group of each of the 21 CSCE Sections and six Regions needs to focus on membership growth with some key performance indicators (KPI) and periodic follow up (what gets measured, gets done).

Moreover, each one of us can contribute to this initiative. Personal contacts are still the best way to recruit new members. Being a member, you recognize the value and personal benefits of your membership:

**Personal
contacts are still
the best
way to recruit
new members.**

For your reputation

By joining the Society, you recognize the importance of keeping abreast of the latest state-of-the-art research, innovation and the best engineering practices in North America and internationally. Through your work, you can build a reputation for efficiency within your organization and your industry. CSCE allows you to build a prestigious reputation within the engineering profession in Canada and overseas.

For your network

There are multiple networking opportunities available at CSCE. The new Mentoring Program is an efficient way of establishing a relationship with an experienced member. Participating in a local Section's events (technical presentations, industry/site visits and conference suppers, etc.) and/or getting involved in a technical division, program or committee of your choice offers you valuable networking opportunities. You may also wish to join our team of volunteer executives at the section, regional and national level, including the board of directors. The benefits formula is simple: every single time you participate, you get an exponential return on your investment. In your career development, there comes a time when what matters is not what you know, but the people you know.

For your recognition

Do not hesitate to add the MCSCE suffix to your name, to be recognized as a member of CSCE and to promote our Society. This exposure of your CSCE membership could take you far in business, as decision makers who are CSCE members will notice and recognize it. This is an effective silent marketing strategy that enhances your know-how, values and principles. Moreover, being recognized by your peers for your career achievements and your contribution to the advancement of the civil engineering profession through one of CSCE's prestigious

annual awards is invaluable.

We are working hard at the national level on the implementation of a business development action plan. We will recruit more corporate partners and event sponsors with repeat business agreements. The Student Affairs, Young Professionals, Membership Services and Communications committees are implementing various strategic initiatives, which will contribute to the achievement of our individual

membership growth objective.

More members will make us stronger financially and will give us a wider influence to accomplish our mission and to support our Vision 2020.

Thank you for your valuable contribution. ■

Tony Bégin is senior director of integrated project delivery at Canam-Buildings, a division of Canam Group.

Prioriser la croissance du nombre d'adhésions

Afin d'atteindre l'objectif de 10,000 membres de la Vision 2020, le nombre actuel s'élevant à près de 4,000, nous avons besoin d'un taux de croissance minimum de 25% par année au cours des cinq (5) prochaines années.

Chacune des 21 Sections et des 6 Régions de la SCGC, incluant leurs comités de direction, doit prioriser la croissance du nombre des adhésions en se basant sur des indicateurs clés de performance et sur un suivi périodique (ce qui est mesuré s'accomplit).

**Les relations
interpersonnelles
restent encore
la meilleure
façon de
recruter de
nouveaux membres.**

Par ailleurs, chacun d'entre nous peut contribuer à cette initiative. Les relations interpersonnelles restent encore la meilleure façon de recruter de nouveaux membres. En tant que membre, vous donnez l'exemple car vous reconnaissez la valeur et les bénéfices personnels de votre adhésion tels que :

Pour votre réputation

En adhérant à la SCGC, vous démontrez que vous prenez soin d'actualiser vos connaissances dans la recherche, l'innovation et les meilleures pratiques du génie civil en Amérique du Nord et à l'international. Par votre travail, vous pouvez bâtir une réputation d'efficacité au sein de votre organisation et de votre industrie. La SCGC vous permet d'acquérir une réputation prestigieuse au sein de la profession de génie civil aux niveaux canadien et international.

Pour votre réseau

De multiples opportunités de réseautage sont disponibles au sein de la SCGC. Le nouveau programme de mentorat est un moyen efficace de mise en relation avec un membre expérimenté. La participation aux activités (présentations techniques, visites industrielles et de chantiers, soupers-conférences, etc.) de votre Section locale et/ou l'implication au sein d'une Division technique, d'un Programme ou d'un comité selon vos intérêts est un autre moyen de réseautage.

Vous avez l'opportunité de vous joindre à notre équipe de bénévoles au sein des comités de direction d'une Section, d'une Région et au niveau national incluant le conseil d'administration. La formule de calcul des avantages est très simple: pour chacune de vos implications, vous recevrez un retour exponentiel sur votre investissement. Dans le cadre du développement de votre carrière, il vient un temps où ce qui importe n'est pas ce que vous savez mais les personnes que vous connaissez.

Pour votre reconnaissance

N'hésitez pas à ajouter l'abréviation MSCGC à votre nom dans votre signature afin d'être identifié à notre Société et de la promouvoir. Cette visibilité que vous procure votre statut de membre peut vous mener loin en affaires auprès de décideurs membres de la SCGC qui le remarqueront et le reconnaitront. C'est une stratégie de marketing efficace et discrète mettant en relief vos valeurs et vos principes dans le domaine du savoir. L'opportunité d'être reconnu par vos confrères pour votre contribution et vos accomplissements de carrière avec l'un des prestigieux prix annuels de la SCGC représente une valeur inestimable.

Nous travaillons fort au niveau national pour la mise en place et le déploiement d'un plan d'action pour le développement des affaires. Nous allons recruter plus de partenaires d'entreprise et de commanditaires d'événements avec des ententes régulières. Les affaires étudiantes, le groupe des jeunes professionnels, les services aux membres et le comité des communications mènent une série d'initiatives stratégiques pour contribuer à l'atteinte de l'objectif de croissance du nombre d'adhésions individuelles.

Plus de membres va nous renforcer financièrement et nous permettre une plus grande influence pour accomplir notre mission et soutenir notre Vision 2020.

Je vous remercie d'avance pour votre précieuse contribution. ■

Tony Bégin est directeur senior, réalisation de projets intégrés pour Canam-bâtiments, une division de Groupe Canam.

Many Projects for the Quebec Region

Jean-Luc Martel, ing. jr., AMCSCE
VICE-PRESIDENT, QUEBEC REGION, CSCE

The Quebec Region aims to be more involved with young professionals during the 2015-2016 season. Consequently, the Montreal area will be among the first to implement the Society's mentor and protégé program. This program grants newly graduated student members access to a mentor from the CSCE. If you are interested in contributing to this program's success, become a mentor today! For more information, please visit <https://csce.ca/mentor-protege-program/>.

Furthermore, the Montreal Section will organize the first edition of the Canadian Steel Bridge Competition for CSCE, in partnership

with the Canadian Institute of Steel Construction (CISC). The first edition will be held in May 2016, in conjunction with the Canadian Concrete Canoe Competition at McGill University, in Montreal. The necessary documentation will be available from the beginning of September. All universities are invited to participate.

Several conferences and events will also be organized by the Montreal and Quebec Sections. The Montreal Section will organize six conferences, to be held on the last Monday of the month. Also, following the success of the first edition of its Career Forum, with participation from more than 100 students and professionals, the Section will hold a second edition in January 2016.

Similarly, the Quebec Section will organize six conferences, as well as its annual Career Forum. As it does every year, the Section will conclude its season in May with its traditional lobster dinner. Last year's dinner drew 75 participants!

If you have any suggestions or would like to know more about our activities and events, please contact me at president@scgcmontreal.ca.

Beaucoup de projets pour la Région du Québec!

Jean-Luc Martel, ing. jr, MASC GC
VICE-PRÉSIDENT – RÉGION DU QUÉBEC, SCGC

Pour la saison 2015-2016, la Région du Québec prévoit s'impliquer davantage auprès des jeunes professionnels. En effet, la ville de Montréal sera l'une des premières à mettre en place le programme Mentor et Protégé de la Société. Ce programme vise à offrir aux membres étudiants nouvellement gradués l'opportunité d'avoir accès à un mentor de la SCGC. Si vous êtes intéressés à faire de ce programme un succès, devenez mentor dès maintenant! Pour plus d'informations, rendez vous

au <https://csce.ca/fr/mentor-protege-program/>.

Ensuite, la Section Montréal a pris l'initiative d'organiser la première édition du Concours canadien de pont d'acier de la SCGC, en partenariat avec l'Institut canadien de la construction en acier (ICCA). Cette première édition sera organisée en mai 2016 conjointement avec le Concours canadien de canoë de béton à l'Université McGill, à Montréal. La documentation nécessaire sera disponible dès le début du mois de septembre. Toutes les universités sont invitées à y participer!

Plusieurs conférences et événements seront aussi organisés par les Sections locales de Montréal et Québec. La Section Montréal planifie un total de 6 conférences qui auront lieu les derniers lundis du mois. De plus, suite au succès de la première édition de son Forum-carrière avec la participation de plus d'une centaine d'étudiants et professionnels, la Section tiendra une deuxième édition en janvier 2016. Similairement, la Section Québec planifie 6 conférences de même que leur Forum-carrière annuel. Comme chaque année, la Section conclura sa saison au mois de mai avec son traditionnel souper de homard auquel un total de 75 membres étaient présents l'année dernière.

Si vous avez des suggestions ou êtes intéressés à en savoir plus sur nos activités et nos événements, n'hésitez pas à me contacter: president@scgcmontreal.ca.

Si vous avez des suggestions ou êtes intéressés à en savoir plus sur nos activités et nos événements, n'hésitez pas à me contacter: president@scgcmontreal.ca.

More than 100 students and professionals participated in the first Career Forum hosted by the Montreal Section.

Première édition du Forum-carrière de la Section Montréal auquel plus d'une centaine d'étudiants et de professionnels ont participé



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Time to Get Involved in Your CSCE Student Chapter

Charles-Darwin Annan, Ph.D., P.Eng.
CHAIR, STUDENT AFFAIRS COMMITTEE, CSCE

On behalf of the CSCE Student Affairs Committee, I would like to extend a heartfelt welcome to all new and continuing civil engineering students across our beautiful country. A special warm welcome to all our foreign students who have travelled far and near to acquire one of the best quality civil engineering educations in the world. I hope you are as excited as I am about this new academic year which is full of new opportunities, and of course challenges, to enrich yourselves and to begin or continue to build on those lifelong and valuable professional contacts.

These are exciting times for the committee; our success in the past two academic years offers new challenges and new opportunities. We have made significant progress in increasing support for students' participation in CSCE national events through our National Civil Engineering Student Capstone Competition and the National Student Leaders Workshop held during the annual CSCE conference. We will continue to hold these events at the next annual conference

in London, Ont., in June 2016. Our student chapters are stronger than ever before because of the support and resources (e.g. Student Chapter Guidebook – downloadable from the Student Affairs website) that we have introduced and continue to update. We also continue to strengthen inter-chapter interactions using social media, and use these media to solicit for students' input for our programs and initiatives. Our practitioner advisors are increasingly getting involved in student chapter planning and activities.

