



Construction Industry Workshop

Instilling a New Culture of Innovation in Canada

April 28 - 29, 2015

Edmonton

Held in partnership with:



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1. Overview

The Canadian construction industry is significantly impacted by rising costs, reduced profit margins, new increasingly-complex market demands, and a decline in productivity. These are necessitating a change in the entire construction process, adding more strain to the limited resources available to the construction industry.

New ideas and innovation can help address these trends, and create opportunities for increased productivity, profitability and market expansion, which is why Canadian Construction Innovations (CCI) and the University of Alberta partnered with the Natural Sciences and Engineering Research Council (NSERC) to facilitate a 'Construction Industry Workshop: Instilling a New Culture of Innovation in Canada' in Edmonton, Alberta on April 28-29, 2015.

The main objectives of the workshop were to:

- Identify key challenge areas where pragmatic solutions can be found and put to market
- Determine the clusters needed to give focus to each of those areas
- Establish networks to leverage the expertise necessary to address each of the identified areas
- Provide a medium to facilitate networking and communication between industry and academia for further collaboration through more-focused research that responds to the needs of industry; and,
- Creating new R&D collaborations

There were 41 participants in total, from a wide variety of backgrounds (17 industry, 14 academia, 4 owners, 2 government, 1 labour, 1 keynote, and 2 workshop resources).

2. Keynote Address: Bill McBride

Bill McBride is the Director of The Westcrowns Group and Chair of the Construction Scotland Innovation Centre (CSIC).

The Centre was created to bring together industry as well as academic & public sector partnerships to create and nurture a culture of innovation. Its aim is to deliver transformational change by addressing both existing challenges and pursuing new opportunities that will enhance sustainable sector growth. It has received significant investment from Scottish Enterprise and The Scottish Funding Council.

Mr. McBride reviewed the keys success factors for the Construction Scotland Innovation Center, including: eliminating barriers to innovation by ensuring incentives are in-line with desired outcomes (i.e. tax incentives, intellectual property rights), building meaningful relationships with all key players (i.e. academia, industry and government) by creating a business case for innovation based on their interests, and providing value-add services to the industry free of charge (i.e. PhD program which will introduce 20 Innovation Managers, prototyping facility). A government grant in the amount of £7.5 million was made available to make the Centre a reality.

Impactful innovation, as Mr. McBride explained, is really about a strong integration of people, processes as well as products.

3. Panel Discussions

Industry

Industry panelists were asked: “What do you think are the main hindrances to achieving better performance on construction projects? Identify what works and what does not work in construction project delivery and what can be done better.”

Comments:

There needs to be a cultural shift towards innovation. A clearly-defined program supporting innovation needs to be developed and communicated by all those at the very top of the organization. Collaboration needs to be a much larger focus. Low bid needs to be addressed as it is not conducive to creating value.

In order for innovation to be best addressed, there needs to be a larger focus on removing fragmentation (reducing duplication), alignment of interests, common goals and objectives, as well as translation of academic research to industry.

The construction industry is highly risk adverse (do not want to be associated with ‘failure’, do not share knowledge). We must remove the current silos to increase communication, and advocate for appropriate fees to perform. We need to promote the use of ecosystems.

There have been successful innovations at the project level, but we struggle to implement industry-wide innovations and repeat successes. Education is a key piece to increasing trust of new innovations, and industry training should be a priority. There is a need to develop agreements and protocols to increase performance. This could be done for modular construction.

If it ain’t broke, break it; look beyond and innovate. Benchmarking can be used to drive innovation (compare yourself against industry standards). The implementation of appropriate reward mechanisms is also essential. There is currently a skill gap that needs to be addressed in order for innovation to be possible.

It is essential that there are tools available to adequately allocate risk when innovating in the construction industry. Tools should be provided to the industry to help identify, price and allocate risk. Some data analysis is required and the data is readily available.

Academia

Academia panelists were asked: “What is the state of research and innovation in areas that need attention? What are your viewpoints on and identification of key research areas where solutions must be applied, standardized and commercialized?”

Comments:

Innovation is a combination of process (product rating index, virtual engineering), people (corporate best practices for productivity, cross training to reduce burnout) and technology (augmented reality hardhat, big data). Ethical issues come into play when implementing some of the technology, but time is of the essence to start producing better results.

Innovation requires institutional memory, seamless product delivery, and the identification/implementation of risk mitigation mechanisms. New innovations include instant jobsite status using remote sensing technology.

People are extremely important to successful innovation, collaboration including front-line workers should be a priority. Silos must be broken, and every role should be engaged to create meaningful change. Embrace technology and keep it simple in its implementation.

