



## CIB TG85: R&D Investment and Impact

### Outcomes of Webex 11 - Wednesday, 16 October 2013 (9 pm Perth, Western Australia time)

**Attendees:** Bakens, Wim; Bougrain, Frédéric; Hampson, Keith (Coordinator); Haugbølle, Kim; Kadefors, Anna; Mesitad, Torill; Heyblom, Tom; Robinson Fayek, Aminah (Speaker and Coordinator), Sanchez, Adriana (Secretary); and.

**Apologies:** Airaksinen, Miimu; Bottura Barros, Mercia; Bröchner, Jan; Cardoso, Francisco; Chapman, Robert; Chi, Seokho; de Oliveira, Lucia Helena; Dewulf, Geert; Kraatz, Judy; Lehtiranta, Liisa; Leiringer, Roine; Mikkonen, Virpi; Nenonen, Suvi; Nüsse, Gregor; Shen, Geoffrey; Slaughter, Sarah; Staub, Alexandra; Støre Valen, Marit; Thomas, Ken; and Wilkinson, Suzanne.

**PRESENTATION** – Aminah Robinson Fayek, Professor, Natural Sciences and Engineering Research Council of Canada (NSERC) Industrial Research Chair (IRC) in Strategic Construction Modeling and Delivery, Edmonton, Canada – *NSERC Industrial Research Chair in Strategic Construction Modeling and Delivery: Overview of Program*

- This presentation covers part of Chapter 5 of the book *R&D Investment and Impact in the Global Construction Industry* to be published in 2014.
- The [NSERC Industrial Research Chair in Strategic Construction Modeling and Delivery](#) (2012-2016) is part of the Industrial Research Program (IRC) funded by the Canadian Federal Government.
- The Hole School of Construction Engineering is part of the Faculty of Engineering of the University of Alberta. There are 6 faculty members in the construction program, 3 of which hold IRC positions. This program has over 70 graduate students, primarily doing PhDs, Masters of Science and Masters of Engineering. Over 250 graduates from this program are currently in industry leadership positions across the globe. The program receives over CAD1 million annually in dedicated funding and has produced over 500 publications. Additionally, this school hosts an annual Innovation Construction Forum which includes people from the industry and academia presenting on the latest developments that are relevant to the construction industry (next forum will be in June 2014).
- The IRC is a partnership between NSERC (federal funding body), the University of Alberta and the local industry, where NSRC and the industry provide 50% of the funding each, and the University of Alberta provides overhead costs and salaries. The mandates of the IRCs are to: (i) advance state of the art in the field; (ii) carry out industrially relevant research to solve problems; and (iii) bring innovation to the Canadian industry and make the industry more competitive. This IRC in Strategic Construction Modeling and Delivery started in 1997 with a focus on delivering innovation to increase partners' competitiveness and profitability, and benefit the construction industry as a whole. The research is organised in 5-year programs where at the end of each term the partners can change or remain the same. Its activities focus on advancing research and technology, transferring knowledge immediately to construction industry and producing highly qualified personnel (HQP). Therefore, a large component of the funding is directed towards training graduate students who work closely with industry partner.
- The industry partners include: Owners, Contractors/Associations and Labour Unions/Associations.
- The Research Advisory Committee is formed by one representative from each partner organisation and meets four times a year to: (i) guide the research direction and focus; (ii)

provide strategic support; (iii) evaluate progress against objectives; and (iv) oversee financial matters related to the administration of the IRC.

- Technical Research Advisory Committees are formed by researchers and people that have more technical positions in the partner organisations. This committees aim to: (i) define the scope and details of research projects; (ii) access organisations and project sites; (iii) provide technical guidance to research assistants; and (iv) facilitate research and technology transfer within their organisations.
- Areas of Focus:
  - Subjective uncertainty in processes and decisions - caused by the unique project conditions; lack of historical data; use of quantitative and qualitative data that can be ambiguous and incomplete; decisions made are often based on expert judgement and expressed linguistically instead of through probabilistic distributions; and lack of continuity in personnel. To address these issues, the program is trying to model human and subjective factors critical to decision support. This is particularly relevant because of the transient nature of the industry which leads to the loss of knowledge and expertise with personnel mobility. There are three main academic research themes: (i) decision support systems based on expert knowledge (fussy logic); (ii) simulation techniques with subjective information; and (iii) industry best practices and tools.
  - Labour productivity; driven by skilled labour shortages, high cost of labour (33-50% of total project cost) and declining productivity, and uncertainty due to the interaction of complex factors that determine productivity.
  - Structuring of projects and teams due to high cost and schedule growth, large project involving multiple parties, and challenges in transferring 'lessons learned' from past projects.
  - Assessing competencies and risk reduction. This area is especially relevant given that 16% of all bankruptcies filed in 2006-2009 were in the construction industry. For this, they are researching contractor and owner competencies and modelling human and subjective factors critical to decision support.
- Project examples: *Labor Productivity Modelling* career paths of tradespeople, structuring projects and teams, owners versus contractor roles, contractor pre-qualification tools, and project risk analysis.
- Value created through: innovative approaches and tools, greater understanding of strategic issues and decisions, collaborative research to transform whole industry, increased investment, construction and resources development, skilled HQP (productivity and performance), training of industry leaders, and increase capture and transfer of knowledge/technology.

#### *Discussion*

- Many organisations are in the business of developing best practices but demonstrating impact can be difficult. Most of the best practices developed were for the Construction Owners Association. Aminah's team has developed a model to track the performance change following the implementation of a set of best practices. However, this team has not been able to demonstrate impact yet because the new best practices have to be validated proving that they in fact lead to performance improvement and need to be used over time, making it difficult to isolate their impact.
- The productivity decline is obvious, based on evidence from statistical data sources. However, the way productivity is measure is often a point of debate. This IRC has a comprehensive data collection method that relies on more traditional techniques such as work sampling, form and delay surveys and questionnaires, supplemented by data collected for fuzzy logic modelling.

#### **TG85**

##### *General*

- TG85 mandate will end in December 2014.
- This group has had a significant number of achievements and successes.

- The group will discuss 'where to now' in the coming January 2014 meeting. Options will be identified in the agenda for that meeting. Members were invited to provide opinion prior to the meeting.
- There seems to be significant activity around knowledge transfer and development, and research, development and innovation. Kim suggested establishing a working commission on innovation to address the issue of industry change. A lot of these discussions are currently taking place in the CIB groups W55 and W65. However, a permanent working commission might be a better way of dealing with these issues.

#### *CIB TG85 Book*

- The book is being submitted in early November to the publishers. After this point, it will probably take 3-6 months for the book to be published.
- Final refinement to chapters, due on Monday 21<sup>st</sup>. If the editors haven't received any communication from the authors by then, it will be assumed that the previous version was final and can be submitted to the publishers.
- T&F has been very positive in their comments.
- John V. McCarthy will write the foreword for the book.
- Keith thanked the authors who provided comments on chapters 1, 2 and 17.

#### **NEXT MEETING**

- Tuesday, 21<sup>st</sup> January 2014 at 3 pm Perth Time.

*Happy holiday season everyone and we wish you a great year 2014!*