Now moving forward, we have been having behind-the-scenes discussions with all relevant parties, such as the CSCE Board of Directors, the local CSCE sections and regions, and the national CSCE office, to improve student services and make student membership benefits more tangible. I am pleased to announce that the Board has approved a motion that, effective September 2015, CSCE student members will not be charged an member annual fee, and they will

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C'est le moment de vous impliquer auprès de votre chapitre étudiant de la SCGC

Par Charles-Darwin Annan, Ph.D., P.Eng

PRÉSIDENT, COMITÉ DES AFFAIRES ÉTUDIANTES DE LA SCGC

Au nom du comité des Affaires étudiantes de la SCGC, j'aimerais souhaiter la bienvenue à tous les nouveaux et actuels étudiants en génie civil à travers notre magnifique pays. Également, un accueil tout spécial et chaleureux à les tous étudiants étrangers qui viennent parfois de très loin pour acquérir l'une des meilleures formations universitaires en génie civil au monde. J'espère que vous êtes aussi excité que moi à l'approche de cette nouvelle année universitaire, laquelle regorgera de nouvelles occasions, et bien sûr de défis, qui vous permettront d'enrichir votre expérience et de commencer ou de continuer à développer des contacts professionnels précieux et durables pour toute votre vie.

Ce sont des moments excitants pour le comité. Nos succès au cours des deux dernières années nous permettent d'espérer rencontrer de nouveaux défis et de nouvelles opportunités. Nous avons réalisé d'énormes progrès en augmentant le soutien destiné à la participation étudiante au sein des événements nationaux de la SCGC, notamment

notre concours national Capstone s'adressant aux étudiants en génie civil et l'atelier des leaders étudiants tenus au cours du congrès annuel de la SCGC. Nous organiserons à nouveau ces événements lors de notre prochain congrès annuel, à London (ON), en juin 2016. Nos chapitres étudiants sont plus forts que jamais en raison du soutien et des ressources (ex. : le Guide du chapitre étudiant - téléchargeable sur le site Web des Affaires étudiantes) que nous avons introduits et que nous continuons à améliorer. Nous continuons également à renforcer les interactions entre les différents chapitres à l'aide des médias sociaux. Nous utilisons d'ailleurs ces médias pour solliciter l'apport des étudiants au sein de nos programmes et initiatives. Nos praticiens-conseillers sont de plus en plus impliqués dans la planification et les activités des chapitres étudiants.

Maintenant que nous sommes de nouveau prêts à progresser, nous avons des discussions en coulisses avec toutes les parties concernées,

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The CSCE Young Professionals Committee is Now Recruiting



Bernard Moulines
CHAIR, YOUNG PROFESSIONALS
COMMITTEE, CSCE

The CSCE Young Professionals Committee operates across Canada, seeking to connect young civil engineers and offer unique opportunities to learn and grow as professionals. Committee members are provided with the help and support necessary to organize local events. These events are as diverse as the committee members themselves, including networking cocktails, site visits, mentorship programs, community and student outreach, and many others. The goal of each event is simple: to

help give back to your community of civil engineers.

Personally, I have been involved with CSCE for four years. Over this time, I have participated in unique construction site visits (including Canada's largest hospital in Montreal); received invaluable career advice from other CSCE members; and participated in networking events at local universities with civil engineering students. Needless to say, CSCE has provided a unique opportunity that has always stood out on my résumé.

The CSCE Young Professionals Committee is composed of civil engineers from across Canada, each operating in different cities and companies. We're looking for new members to help share our vision of building a stronger civil engineering community nationwide.

If you're interested in joining or have any questions, please do not hesitate to contact me, Bernard.Moulines@enercon.de. ■

Le comité des jeunes professionnels de la SCGC est en période de recrutement

Bernard Moulines
PRÉSIDENT, COMITÉ DES JEUNES PROFESSIONNELS, SCGC

Le comité des jeunes professionnels de la SCGC est présent partout au Canada, cherchant à recruter de jeunes ingénieurs civils et à offrir des occasions uniques d'apprendre et de grandir dans un monde de professionnels. Les membres du comité reçoivent l'aide et le soutien nécessaires à l'organisation d'événements locaux. Ces événements sont aussi diversifiés

que les membres du comité le sont. Ils incluent des cocktails de réseautage, des visites de chantiers, des programmes de mentorat, des activités de rayonnement auprès de la communauté et des étudiants, et plusieurs autres activités. Le but de chaque événement est simple : contribuer à redonner à

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Suite de la page 9

votre communauté d'ingénieurs civils.

Personnellement, je suis impliqué dans la SCGC depuis quatre ans. Au cours de cette période, j'ai participé à des visites de chantiers de construction uniques (dont le plus grand hôpital du Canada, à Montréal), j'ai reçu des conseils précieux pour ma carrière de la part d'autres membres de la SCGC et j'ai participé à des événements de réseautage dans des universités locales avec des étudiants en génie civil. Il va sans dire que la SCGC m'a fourni des occasions uniques qui ont toujours permis à mon curriculum vitae de se démarquer des autres.

Le comité des jeunes professionnels de la SCGC est constitué d'ingénieurs civils de partout au Canada, chacun pratiquant ses activités au sein de différentes villes et entreprises. Nous recherchons de nouveaux membres pour nous aider à partager notre vision visant à bâtir une communauté en génie civil plus forte à la grandeur de notre pays.

Si vous êtes intéressés à vous joindre à nous ou pour toute question, n'hésitez pas à me contacter au Bernard.Moulin@enercon.de. ■



CANADIAN CIVIL ENGINEER
L'INGÉNIEUR CIVIL CANADIEN

CALL FOR CASE STUDIES - 2016

The editors of CIVIL magazine invite CSCE-CSGC members to submit case studies for possible publication in future issues.

Projects submitted should demonstrate technical innovation in structural/civil engineering, project management or other engineering expertise.

Submit a brief summary of 700 words (in English or French), plus two or three images, to:

Bronwen Parsons, Associate Editor, CIVIL.
e-mail bparsons@ccemag.com, Tel. 416-510-5119.

Peter Dozzi, FCSCE

Peter Daniel Burns, FCSCE



Peter Dozzi, FCSCE, long time member of the Canadian Society for Civil Engineering, passed away on July 3 in Calgary at the age of 82. Peter was the co-recipient of the EIC Duggan Medal in 1965 for his paper entitled "Concordia Bridge, Fabrication and Erection." He received his Fellowship from the CSCE in 1985, and was chair of the CSCE's Construction Division from 1991 to 1993. In 2004, Peter received the Walter Shanly Award that recognizes outstanding contributions by a civil engineer to the development and practice of construction engineering in Canada. He also co-authored two books.

Peter was born in Copper Cliff, Ont., near Sudbury, and as a lifelong learner, earned degrees from Queen's University (B.Sc. in Civil Engineering), McGill University (Diploma of Management), and the University of Calgary (Master

of Engineering). He started his career in Montreal with the Dominion Bridge Company where he served as chief engineer and construction manager. It was in Montreal that he met his wife Agnes and started his family.

As a renowned bridge engineer, his work included many notable bridges across Canada. One of his proudest achievements was Alberta's first suspension bridge at Dunvegan. Various assignments with Dominion Bridge included work in Sudbury (with INCO), Regina and Calgary. Peter joined Fluor Canada in Calgary in 1979 and served as general manager operations, senior manager projects, general manager engineering, manager of piping engineering and chief structural engineer. He then accepted the challenge to be a professor at the University of Alberta and started the program to teach project and construction management in the Civil Engineering Department. Peter also taught this program for three terms at Purdue University. During his distinguished career, Peter served on the Consulting Practices Committee of APEGA and held memberships in PEO, APEG-BC, APEGS and ACI.

Peter used his talents in various ways. As a draftsman he designed homes and cottages, as an artist he painted landscape and still life compositions, and as a teacher he shared his knowledge with his students. Even in retirement, he remained active by consulting, lecturing in China, India and Egypt, and pursuing leisure activities -- travel, skiing, golfing, and playing hockey.

Peter Dozzi will be sadly missed by Agnes, his wife of 55 years, his son Bryan, daughters Karina and Christina and their families. Those of us from across Canada who knew Peter as a friend, colleague and professor will remember his passion for good engineering and the twinkle in his eye as he told a humorous story. ■

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REPLACING THE MILTON-MADISON BRIDGE

Buckland & Taylor won the 2015 CSCE/CANAM Excellence in Innovation in Civil Engineering Award for this extraordinary project to replace a crossing over the Ohio River.

By Murray Johnson, P.Eng., P.E.,

BUCKLAND & TAYLOR | COWI

When the first bridge over the Ohio River between Milton, Kentucky and Madison, Indiana was constructed in 1929, no doubt the two towns were ecstatic to be connected by the two-lane truss bridge, which served for 85 years. When the time came to replace the bridge, the two communities were highly dependent on the connection. The next closest crossing of the Ohio meant a detour of more than 80 kilometres.

Studies had shown that the best option for least cost and minimal disruption to the historic town of Madison was to replace the superstructure on rehabilitated existing piers. Since the old bridge would have to be demolished to construct the new one, the potential negative impact on the communities was huge. When the owners, Kentucky and Indiana, put the project out to tender as a design-build job, therefore, they included a requirement for a full-time temporary ferry, plus an additional clause which added a bid amount of \$25,000 per day for every day that the contractor had the bridge closed, to a maximum closure allowed of 365 days.

The winning design-build team included contractor Walsh Construction, with engineers Buckland & Taylor for the design and construction engineering of the four main spans, and engineers Burgess & Niple for the pier rehabilitation, temporary ramps, and approaches. During bidding, the team developed a plan to eliminate the ferry service and drastically reduce the bridge closure time, allowing them to bid just 10 days of closure while all other bidders went with 365 days. Traffic would continue to use the old bridge while the piers were rehabilitated and the new bridge superstructure was being built on

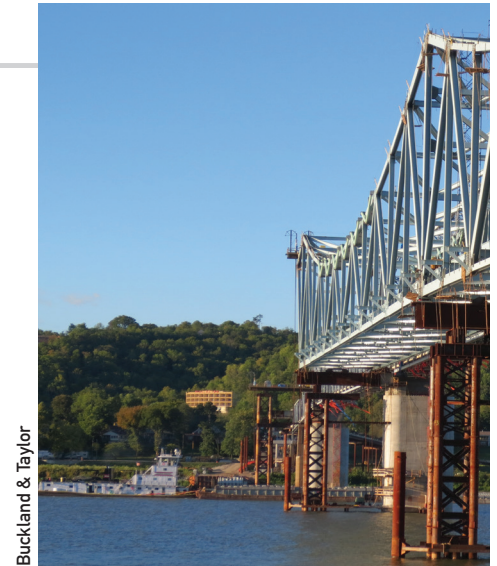
temporary supports alongside. Traffic would be then diverted onto the new spans, allowing demolition of the old bridge and completion of the pier rehabilitation. Finally, the bridge would be closed for a short period while the entire new superstructure, 742 metres long and weighing 13,850 tonnes, was slid into place onto the rehabilitated piers. The innovative plan to maintain traffic won the approval of the owners and the community, and a fast-paced design and construction effort began.