Keys to successful innovation on a large scale include creating a common context for everyone to work within (BIM), achieving a balance in risk sharing and providing reward (incentives), and making available the required education (for all stakeholders).

The use of real-world issues, such as extreme climates, can be an avenue for innovation. 3D windtunnel (“Windy”) provides world class testing of building envelope, structure, or even city blocks. We need to leverage resources and break the silos that exist in the world of academia. We need to make the building envelope smarter.

As one of the industries with the largest human-caused environmental impact, innovation can be used to reduce these. Innovations include: materials, design for deconstruction, energy, LCA, and EPD’s. We need to adopt the green engineering principles and push forward.

4. Roundtable discussions

Workshop attendees were divided into five groups, and provided with an identified topic (based on the outcomes of the previous two phases and previous analysis). Each group was asked to brainstorm and identify the causes and effects that may lead to substandard performance under their assigned topic, and key research, development, and educational needs that could potentially address the identified causes.

Procurement

Procurement was discussed and additional research (to develop new practices, tools, or support programs) opportunities have been identified in the following areas, to best support the construction industry:

- Data comparison of procurement modes, including success stories and lessons learnt
- Database on productivity measures
- Research on current innovations in the marketplace (such as modular construction)
- Tools to support owners (including government) to drive innovation
- Review of what other countries around the world are doing in terms of construction innovation
- New practices to reward contractors for additional innovation risks

Sustainability/Environment

Sustainability and the environment were discussed and additional research (to develop new practices, tools, or support programs) opportunities have been identified in the following areas, to best support the construction industry:

- Determine a method to internalize external (environmental) costs
- Integrate LEED into code, raising the standards of construction practices
- Tools to assist owners to focus on total cost of ownership (Life Cycle Assessments, Service Life Length)
- Education surrounding benefits of environmental risk mitigation (i.e. social, safety, worker health, tenant productivity, unpredictable cost of energy {e.g. Carbon tax})
- Tools to assist and encourage the reuse of buildings & materials

- Training all industry players on environmental issues (is trades, engineers, architects) in order to unfragment the industry
- Programs are needed to provide financial stimulus (incentives) for environmental innovation, and research is needed to reduce costs

Productivity

Productivity was discussed and additional research (to develop new practices, tools, or support programs) opportunities have been identified in the following areas, to best support the construction industry:

- Tools to increase collaboration between all parties (owners, engineers, trades and contractors), breaking down adversarial interactions
- Programs to increase collaboration between academia and industry to identify productivity opportunities
- Create a declaration that would engage the industry in shouldering its responsibility towards increased productivity
- Create a new model as an alternative to the current chain value of construction execution.

IT/Process Management

IT and process management were discussed and additional research (to develop new practices, tools, or support programs) opportunities have been identified in the following areas, to best support the construction industry:

- Create a value proposition (full cost-benefit) with Canadian case studies, highlighting the capabilities to support design, rather than drawings.
- Develop industry consensus on common use method, for BIM; Education to train industry in this common method (i.e. certification)
- Advocacy for regulation of processes (voluntary or mandatory)
- Develop strategy to bring down the barriers; whether technological or human in nature

Market Expansion

Market expansion was discussed and additional research (to develop new practices, tools, or support programs) opportunities have been identified in the following areas, to best support the construction industry:

- Develop programs that support export opportunities, such as modular construction for areas of rapid urbanization, remote locations, and extreme weather cleanup.
- Integrate reporting mechanisms to track innovation in government tendering requirements (i.e. % constructed in offsite factory)
- Opportunities to identify and market world-class Canadian construction innovation resources (i.e. “Windy” at Western University)
- Support increased investments in Canadian innovation that is geared toward (global) commercialization.

5. Summary

The workshop served as a platform for industry, owners, government and academia to discuss issues of common interest as they relate to the state of innovation in Canada.

Several areas where improvements are needed were identified during the panel discussions, namely: increased collaboration (breaking the silos), new standards, benchmarking and rewarding mechanisms, risk allocation, data analysis in key industry performing areas, educational programs for all stakeholders, including training (mentoring - corporate memory).

The roundtable discussions focussed on specific topics, recommendations were formulated on potential research projects and clusters. As resources are leveraged, these recommendations can be pursued, making them a key take-away from the workshop.

The workshop served as a venue to create new relationships and these will serve as the basis for establishing new R&D collaborations based on common goals and objectives and driven by one prevailing criteria: the commercialization of new innovative solutions in the Canadian construction industry. This will require persistence over the long term in order to succeed.