Main river spans

As with any innovative scheme of such scale, there were many challenges to be met and overcome by the design team. The new main spans of the bridge were designed as four-span continuous steel trusses, made up of fabricated H-shaped truss members with all-bolted connections. All of this main steel had to be ordered within a month of beginning design. The concrete deck had to be jointless over the main spans, resulting in a floor system anchored longitudinally at mid-river and floating over hundreds of stringer bearings elsewhere. The Ohio River is a major marine highway, with frequent heavy barge train traffic passing the bridge site. The two main river spans were therefore assembled on barges at the shore, floated out, and lifted into position using strand jacks during 24-hour closures of the river. The temporary piers – which would carry not only the new superstructure but also live traffic for several months – had to be designed to resist potential large barge impact loads over a range of elevations, as the river level fluctuates by several metres. The solution was three levels of lateral bracing frames welded from heavy W-sections, stressed to the newly rehabilitated concrete piers and doubling as pile-driving templates for the temporary piers.

Lateral sliding on large scale

Lateral sliding of smaller bridges into place is becoming fairly common as a solution for projects demanding minimal disruption of traffic. Most of these bridges include several girder lines, and sliding can be accomplished on multiple sliding shoes imparting a distributed





Walsh Construction

Above: Halfway there! The new bridge truss superstructure being slid laterally onto the rehabilitated piers of the original bridge beside it. Inset: New bridge superstructure being constructed on temporary supports while existing bridge carries traffic.

load to relatively small sliding girders. For the Milton Madison trusses, however, dead loads of up to 2,300 tonnes come down to single bearings up to 1.5 metres wide that had to slide along the sliding girder as point loads. This resulted in sliding girders designed as welded steel boxes 2.6 metres deep and 2.0 m wide, with a heavily-stiffened top flange to take the sliding load without significant deflections. Lifting the truss spans into place, with the bearing panel point at pier centerline, precluded a fixed connection between the temporary and permanent piers above the truss float-in level. It also meant that the 100 tonne sliding girders/temporary pier caps had to be inserted after the suspended truss was lifted past their location, which became a carefully orchestrated erection feat.

Once the new steel superstructure was fully erected and the deck constructed, traffic was diverted onto it and the old bridge was demolished with explosives. New pier caps completed the pier rehabilitation, sliding plates were installed atop them to align with the sliding girders, and sliding guides were installed. Temporary pulling frames were installed on all the piers, using the same strand jacks that had lifted the truss spans, now turned sideways. The sliding plates and the tops of the sliding girders were polished and greased for the specially-designed Teflon-filled base of the permanent truss bearings to slide

along. Because the new bridge had been in service in its temporary location for some time, all of the truss bearings had been fully operational, and now had to be locked-up for the lateral slide.

For the final step, the bridge was closed to traffic and the jacks, carefully controlled with a laser targeting system, pulled the new bridge 17 metres into its final location, in what is understood to be the world's longest-ever lateral bridge slide. A few days were required to complete deck joints and restraints and then the bridge re-opened to traffic in April 2014. In addition to wider, safer lanes and shoulders, the bridge now carries the first sidewalk connecting the two towns. ■

Murray Johnson, P.Eng., P.E. is vice president project director with Buckland & Taylor | COWI. He was the lead of construction engineering for the main truss spans on the Milton Madison Bridge Replacement.

OWNERS: States of Kentucky and Indiana
DESIGN-BUILD CONTRACTOR: Walsh Construction
DESIGN & CONSTRUCTION ENGINEERING OF MAIN SPANS: Buckland & Taylor | COWI, North Vancouver, B.C.
PIER REHABILITATION, TEMPORARY RAMPS, APPROACHES: Burgess & Niple, Columbus, Ohio

SASKPOWER BOUNDARY DAM CCS FACILITY



SaskPower



SaskPower

Top: Inside the CCS facility. The sulphur dioxide stripper removes captured SO_2 from an amine solution. Above: Aerial view of the station, with the CCS facility at right.

SaskPower won the 2015 CSCE Award for Governmental Leadership in Sustainable Infrastructure for the world's first post-combustion coal-fired carbon capture and storage (CCS) facility.

By Mike Monea, P.Eng.
SASKPOWER

SaskPower is leading the way to make a viable, technical, environmental and economic case for the continued use of coal. The Boundary Dam Integrated Carbon Capture and Storage (CCS) Project in Estevan, Saskatchewan is the world's first and largest post-combustion capture, coal-fired energy generation project of its kind. The project is a \$1.467 billion government-industry partnership between the Government of Canada and SaskPower. Global power industries can now see the full integration of a rebuilt coal-fired generation unit with carbon capture technology into the operation of a commercial power station. The results are low-emission electricity, capturing carbon dioxide (CO_2) which can then be used for enhanced oil recovery (EOR) operations or storage in a deep saline formation.

The CO_2 challenge

The Boundary Dam Project has successfully demonstrated large-scale CO_2 capture. Additionally, SaskPower is making technological inroads into the control of a variety of emissions, including particulate matters, sulphur dioxide (SO_2) and nitrogen oxides (NO_x). We also have the capacity to

further explore mercury capture options there in the future.

This project transformed an aging power unit at Boundary Dam Power Station into a reliable, long-term producer of 120 MW of base-load electricity. At peak operation Unit #3 at Boundary Dam will be able to capture approximately 90 per cent of its CO₂ emissions, or one million tonnes of CO₂ per year. This is the equivalent to taking 250,000 vehicles off the road every year. When not in demand for enhanced oil production, the CO₂ is stored in a safe, permanent, deep saline formation. Conclusive research has shown that CO₂ can be safely and permanently stored in such underground geological formations.

Reliable, sustainable, affordable power

Saskatchewan maintains close to a 300-year supply of lignite coal, a fuel that is bountiful in supply and predictable in price. Coal currently provides nearly 45 per cent of Saskatchewan's electrical needs. Through the launch of the Boundary Dam CCS Project, SaskPower has made the case for the continued use of coal as an affordable and reliable fuel source for baseload power generation, while also mitigating greenhouse gas emissions and meeting federal emission regulations. What's more, SaskPower believes the experience will lead to up to 30 per cent cost savings on future CCS undertakings.

Comparison with natural gas

When SaskPower began evaluating CCS as a possibility, generating power with coal through CCS was compared against the next best alternative: natural gas. Assumptions were made on the initial investment, current borrowing rates, and the internal rate of return, as well as coal and natural gas prices to determine if CCS was economically competitive with the natural gas in an equal life cycle. As a result, SaskPower found that the costs of building and operating a combined-cycle gas facility from scratch and retrofitting a coal unit with CCS were essentially the same using the gas prices and forecasts of the time. Those prices have reached unforeseen lows today; however natural gas prices remain volatile (doubling in price in 2006 alone for example). The true benefit comes from Saskatchewan's abundance of coal and that fuel source's affordable, stable price.

Revenue from byproducts

Flyash is a byproduct of coal generation and is used by the concrete industry. SaskPower sells a large percentage of its flyash produced by all the units at the Boundary Dam Power Station.

One hundred per cent of the SO₂ produced at Boundary Dam's Unit #3 will be captured and transformed into 96 per cent pure sulphuric acid. Annually, that represents 10,800 tonnes of saleable sulphuric acid to be sold primarily for industrial purposes. This will also allow SaskPower to meet its own needs for this product.

The use of CO₂ in enhanced oil recovery is critical for offsetting some costs associated with the initial CCS project, therefore providing a critical incentive for CCS technology development. SaskPower has secured a 10-year contract for CO₂ to be used for EOR in nearby oilfields. EOR



Exterior of CCS facility.

production has been piloted in Saskatchewan since the late 1970s and has been used on a commercial scale since 2000. The process has had a significant impact on oil production, labour, community economic spin-offs and provincial royalties. The application of EOR with CO₂ injection has not only prolonged the life of oilfields in Saskatchewan, but has also secured economic benefits for many years to come.

Permanent storage through Aquistore

SaskPower's Carbon Storage and Research Centre hosts Aquistore, an independent research and monitoring project which demonstrates that storing CO₂ deep underground is a safe, workable solution to reduce greenhouse gas emissions. The geological storage of CO₂ takes place 3.2-km deep in a layer of brine-filled sandstone called the Deadwood Formation. Located near Estevan, Saskatchewan, Aquistore is administered by the Petroleum Technology Research Centre (PTRC), which manages the CO₂ monitoring and storage. Aquistore is the PTRC's second world-class flagship project, following the IEAGHG Weyburn-Midale CO₂ Monitoring and Storage Project in Saskatchewan.

Progress after a year

SaskPower has released preliminary performance numbers for the operation of Unit #3 at Boundary Dam Power Station. Named one of National Geographic's 10 Energy Breakthroughs of 2014 That Could Change Your Life, the plant has nearly a year of commercial operating experience logged. Unit #3 is now producing affordable coal power for more than 100,000 homes and businesses and will continue to do so for at least the next three decades. What's more, it can do so 10 times more cleanly than other coal units and four times cleaner than a comparable natural gas unit. ■

Mike Monea, P.Eng. is president of Carbon Capture and Storage Initiatives with SaskPower, in Regina, Sask.

OWNER: SaskPower

PROJECT MANAGER: Doug Daverne, SaskPower

Matthew Neilson and the CS of CE Stick Pin?

A few weeks ago, Gary Davies sent me a photo of a stick pin that belonged to his great-grandfather. The stick pin appears to be that of CSCE's ancestor, the Canadian Society of Civil Engineers. I did some research and consulted present and past members of our History Committee to determine if the stick pin was indeed that of CS of CE.

My search was not conclusive so I suggested Gary write an article on his great grandfather and his stick pin. This article is a tribute to the first Canadian civil engineers. Perhaps it will also jog some memories as to the origin of the stick pin. — Mahmoud Lardjane, programs manager, CSCE

Gary Davies

Matthew Neilson, my great-grandfather, was one of Canada's earliest professional engineers. He was born in Lanark

County, Ont., the son of a Scottish immigrant. Among the papers I inherited from his son, my grandfather, is a copy of his February 1888 application to the Canadian Society of Civil Engineers (CS of CE), to which he was admitted in April 1888, just the year after CS of CE was founded. A copy of this document accompanies this article. I obtained this copy from Library and Archives Canada, which indicated that the CS of CE later became the Engineering Institute of Canada and that, in the 1880s there was no academic training for engineers. Thus, the application details the work experience on which Neilson's application for CS of CE membership was accepted.

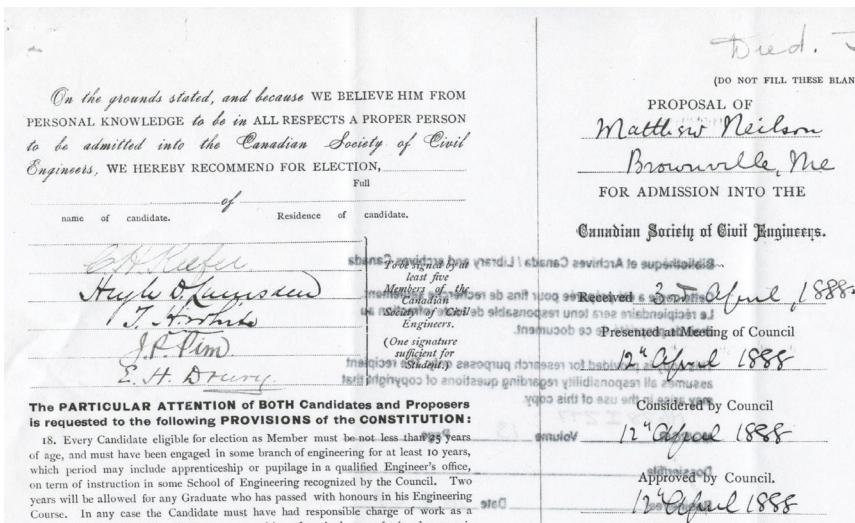
Great-grandfather Matthew worked in Canada, the U.S. and Mexico from roughly 1876 to 1912, the year he died in Montreal. Most of his

work was on railroads, including a lot of work surveying the route of the CPR across Canada, but he also worked on a street railroad. Most of his papers were donated to Exporail, the railroad museum at St. Constant, Que., just southeast of Montreal.

Family records tell me that Matthew's son, my grandfather, graduated from McGill with a Bachelor of Science in Civil Engineering in 1916. He had a variety of jobs in engineering including a stint in the Canadian Engineers (Army) during World War I. He later taught engineering at McGill and was made a life member of the Engineering Institute of Canada in 1970. He died in 1979.

Keeping the engineering tradition alive in the family is one of my cousins, a consulting engineer in Alberta.

The stick pin was likely my great-grandfather's, based on the lettering it contains. It seems as though the crest is an early version of CSCE's current crest. ■



Neilson's application to the Canadian Society of Civil Engineers. Le formulaire d'adhésion à la Société canadienne des ingénieurs civils de M. Neilson.

Matthew Neilson, 1852-1912 – l'épinglette de la Société canadienne des ingénieurs civils?

Il y a quelques semaines, monsieur Gary Davies m'a envoyé la photo d'une épinglette qui a appartenu à son arrière-grand-père. L'épinglette semble avoir été une épinglette de l'ancêtre de la SCGC la SC des IC. J'ai fait une recherche et j'ai consulté des membres actuels et passés de notre comité historique afin de déterminer si l'épinglette était bien celle de la SC des IC.

Ma recherche ne fut pas fructueuse, aussi ai-je proposé à Gary Davies d'écrire un article sur son arrière-grand-père et son épinglette. Cet article est un hommage aux premiers ingénieurs civils canadiens. Peut-être pourrait-il aussi susciter des souvenirs quant à l'origine de cette épinglette. Mahmoud Lardjane, Directeur Des Programmes, SCGC



The stick pin likely belonged to Neilson (at right), who became a member of CS of CE in 1888./L'épinglette a dû appartenir à M. Neilson (photo de droite) qui devint membre de la SC des IC en 1888.

Gary Davies

Matthew Neilson, mon arrière-grand-père fut l'un des premiers ingénieurs professionnels du Canada. Il est né à Lanark County en Ontario fils d'un immigrant écossais. Parmi les documents dont j'ai hérité de son fils, mon grand-père, se trouvait une copie de sa demande d'adhésion à la Société canadienne des ingénieurs civils (SC des IC) de février 1888 à laquelle il fut admis en avril 1888, une année après la création de la SC des IC. Une copie de ce document est jointe à cet article. Je l'ai obtenue de Bibliothèque et archives Canada qui indiquent que la SC des IC est devenue l'Institut canadien des ingénieurs et que dans les 1880 il n'y avait pas de formation académique pour les ingénieurs. Ainsi, le formulaire d'adhésion contient des informations sur l'expérience professionnelle, base sur laquelle sa demande fut acceptée.

Mon arrière-grand-père Matthew a exercé au Canada, aux États Unis et au Mexique entre environ 1876 et 1912, l'année de son décès à Montréal. La grande partie de son travail était dans les chemins de fer y compris beaucoup de travail d'arpentage du tracé du CFCP partout au Canada, mais il a également travaillé sur une ligne de transport en commun. La plupart de ses documents furent remis à Exporail, le musée ferroviaire canadien de St-Constant au sud-est de Montréal.

Des archives familiales indiquent que le fils de Matthew, mon grand-père, a obtenu un baccalauréat ès sciences en génie civil en 1916. Il a eu une variété d'emplois en ingénierie y compris un passage dans Les Ingénieurs militaires canadiens durant la Première Guerre mondiale. Plus tard, il enseigna à McGill et devint membre à vie de l'Institut canadien des ingénieurs en 1970. Il décéda en 1979.

Restant dans la tradition de la famille, un de mes cousins est ingénieur-conseil en Alberta.

L'épinglette a dû appartenir à mon arrière-grand-père si l'on se base sur les lettres qu'elle contient. Il semble que l'écusson est une première version de l'écusson actuel de la SCGC telle qu'elle est connue aujourd'hui. ■

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The Leading Edge in Construction Innovation: An Overview of the International Construction Specialty Conference



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The CSCE International Construction Specialty Conference (ICSC '15) was held in June 2015 at the University of British Columbia in Vancouver, as the first stand-alone conference organized by the Construc-

tion Division. The conference brought together more than 250 researchers and practitioners from around the world to share the most recent innovations and developments in the construction industry. One of the contribut-

ing factors to the success of this conference was the close partnership with a number of international counterpart associations, namely: the Construction Research Congress (CRC) of the American Society of Civil Engineers (ASCE), the Construction Industry Institute (CII), and the Association of Researchers in Construction Management (ARCOM) from the UK, as well as close collaboration with the industry. This partnership enabled a number of interesting programs in the conference including four keynote addresses and an Industry Innovation Symposium. This edition of CIVIL reviews some conference highlights.

■ Dr. Linda Newton, the technical chair of the conference, provides an overview of the papers presented at the conference, as well as emerging trends and directions of research in construction.

■ Dr. John Taylor, the recipient of the ASCE Daniel W. Halpin Award for Scholarship in



Construction, presents a compelling view on how network dynamics can be used to address important societal problems.

■ Dr. Chris Harty, who presented the ARCOM keynote address, uses examples of two research studies to show how BIM has positively brought new perspectives to people and processes in the UK construction industry.

■ Dr. Carl Haas, the recipient of the ASCE Peurifoy Construction Research Award, envi-

sions common threads between industry and academia over a construction career life cycle.

■ Dr. Roger Woodhead, the recipient of the CSCE Construction Division Alan D. Russell Award, shares the lessons he has learned during his long and productive career in civil engineering.

■ Erik Poirier and Dr. Sheryl Staub-French, the chair of the Industry Innovation Symposium, summarize the innovative construction

projects and emerging trends and technologies in sustainable buildings and infrastructure showcased by industry leaders and global experts at the symposium.

■ Kees Cusveller, the honorary chair of the conference, provides a practitioner's perspective on the need for closer collaboration between industry and academy.

We hope you enjoy this brief overview of the conference. ■

À l'avant-garde de l'innovation en construction : Un survol de la Conférence internationale spécialisée sur la construction

Farnaz Sadeghpour, Ph.D.

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La Conférence internationale spécialisée sur la construction de la SCGC (ICSC 2015) s'est tenue en juin 2015 à l'Université de Colombie-Britannique, à Vancouver. Elle était la toute première conférence indépendante organisée par la Division de la construction. La conférence rassemblait plus de 250 chercheurs et professionnels de partout à travers le monde afin de discuter des plus récents développements et innovations dans l'industrie de la construction. L'un des facteurs clés ayant contribué au succès de la conférence fut l'étroit partenariat avec un certain nombre d'associations internationales, soit : le Construction Research Congress (CRC) of American Society of Civil Engineers (ASCE), la Construction Industry Institute (CII), l'Association of Researchers in Construction Management (ARCOM) du Royaume-Uni, ainsi qu'une étroite collaboration avec l'industrie. Ces partenariats et collaborations ont permis de mettre sur

pied un certain nombre de programmes intéressants durant la conférence, dont quatre conférenciers principaux et un symposium sur l'innovation dans l'industrie. Cette édition de la revue CIVIL vous propose un résumé des faits saillants de la conférence.

■ La Dre Linda Newton, présidente technique de la conférence, offre un survol des sujets présentés lors de la conférence, ainsi que des nouvelles tendances et orientations de recherche en construction.

■ Le Dr John Taylor, récipiendaire du prix Daniel W. Halpin de l'ASCE pour les bourses d'études en construction, présente un point de vue convaincant sur la façon dont la dynamique des réseaux peut être utilisée pour traiter des problèmes sociétaux importants.

■ Le Dr Chris Harty, qui a présenté le discours d'ouverture, utilise les exemples de deux études de recherche pour démontrer comment le BIM (la modélisation des données du bâ-

timent) a contribué à deux nouvelles perspectives positives pour les personnes et les processus dans l'industrie de la construction au Royaume-Uni.

■ Le Dr Carl Haas, récipiendaire du prix Peurifoy de l'ASCE pour la recherche dans le domaine de la construction, nous parle des préoccupations communes entre l'industrie et l'université au cours d'une carrière complète dans le domaine de la construction.

■ Le Dr Roger Woodhead, récipiendaire du Prix Alan D. Russell de la Division de la construction de la SCGC, partage les leçons qu'il a apprises au cours de sa longue et productive carrière en génie civil.

■ Erik Poirier et la Dre Sheryl Staub-French, présidente du symposium sur l'innovation dans l'industrie, résument les projets de construction innovateurs et les tendances et technologies émergentes dans le domaine des bâtiments et des infrastructures durables, démontrés par les leaders de l'industrie et des experts mondiaux lors du symposium.

■ Kees Cusveller, président honoraire de la conférence, présente le point de vue d'un professionnel sur les besoins d'une collaboration plus étroite entre l'industrie et l'université.

Nous espérons que vous aurez apprécié ce résumé de la conférence. ■

Research Trends and Direction – an Overview

Linda Newton, Ph.D.

CHAIR, CSCE PUBLICATION COMMITTEE; TECHNICAL CHAIR ICSC '15

ICSC '15 was the most successful construction specialty conference yet for the CSCE from a technical perspective. As technical chair, I was overwhelmed with the number and breadth of papers submitted to the conference. The conference billed itself as providing “the opportunity for researchers and practitioners of construction from around the world [to share] the most recent innovations and developments in the construction industry.” This was certainly accomplished, with more than 320 abstracts initially submitted for review and 200 papers eventually submitted on ten themes or tracks.

The most popular tracks were Construction Engineering and Management with more than 60 papers submitted, followed by Asset Management and IT Applications with 30 papers each, and Building Information Modelling and Sustainability with just over 20 papers each. The technical committee was certainly challenged to review so many submissions and even more challenged to pick the best three papers.

The final honours went to:

- “The feasibility of plug-load monitoring and energy saving interventions in residential and office buildings on the University of Washington campus,” by Heta Kosonen and Amy Kim, University of Washington.
- “Investigating model evolution in a collaborative environment,” by Erik Poirier and Sheryl Staub-French (University of British Columbia); and Daniel Forgues (École de Technologie Supérieure).
- “Life safety demos: a new method to enhance situational awareness and situational interest through emotional engagement,” by Sidharth Bhanbadri and Matthew Hallowell, University of Colorado.

We observed new emerging trends in this conference. An initial word cloud produced from the 2013 Construction Specialty Conference resulted in the following five major themes:

- construction projects
- project delivery
- case studies
- building information modelling
- project management

After the 2015 conference, the word cloud still included building information modeling, project management and project delivery but “life cycle” and “construction safety” bumped case studies and construction projects out of the top five.

A deeper look at what papers comprised the Construction Engineering and Management track found that almost half of the papers were on health and safety or productivity, benchmarking and workforce issues. Very few papers were submitted on cost estimating, scheduling or equipment. Only one paper was submitted on project risk assessment in the Project Management track. Meanwhile, 19 of the 30 papers in the Asset Management track were on decision making. The IT Applications track papers were split almost evenly between modelling and simulation, and computer applications.

What does this imply about current research? Perhaps it is an indication that areas such as risk, scheduling and estimating have reached the limits of gains to be had from further study at this point, whereas project life cycle costing is emerging from the increased understanding that a project is more than optimizing design and construction costs. Issues such as sustainability and energy use and how to make the best decisions for the life cycle of an asset are far more topical than they were even two years ago. Finally, the large number of health and safety papers may be indicative of a shift in research from a safety education approach to a behavioural approach in which workers’ attitudes and behaviours are studied.

So much more can be said but I encourage you to view the conference proceedings for yourself. The proceedings are published on the UBC Document Repository System, Circle, where they will be indexed by services including Google Scholar. The link can be found on the ICSC '15 website (<http://icsc15.engineering.ubc.ca/proceedings/>) or through Circle (<https://circle.ubc.ca/handle/2429/52660>).

I’d like to conclude by thanking the track chairs, reviewers and session chairs, without whom the conference could not have been a success. ■

Five major themes emerged in the word cloud produced after the 2015 conference: project delivery, building information modeling, project management, life cycle, and construction safety.

Le Fil Rouge: Exploring Dynamics at the Intersection Between Human and Engineered Networks

John E. Taylor

PROFESSOR, CHARLES E. VIA, JR. DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING, VIRGINIA TECH, BLACKSBURG, VA

Recent reports by the National Academies in the United States have encouraged investment in developing a more comprehensive understanding of network dynamics at the intersection between human and engineered networks to address important societal problems. Networks are the structures over which dynamic system behavior unfolds. Network dynamics involve understanding superimposed diffusion processes through different organizational, social and technological network structures. In the field of civil engineering, we can imagine network dynamics occurring in the way we work, the structures that we build, and the way society interfaces with the infrastructure we build.

In terms of the way we work, there are many changes occurring that we need to understand in order to adapt effectively. Our civil engineering work is complex, often requiring a myriad of organizations to work together in project-based forms of organization. Our companies and project organizations are divided into teams and those teams are comprised of many individuals. It can be difficult for change to diffuse effectively through so many layers, particularly when one considers the shifting participation of individuals on teams, and teams on projects. This then is coupled with the fact that the same group of individuals, teams and companies may not work together on the next project. It is difficult for us, as a field, to carry forward what we learn collectively on one project to the next (Taylor and Levitt, 2007).

Globalization

One can cite many dynamics affecting the “human” side of our work but I will mention two dynamics currently occurring in our industry. First, globalization is impacting our field as we outsource aspects of civil engineering projects to teams in other countries, as our domestic competition for projects is made more intense by new foreign competitors, and as we compete abroad in new markets ourselves (Nayak and Taylor, 2009). None of these globalizing dynamics are intrinsically bad; however, each may require our workforce to work in different ways across cultures, time zones and differing standard work practices.

Second, working in global teams coupled with the introduction of a technology-savvy workforce is creating changes in how we work together. The workforce is increasingly using virtual teams and virtual collaboration technologies to complete their work, creating yet another dynamic to which our workforce must adapt (Iorio et al., 2011)

The “engineered” component of our work as civil engineers is facing similar changes. Society is demanding increasingly energy efficient infrastructure. Buildings alone account for about 40% of all energy consumed. Our infrastructure is evolving to be more energy efficient and smarter. Smart buildings can

Construction begins on Zone 1 Interconnecting Watermain

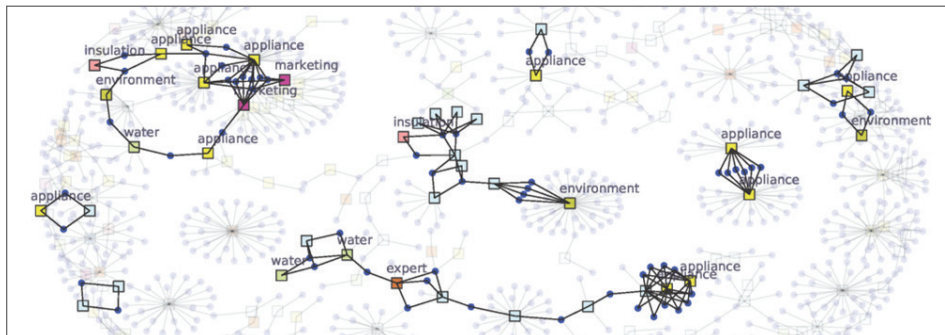


Construction has begun on Halton Region's Zone 1 Interconnecting Watermain. The project includes 6.3 km of 1800 mm and 1500 mm diameter watermain in a tunnel. The new watermain is required to facilitate water conveyance between the Burloak Water Purification Plant and the Kitchen Reservoir and to supply water to a future Zone 2 Booster Pumping Station. Work is underway at the main shaft site.

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Human network exchanges of energy-saving practices.

interface with building energy systems and with humans to reduce energy and other resource consumption (Peschiera et al., 2010). However, adding this level of intelligence to our infrastructure requires changes in our engineered systems. One recent and exciting dynamic occurring in the engineered systems we create is the increasing use of bio-inspiration and bio-mimetics to design infrastructure based on optimally performing systems occurring in nature (Han et al., 2015).

Common thread

It may already be evident to the reader that there is a fil rouge – or common thread – connecting the dynamics occurring in our “human” and “engineered” networks. We cannot achieve the “engineered” network change of dramatically reducing the energy consumption in the built environment with-

out changing the way we design as engineers, the way we build as constructors and the way we occupy and use infrastructure as citizens. Similarly, we cannot thoroughly adapt to global cross-cultural differences in our “human” networks unless we arrive at a shared understanding of work practices which will necessarily change the way we design, build and occupy our civil infrastructure.

A central question I raise in my own research is whether, as a field, we can absorb this much change (Unsal and Taylor, 2011). I am reminded often of when Alice meets the Red Queen in the Lewis Carroll book *Through the Looking-Glass*. After running for a while, Alice asks the Red Queen why they are not getting somewhere after running for so long. The Red Queen replies that Alice must be from a slow sort of country. In Wonderland one has to run fast simply to stay in the

same place; to get somewhere else one must run twice as fast. The network structures of our industry, as well as the interdependencies that can occur across levels and between the human and engineered networks, are critical to the successful completion of complex civil engineering work. However, they also may create challenges to adaptation for which we need a deeper understanding. The National Academies have given us the charge to examine and improve these dynamics as we investigate the grand challenges facing our industry, our society and our world. ■

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John E. Taylor is the recipient of the ASCE Daniel W. Halpin Award for Scholarship in Construction. This award is made to a researcher “who has demonstrated outstanding scholarship that advances construction engineering as a science.”

John E. Taylor is the Preston and Catharine White Professor at the Charles E. Via, Jr. Department of Civil and Environmental Engineering, Virginia Tech.

BIM: People, Processes, Perspectives

Chris Harty, Ph.D.

PROFESSOR, SCHOOL OF CONSTRUCTION MANAGEMENT AND ENGINEERING, UNIVERSITY OF READING, READING, UK

In the UK context, (and in many other places), building information modelling (BIM) seems to be the only game in town. In 2011, the UK government mandated the use of BIM on all public projects by 2016, and since then there has been extensive debate, initiatives, myths, rumours, arguments and general hand-waving across the sector. But there is very little consensus on what BIM actually is. To some, it is an incremental shift from 2D CAD to 3D, allowing better spatial coordination, with the 3D model able to act as a repository for all sorts of associated construction and asset information. For others, it is a radically new way of doing design, construction and operation, and holds the key to addressing the industry's long standing communication problems, hence bringing about the improvements in efficiency, productivity and value that many policy initiatives have called for over several decades. No wonder it has generated so much interest, in practice and in universities.

But often the advocating of (or resistance to) BIM in the UK has little connectivity to what organizations are actually doing with it. So the aim of this short paper is to describe two empirical research projects, and attempt to argue that BIM is having a positive impact on construction in the UK, without being the technological panacea to all of the industry's perceived problems. It will also try to claim that issues around the implementation and use of BIM, and ultimately its real value to construction and its clients and users, lies in understanding the dynamics of attempts to develop new innovative practices which exploit these technologies on the one hand, and on the other hand, attempts to embed standard, predictable and transferable ways of working that are applicable across a whole sector. These are what I call the problems of spinning out and scaling up.

The first project describes a BIM "awareness" survey conducted by the University of Reading

with one of the UK's largest contracting organizations. The organization had mandated the use of BIM prior to the UK government mandate, and had conducted an extensive programme of "BIM awareness" across its 5000 employees. The purpose of the survey was to understand the impact this had in terms of attitudes towards BIM, and to provide a barometer of current use of BIM processes on their projects. We used a standard approach which allowed us to gauge whether individuals felt positive towards BIM and believed it would improve their work, for the 1200 respondents who participated. The outcome was that the majority (84%) felt that BIM would help. However, the survey also revealed that only 16% were actually using BIM, despite this positive attitude.

Awareness is not enough

This shows us that awareness and a positive attitude are not enough to enable widespread adoption and use, of BIM or any technology. This is the problem of scaling up. This runs counter to the widespread and rather convenient view that issues over embedding new technology are grounded in individual resistance. Here we see positive intentions, but something is missing to enable this to be converted into widespread adoption. This problem of scaling up cannot be solved merely by relying on convincing individuals of the benefits of new technology like BIM.

The second research project is a longitudinal case study of the development and use of BIM technologies on two large hospital projects in the UK. They are huge and on-going projects, to the value of around £1 billion. The decision to use BIM was taken well before the mandate as a way to manage the complexity of the project – a relatively familiar application of BIM for coordination and information management. But it was when the projects moved to on-site work that some more novel processes were developed. These centred on making the

BIM information mobile – through the use of tablet computers – and taking it onto the site. The development team worked with various site managers and the model was tailored for a range of purposes, including: recording site progress, performing hand-overs and sign-offs, and troubleshooting equipment delivery at various stages of construction. The development was deliberately low key, involving only a handful of people and very little resource, and informal, kept separate from the main IT infrastructure. This circumvented problems of scaling up and embedding within existing large scale IT systems.

The case also shows how entrepreneurial activity at the project level can lead to a multiplicity of different ways of appropriating and using BIM technology – spinning out the technology for different purposes. But this divergence in ways of using BIM across different teams, projects and firms is now being recognized in the UK as a problem for establishing standards and consistent, transferable BIM implementation.

These two cases demonstrate the benefits of BIM, whether through people's positive attitudes or the development of new practices. But they also show the significant challenges that are still to be addressed. What is required to embed BIM across a whole organization, or whole sector? How do we build on project level applications whilst moving towards transferable and generic ways of using BIM? Finding the balance between spinning out and scaling up remains the central challenge of leveraging the benefits of BIM. ■

Dr. Harty is an associate professor of design and construction innovation in the School of Construction Management and Engineering at the University of Reading, UK. A sociologist working in construction, his research interests include the impact of BIM on projects and organizations and healthcare infrastructure provision.

Common Threads in Construction Career Life Cycle Management Between Industry and Academia

Carl Haas, Ph.D., P.E.

PROFESSOR, DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING, UNIVERSITY OF WATERLOO, WATERLOO, ONT.

Possibly the best book on managing a career in engineering, *The Unwritten Laws of Business*, was written more than 70 years ago by W.J. King and then revised with additions by J.G. Skakoon in 2001. The latest edition in 2014 is published by Profile Books Ltd., and its copyright is held by the American Society of Mechanical Engineers. Frankly, I do not believe there is much I can add to that book, but I will offer a few comments on construction career paths based on what I have learned from my own mentors and experience over the last thirty years in our industry. Most of those years are academic experience working with industry, but it has afforded some perspective.

We know that roles evolve through career stages. As we develop tool and domain knowledge, it is interesting to consider how that coincides with the evolution of those

roles. Academics are concerned with how our research, service and teaching activities are renewed and sustained, and how they can have an impact. Industry practitioners are concerned with updating their skills, learning from their experiences and accomplishing significant public and private works. Common concerns include the role of networking, career advancement and recognition. Challenges along the way include learning and recovering from our mistakes, resolving the parts that art and science play in construction engineering and management, and figuring out what works for us each as individuals. Perhaps our greatest challenge is balance though. And, in the end, what constitutes a positive impact and a worthwhile legacy?

Our career stages influence how we address these issues. We start as apprentices – that

early career stage, in which we are mostly still learning, and we are mostly still seeking external validation, but we are transitioning to self-motivated, goal-setting and achievement-oriented individuals. We move on to exploration, commitment and service, leadership, and then stewardship or retirement. Exploration in industry is the movement between departments, job roles, projects and companies. Academics are spending that time of life developing areas of expertise.

Eventually, we commit to a company or an area of research, where, with some persistence, we expect we can make an impact. We hope to rise to a position of leadership over time, and when that wanes, we may become stewards of our profession, whether it is Warden of an Iron Ring Camp, member of a professional committee, or editor of an academic journal.

Find the balance

At each stage, we build and renew our skill set, only a small part of which is the technical knowledge we learned as undergraduate engineers, whether we are academics or practitioners. An academic skill set might include: teaching, developing proposals, critical thinking and assessment, conducting research tasks such as lab experiments, oral presentations, literature reviews, preparing manuscripts for publication, experimental design and hypothesis, reviewing articles and proposals, and research data management. Overlap with practitioners' skills is substantial, though practitioners may better under-



Carl Haas (third from left) receiving the ASCE Peurifoy Construction Research Award. This award was established "to recognize individuals who have made outstanding contributions to the advancement of construction engineering through research and development of new technology, principles or practices."

stand and value the arts of negotiation and conflict resolution, as well as leadership, strategic planning, and business practices such as accounting.

We all struggle with new ways of collaborating over the Internet, with emerging technologies, and with the changing values of each new generation of engineers as they enter the profession. We are all learning to sustain our careers by occasionally stirring the pot with a change of employer or role, but more importantly by constantly renewing our skill set. That takes commitment, to enroll in continuing education and to create our own version of Google's "20% time"

against all the day-to-day pressures of work. In the end, by exercising those skills, we will have made an impact.

Most of the impact will have been the positive influence we have had on people through mentorship, service, and the values we have nurtured. Academics wish to have an impact on practice such as design code changes or standard planning methods, and we like to add new knowledge such as the properties of new materials that can eventually support other discoveries or be transferred through the classroom. Practitioners are proud of the construction projects they helped to complete, or of leading the establishment of a

new corporate division.

To accomplish all this, we know the common success factors are strength and quality of character, some early luck and momentum, hard work, both team and leadership skills, ability to communicate, and increasingly, networking and creativity. While we ourselves are ultimately responsible for these factors, so much depends on family, colleagues, and mentors throughout our careers. That brings us back to balance. Finding some kind of balance between our beliefs, our family and our work is the greatest challenge, and the foundation of our own happiness and success. And that's not just academic. ■

From the Stone Age to Smartphones — Lessons Learned From a Long Career

Roger Woodhead, Ph.D., P.Eng

DIRECTOR TRANSIT SYSTEMS, SNC-LAVALIN, VANCOUVER

I started my career in 1973 before personal computers, the Internet, Google, AutoCAD and smartphones. Today that seems like the Stone Age! But work was much simpler, less hectic and progressed at a slower pace.

Since my first job as a structural engineer I have been privileged to fill a variety of positions for both consulting engineers and contractors, including construction engineer, chief structural engineer, chief engineer, design manager, technical services manager, quality systems manager, project director and technical director. The projects have included multi-storey buildings, marine projects, industrial plants, bridges, offshore concrete structures, caissons and rapid transit systems. They have been constructed using traditional design-bid-build, design-build and P3. This experience has covered almost every facet of the construction industry.

In that time I have learned a plethora of lessons. Some of these are meant to be hu-

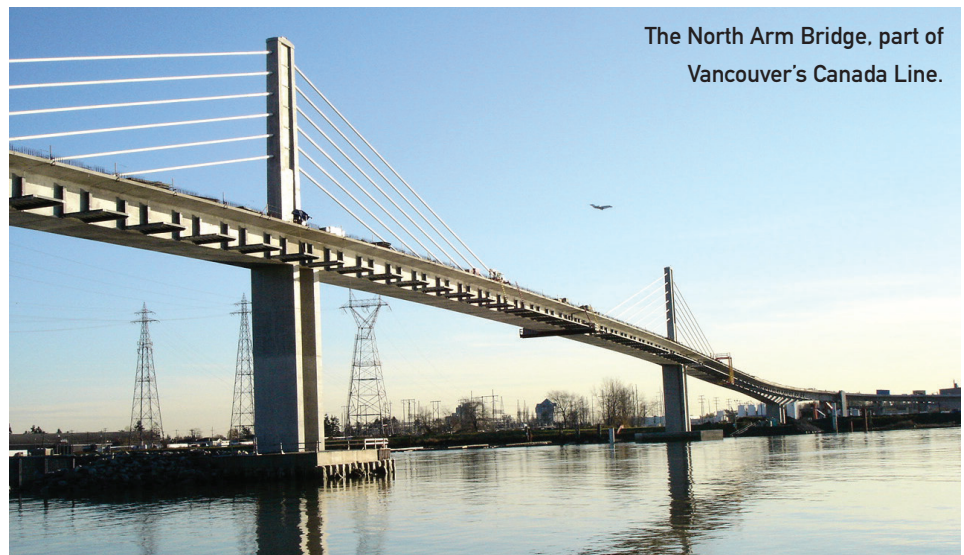
morous but most should be useful to readers whatever stage of their career.

In my early career in both consulting and construction I learned:

- Get a variety of experience early on.
- Loyalty doesn't always pay. Generally a

return to a previous employer is at a higher level than the people who stayed.

- Don't turn down a move. I was once asked to go to Edmonton to open an office. Even though I didn't want to leave Vancouver, I agreed. The office never opened but I



The North Arm Bridge, part of Vancouver's Canada Line.

Photo courtesy Roger Woodhead.



The construction of the Yaletown station on Canada Line. Right: A completed bored tunnel for the Canada Line rapid transit project.

was seen as a “company man.”

- Never organize the company Christmas party. Half the attendees won't like the food, others won't like the venue and others won't like the band/music.
- Always try to get along with your boss's executive assistant. He/she is the most important person in the company
- Go to Toastmasters. You will learn public speaking, which will dramatically improve your communication skills – a strong asset for a senior manager.

After working for 17 years I was fortunate to work on my first design-build mega proj-

ect, an offshore oil platform in Newfoundland. I found it to be overwhelming at the start but learned many lessons that enhanced my career:

- Nothing can prepare you for a large project other than doing one.
- You will learn much more from a difficult project than an easy one.
- Communication, both written and verbal, is very important since many people work on a large project.
- Don't shy away from a challenge.
- Never give up.

When I returned to Vancouver I started my

own consulting business. Soon afterwards I obtained a contract on an overseas design-build mass transit project by selling myself as a generalist who could manage large, complex projects. Lessons learned were:

- Sell your skills from previous projects even if you don't have specific experience.
- Overseas work allows more flexibility.
- Learn to work with other cultures.
- Be humble when working in other countries.

After returning to Vancouver I was retained as construction engineer on two underground dumper pits which the contractor had elected to construct using the caisson sinking method. The project proved to be very difficult as one of the caissons was stuck underground before it reached the correct depth. However, I had noticed that the soil conditions were different to that in the geotechnical report so the contractor was able to work on a cost plus basis. I learned the following lessons:

- Don't be afraid of new challenges.
- Use engineering basics to solve problems.
- Read the contract documents.
- And never, never, ever give up.

My next major contract was as quality systems manager for the owner's engineer on a large rapid transit project. I used my large project experience, my knowledge of quality management and knowledge from my previous rapid transit project. The contracts were a mix of design-bid-build and design-build. The project taught me:



All photos courtesy Roger Woodhead.

Roger Woodhead and the first train on site for the Canada Line rapid transit system.

- Use experience from previous projects to market yourself.
- Working for the owner is less stressful but not as interesting.
- Quality is not a priority in the construction industry.

Be able to give feedback (i.e., results of audits) in a non-confrontational manner.

In 2005 I happened to be in the right place at the right time and was offered the role of technical director on Canada Line, a \$2-billion P3 rapid transit project in Vancouver. The project was very successful in that it was finished on budget and three-and-a-half months ahead of the aggressive schedule. I was able to build upon the lessons learned and past experience to play a major role in what is to date my “blue ribbon” project. Among the lessons learned were:

- Luck plays a part but grasp the opportunity – never be afraid of a challenge.
- Big projects require personal sacrifices; they are not 9-to-5.

- Use all lessons learned on previous projects.
- Internal/external communications are very important.
- Soft skills are much more important than technical ones.
- Engineers work in silos and have to be pushed into communicating with each other.

Most of my career has been spent designing or managing designers. In that time the importance of design management has become better understood. I believe that a design manager should have above-average technical skills but should not be an expert, since having a big picture view is much more important. A design manager should:

1. Have a calm personality so as not to get

over-excited or angry.

2. Have good leadership, motivation and team building skills.
3. Be able to solve problems and make quick decisions. (The wrong decision is usually better than no decision.)
4. Have an understanding of other disciplines without being an expert in them.
5. Be able to delegate.
6. Have a very thick skin.
7. Possess a good sense of humour.

I am now well past retirement age; I work long hours and thoroughly enjoy my job. I have worked on many difficult and high-profile projects, which has given me a very satisfying and enjoyable career. I wish all of you the same. ■

Roger Woodhead is the recipient of the CSCE Construction Division Alan D. Russell Award, which was established “to recognize a lifetime of significant achievements and contributions, and to ensure that there is an ongoing forum for those that follow to fulfill their duty to share perspectives on the past, present and future state of the industry.”

Industry Innovation Symposium

Erik Poirier and Sheryl Staub-French, Ph.D.
UNIVERSITY OF BRITISH COLUMBIA

The Industry Innovation Symposium, held at the University of British Columbia, Vancouver, in the context of the CSCE’s 5th International/11th Construction Specialty Conference, was a unique event aimed at bridging the gap between academia and industry by bringing together local industry professionals and the ICSC conference delegates.

A total of six speakers took to the podium to present the emerging trends in industry practices and in academic research. The keynote presentations were delivered across three themes: infrastructure construction, project organization and delivery, and building construction and renewal.

Infrastructure construction

Under the theme of emerging trends in infrastructure construction, Ross Gilmore, area manager with Peter Kiewit Infrastructure Co., presented three large iconic infrastructure projects that were performed by Kiewit over the past two decades: Confederation Bridge, the 12.9-km link between Prince Edward Island and New Brunswick; the extension of the Millennium line, part of Metro Vancouver’s SkyTrain network; and the construction of the Port Mann bridge, a \$2.4-billion cable-stayed bridge over the Fraser river in Metro Vancouver. The keynote covered the intricacies and the challenges of delivering these three large design-build in-

rastructure projects and how, in this context, the company innovated to meet stringent time, budget and quality constraints.

Dr. Burcu Akinci, professor in civil and environmental engineering at Carnegie Mellon University, presented her work in the field of data sensing and collection technologies, with a particular emphasis on laser scanning and automated capture using drones. Dr. Akinci discussed the complexities of integrating 3D imaging and building information modeling (BIM), and the challenges in automating and processing laser scans to develop their full potential and use in the construction industry. She also discussed future opportunities for the deployment of aerial robots for virtual inspec-

tion and project data collection.

Project organization and delivery

The second theme touched on emerging trends in project organization and delivery. Geraldine Rayner, director at Summit BIM, discussed the impact of the transition to BIM-based digital data on the information life cycle of building owners' assets. The keynote touched on the complexity of information handover in the digital age, questioning the quantity, type and format of information being handed over to the owner upon completion of a project. Issues of information quality, accuracy, trustworthiness and usefulness were addressed. The need for standardized rules, data and object requirements and their accurate mapping at handover to support the owner's facility maintenance and operations programs was discussed.

Dr. Jennifer Whyte, professor in innovation and design at the School of Construction Management and Engineering, University of Reading, in the UK, presented her research work in the field of digital design interfaces and new modes of design and digital project delivery in the digital economy. Her keynote presented new forms of organizing projects

around digital artifacts and also addressed the question of data handover as a continuous and ongoing process throughout the design and construction stages of a project.

Rayner's keynote touched on the complexity of information handover in the digital age, questioning the quantity, type and format of information being handed over to the owner upon completion of a project.

Building construction and renewal

The final theme touched on emerging trends in building construction and renewal. Marwan Bakri, director of BIM and virtual construction services at Ledcor Construction Ltd., presented the BIM adoption and implementation process at Ledcor. His presentation outlined the various uses, benefits and challenges of the transition to a BIM-based

project delivery process for a general contractor. Various uses of BIM across the project life cycle, namely pre-construction and planning services, virtual mock-ups and clash detection/coordination as well as BIM use during operations, were discussed.

Dr. Mohamed Al-Hussein, professor in civil and environmental engineering at the University of Alberta, presented his work in the field of modularization and industrialization of construction, namely single- and multi-family residential construction. He presented how BIM is being used to drive prefabrication in the Alberta housing industry, the gains that are being felt and the potential deployment throughout the AECO industry. Dr. Al-Hussein presented his experience working with numerous organizations in the project delivery supply chain and the extraordinary benefits that have been achieved in terms of improved productivity and cost and time savings.

Lastly, Dr. Chimay Anumba, department head and professor of architectural engineering at Pennsylvania State University, presented his research work in the domain of sustainable urban renewal and achieving high-performance buildings through retrofitting. Dr. Anumba highlighted that cities are facing increasing pressure to renew their building stock and thus there is a need for a systemic approach to this sustainable urban renewal to capture its full scope and complexity. Dr. Anumba maintains that considerable benefits can be had if the works are well planned and adopt an integrated and systemic approach. He also maintains that this approach will be achieved only through regulatory, policy and behavioural changes.

The day ended with the first ever buildingSMART Canada BIM forum, which was an opportunity for industry practitioners to get a first-hand account of buildingSMART Canada's activities, including its work on the Roadmap to Lifecycle BIM in the Canadian AECO industry, as well as insight into open standards for BIM and the built environment. ■



Panelists at the Industry Innovation Symposium, held in the context of CSCE's 2015 International Construction Specialty Conference.

The Need for Industry–Academic Collaboration

Kees Cusveller

VICE-PRESIDENT, ALTERNATIVE PROCUREMENT AND DELIVERY, GRAHAM CONSTRUCTION

HONORARY CHAIR, ICSC '15

As a first time attendee to the ICSC conference, and as the honorary industry chair, I had no preconceived expectations about the conference, nor its implications to the construction industry at large.

I was one of the judges for the graduate student's poster presentations and found that very enlightening. It is difficult to present a research project using a single poster-sized document to an audience of non-academics that have no prior knowledge of the project, and to do so in a five-minute time period. Yet, all of the groups did so and did it well. The quality of presentations has reinforced my belief that the students of

today will become the leaders of our industry in the future.

The opening and closing events were a great way to mix with academics and students from around the globe and I found these events very worthwhile. The industry symposium was an opportunity to listen to both academic and industry panelists on the subject of what the future of our industry could look like and how it could work. Overall, it was an excellent effort by the conference organizers to bridge the gap between the academic world and the real world.

So what's next? How do we, as academic and industry leaders, continue to build in a meaningful way on what was started at the conference? I believe there are a number of potential avenues worth exploring by both sides. From an industry perspective, we must ask ourselves what the future holds or potentially holds, and how the academic community could contribute to that. From an academic perspective, we need to look into tomorrow in a holistic manner and gauge the interest of the industry to engage in those ideas and projects. Personally, I believe there are three major influences that will change our industry in the future.

Technology

First, we will continue to see an explosion of technological advances that affect the way in which we communicate and construct projects. This includes advances in building information modeling (BIM), in prefabrication and modular construction, and advances in higher technical components being utilized in projects. The academic world has done significant research into these areas and I believe this area is well served with one exception: construction owners of the world have not embraced many of the new paradigms, and need to get onboard and allow some of these new initiatives to be utilized in their projects.

Secondly, there is a significant societal shift in attitude toward construction projects. This includes not only the environmental and green side of building construction, but also an improved emphasis on safety, the aging of our population and the impacts of projects on the 'built' world. We are seeing an emphasis on the entire life cycle of projects including operating costs, utility consumption and, ultimately, the decommissioning process. There has been very limited research on these factors,



Top: Coffee break during ICSC 2015. Above: Kees Cusveller (Honorary Chair) and Susan Keenlside (of S8 Inc.) on jury duty for the poster competition in the Graduate Student Colloquium in Construction.

including defining what it all entails. I believe there is a significant opportunity for academics to demonstrate leadership here.

Third, and finally, there is a growing trend towards alternative construction project processes. Projects have become significantly larger and more complicated, yet the ability of both the design and construction communities to manage these has not kept up. We have seen a significant increase in the use of P3 (public private partnership) delivery methods as well as other trends, such as modified design build and IPD (integrated project delivery), among others. There has been much hype about these procurement and delivery methods, but very little data, other than self-serving information, as to whether any

of this has resulted in better projects. There is a great opportunity for the academic world to look at some of these trends and truly define if it is better, and if so, by what factor? Initially, success factors would need to be defined and then explore from there.

In summary, I believe there is a need for more and better-targeted collaboration between the industry and academia, and it all starts with open and honest communication between all sides. The Canadian Construction Association has provided seed funding for CCI (Canadian Construction Innovations) and this is targeting applied research into specific areas of interest by certain companies. An excellent start, but much more can and should be done. ■

THE STUDENT VOICE | LA VOIX DES ÉTUDIANTS

Continued from page 8

receive the digital version of *Canadian Civil Engineer* magazine. We intend to soon revise the online registration form to reflect this exciting news, and we will try to make the transition process as smooth as possible. Another exciting change this year is that we will be sending “swag” packages to all our active student chapters to help with their school year kick-off events. Please, make sure we have your correct current mailing address.

We will be engaging the local CSCE sections to take an active role in the activities of student chapters and to provide support. If you do not hear from your local section chair, please talk to your faculty and/or practitioner advisor, or contact myself or Amie Therrien at the national office so we can put you in contact with your local section

chair. Also, currently, we are discussing extending student membership to civil engineering students beyond Canada to give our students a unique opportunity to interact and exchange ideas across national borders. We will continue to update you on any new development.

So once again, welcome to yet another exciting school year, a time to get involved in your CSCE student chapter and make your student membership count. ■

Dr. Charles-Darwin Annan is an associate professor of civil engineering at Université Laval and can be reached at Charles-darwin.annan@gci.ulaval.ca

Suite de la page 8

telles que le conseil d'administration de la SCGC, les sections locales et les régions de la SCGC, ainsi que le Bureau national de la SCGC, afin d'améliorer les services aux étudiants et de rendre les avantages des membres étudiants encore plus tangibles. Je suis fier d'annoncer que le conseil d'administration a approuvé une résolution, en vigueur dès septembre 2015, à l'effet que les membres étudiants n'ont plus à payer de frais de membre annuels, et qu'ils recevront la version numérique de la revue *L'ingénieur civil canadien*. Nous avons l'intention de corriger l'inscription en ligne afin de refléter cette formidable résolution et nous tenterons de rendre ce processus de transition le plus harmonieux possible. Un autre palpitant changement fut les ensembles promotionnels envoyés à tous nos chapitres étudiants actifs afin de les aider lors de leurs événements de lancement de la nouvelle année universitaire.

Nous demanderons aux sections locales de la SCGC de prendre un rôle actif lors des activités des chapitres étudiants et de leur fournir un certain soutien. Si vous ne recevez pas de nouvelles du président

ou de la présidente de votre section locale, veuillez contacter votre conseiller de faculté ou votre praticien-conseiller, ou encore prendre contact avec Amie Therrien ou moi-même au Bureau national afin que nous puissions vous mettre en relation avec le/la responsable de votre section locale. De plus, nous discutons présentement de l'extension probable du statut de membre étudiant aux étudiants en génie civil à l'extérieur du Canada, afin d'offrir aux étudiants une occasion unique d'interagir et d'échanger des idées au-delà des frontières canadiennes. Nous continuerons à vous tenir au courant de tout nouveau développement.

Donc, encore une fois, accueillons avec joie une autre année universitaire excitante. C'est maintenant le bon moment pour vous impliquer au sein d'un chapitre étudiant de la SCGC et de faire valoir votre statut de membre étudiant. ■

Le Dr. Charles-Darwin Annan est professeur agrégé en génie civil à l'Université Laval et on peut le joindre au Charles-darwin.annan@gci.ulaval.ca

Infrastructure Canada's Asset Management Roundtable

Doug Salloum,
EXECUTIVE DIRECTOR, CSCE

On March 19, 2015, asset management stakeholders from across the country gathered in Ottawa to share best practices, and to identify challenges to implementing asset management as well as possible innovative solutions to these identified challenges.

Hosted by Infrastructure Canada, the day's discussion was facilitated by Reg Andres, P.Eng., vice-president of R.V. Anderson Associates Ltd. and, at the time, president of the Canadian Society for Civil Engineering. Participants included representatives from provincial/territorial governments, municipalities and the federal government, along with members from national stakeholder groups including Ontario's First Nations, the Federation of Canadian Municipalities, the Canadian Society for Civil Engineering and the Canadian Network of Asset Managers. As your executive director, I represented CSCE.

The roundtable discussions were structured around presentations by a number of the participants, who were asked to provide input for the discussions. The participant presentations provided a backdrop to initiate the group discussions. These were held in two parts. The first set of group discussions focused on the identification of barriers and challenges to implementing asset management. The second break-out discussion focused on solutions and potential opportunities (potential action items) to address some of the challenges identified.

The following table outlines the challenges identified and potential action items to address them.

Infrastructure Canada is hoping that specific asset management stakeholders will take on some of these action items. For example, I have already volunteered on behalf of CSCE to work on action item 2.2. Accordingly, over the next few months I will be discussing with the heads and chairs of the civil engineering departments across Canada the feasibility of developing a curriculum or certification program for asset management. I will be connecting with individuals outside of the universities as well, members and non-members. If you have a particular interest and expertise in the development of certification programs or curricula, I would like to hear from you.

In the meantime, you can find the Report from the Asset Management Roundtable on the CSCE website at <https://csce.ca/strategic-directions/> under the section on our Strategic Direction #3 – Leadership in Sustainable Infrastructure.

This is an important activity for CSCE to be involved in. I hope, with the help of our members, that CSCE can make a contribution to the advancement of the state of asset management awareness and implementation capacities in this country. Stay tuned for more information as this work develops. ■

ASSET MANAGEMENT ROUNDTABLE, MARCH 19, 2015

CHALLENGES	POTENTIAL ACTION ITEMS
CHALLENGE 1 - Communicating the benefits of asset management	ACTION ITEM 1.1 - Develop a coordinated national awareness/education campaign on the actual cost of infrastructure and the benefits of asset management
CHALLENGE 2 - Resources to support asset management, including capacity building and training	ACTION ITEM 2.1 - Establish funding sources to support the development of capacity building in particular for the small, rural, remote, First Nation and northern communities. ACTION ITEM 2.2 - Develop a curriculum or certification program, in partnership with a Canadian university, for asset management.
CHALLENGE 3 - Access to asset management information resources	ACTION ITEM 3.1 - Create a Centre of Excellence for Asset Management to provide multi-disciplinary training and help disseminate information. ACTION ITEM 3.2 - Develop a national multi-disciplinary forum for asset management to facilitate the breakdown of stakeholder silos and increase information sharing
CHALLENGE 4 - Information and data management	ACTION ITEM 4.1 - Establish national templates and analytical tools to support data collection and analysis ACTION ITEM 4.2 - Develop a national database for infrastructure assets
CHALLENGE 5 - Legislation, policy and standardization	ACTION ITEM 5.1 - Explore the possibility of establishing asset management policy consistency across infrastructure programs



CSCE National Awards and Fellowships — Call for Nominations



Fellowships (FCSCCE)

Members who have attained civil engineering excellence and who have contributed actively to CSCE and to the profession of civil engineering may be elected as Fellows by the CSCE Board of Directors. With the designation of Fellow, CSCE seeks to acknowledge annually academic and practicing members, currently active or retired. Fellowship nominations will be received up until October 30, 2015 for consideration this year.

Nomination forms and additional information on CSCE Fellowships can be found on the CSCE website <http://csce.ca/committees/honours-and-fellowships/>

Career awards

Nominations are invited at any time for the awards listed here. Those nominations received by November 15, 2015, will be considered for the 2016 awards to be presented at the CSCE Annual Conference in London, Ont., in June 2016. Please submit nominations and supporting material electronically, clearly stating the award for which the nomination is made, by e-mail to the executive director, Doug Salloum, at doug.salloum@csce.ca.

Further details and Terms of Reference for all of the following awards are available on the CSCE website at <http://csce.ca/committees/honours-and-fellowships/>

A.B. Sanderson Award

Recognizes outstanding contributions by a civil engineer to the development and practice of structural engineering in Canada.

Albert E. Berry Medal

Recognizes significant contributions by a civil engineer to the field of environmental engineering in Canada.

Camille A. Dagenais Award

Recognizes outstanding contributions by a civil engineer to the development and practice of hydrotechnical engineering in Canada.

E. Whitman Wright Award

Recognizes significant contributions by a civil engineer to the development of computer applications in civil engineering in Canada.

Horst Leipholz Medal

Recognizes outstanding contributions by a civil engineer to engineering mechanics research and/or practice in Canada.

James A. Vance Award

Recognizes a CSCE member whose dedicated service, other than as president, has furthered the advancement of the CSCE and who has completed or recently completed service in one or more sequential positions at the national level.

Sandford Fleming Award

Recognizes outstanding contributions by a civil engineer to transportation engineering research and/or practice in Canada.

Walter Shanly Award

Recognizes outstanding contributions by a civil engineer to the development and practice of construction engineering in Canada.

W. Gordon Plewes Award

Recognizes particularly noteworthy contributions by an individual to the study and understanding of the history of civil engineering in Canada, or civil engineering achievements by Canadian engineers elsewhere. Normally, the recipient will be an individual, not necessarily an engineer, but in special circumstances the award can be given to an organization.

Appel aux Candidatures – Distinctions Honorifiques Nationales et Fellowships de la SCGC

»»» Fellowships (FCSCCE)

Les membres ayant atteint un niveau d'excellence dans le domaine du génie civil et ayant contribué activement à l'avancement de leur profession et de la SCGC peuvent être élus au titre de « Fellow » par le conseil d'administration de la SCGC. Avec la nomination d'un fellow, la SCGC vise à reconnaître annuellement les membres appartenant au monde universitaire et les membres pratiquants, présentement actifs ou à la retraite. Les candidatures de fellowship doivent être reçues avant le 30 octobre 2015 pour être prises en compte cette année.

Des formulaires de candidature et des informations supplémentaires sur les fellowships de la SCGC se trouvent sur le site Web de la SCGC <http://csce.ca/fr/committees/honours-and-fellowships/>

Prix carrière

Les membres sont invités à soumettre en tout temps, des candidatures pour ces prix; les candidatures soumises d'ici le 15 novembre 2015 seront considérées pour les prix 2016 qui seront décernés au congrès annuel de la SCGC à London, ON, en juin 2016. Veuillez soumettre les candidatures, en précisant le titre du prix, par courriel au Directeur Exécutive, Doug Salloum à doug.salloum@csce.ca.

De plus amples détails et paramètres pour l'ensemble des prix énumérés ici sont disponibles sur le site Web de la SCGC <http://csce.ca/fr/committees/honours-and-fellowships/>.

Le prix A.B. Sanderson

Est décerné aux ingénieurs civils qui se sont signalés par leur contribution exceptionnelle au développement et à la pratique du génie des structures au Canada.

La médaille Albert Berry

Est décernée à un ingénieur civil qui s'est distingué par son importante contribution au génie de l'environnement au Canada.

Le prix Camille A. Dagenais

Est décerné aux ingénieurs civils qui se sont signalés par leur contribution exceptionnelle au développement et à la pratique de l'hydrotechnique au Canada.

Le prix E. Whitman Wright

Est décerné à un ingénieur civil qui s'est distingué par son importante contribution au développement des applications de l'informatique au génie civil au Canada.

La médaille Horst Leipholtz

Est décernée à un ingénieur civil qui s'est distingué par son importante contribution à la recherche et/ou à la pratique de la mécanique appliquée au Canada.

Le prix James A. Vance

Est décerné à un membre de la SCGC dont le dévouement a favorisé l'avancement de la Société et qui termine, ou achève, récemment un mandat au sein de la Société, sauf comme président.

Le prix Sandford Fleming

Est décerné à un ingénieur civil qui s'est distingué par son importante contribution à la recherche et/ou à la pratique du génie du transport au Canada.

Le prix Walter Shanly

Est décerné à un ingénieur civil qui s'est distingué par son importante contribution au développement et/ou à la pratique du génie de la construction au Canada.

Le prix W. Gordon Plewes

Est décerné à une personne, pas nécessairement un ingénieur, qui s'est distinguée par sa contribution à l'étude de l'histoire du génie civil au Canada ou de l'histoire des réalisations canadiennes en matière de génie civil à travers le monde. Dans les circonstances exceptionnelles, le prix peut être décerné à une organisation

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