NSERC Industrial Research Chair in Strategic Construction Modeling and Delivery: Overview of Program

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Topics

- Overview of IRC Program
- Industrial Research Chair (IRC) 2012-2016
- Structure of IRC Program
- Research Areas and Projects
- Value of IRC to Industry
- Questions and Discussion
Our Construction Program

• 6 faculty members
  – 3 Industrial Research Chairs (IRC)
• + 75 graduate students
• + 250 graduates
  – leadership positions
• + $1 million per year in dedicated funding
• + 500 publications
• 19 Annual Innovation in Construction Forums
Our Partnership: NSERC Industrial Research Chair (IRC)

A partnership between the University, NSERC, and Industry (Chairholder: Aminah Robinson Fayek)

Funding
- NSERC 50% (research)
- Industry Partners 50% (research)
- University (overhead and salary)
Objectives of NSERC
Industrial Research Chairs

- Advance state of the art in the field
- Industrially relevant research to solve problems
- Innovation to the Canadian construction industry
Advanced Research & Technology

Highly Qualified Personnel

Products

Knowledge Transfer
History of IRC Program

**Focus:** Deliver innovation to increase partners’ competitiveness and profitability & benefit construction industry as whole
Owners
- Capital Power Corporation
- Construction Owners Association of Alberta
- Suncor Energy
- TransAlta Corporation

Contractors/Associations
- Aecon Industrial Western
- Merit Contractors Association
- Progressive Contractors Association of Canada

Labour Unions/Associations
- Building Trades of Alberta
- Christian Labour Association of Canada
Research Advisory Committees

Management (Industry & University)

- Guide research direction & focus
- Provide strategic support
- Evaluate progress against objectives
- Oversee financial matters

Each brings 20+ years construction management experience, international experience
Research Advisory Committees

Scope & details of research projects

Access to organizations & project sites

Technical guidance to research assistants

Research & technology transfer

Each brings technical skills to assist with detailed research activities
Uncertainty in Construction

Subjective uncertainty in process or decision

Unique project conditions
Lack of historical data
Qualitative & quantitative data
Lack of continuity in personnel
Expert judgment & linguistic expression
Ambiguous & incomplete data

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Capturing Industry Expertise

Modeling human & subjective factors critical to decision support

Construction decision-making dependent on experience

More people leaving than entering - capture expertise
Decision support systems based on expert knowledge (fuzzy logic)

Simulation techniques with subjective information

Industry best practices and tools
Research Program

Target Areas in Construction

• Labour Productivity
• Structuring Projects & Teams
• Assessing Competencies & Reducing Risk
## Labour Productivity

| Skilled labour shortage: need to optimize | Labour = 1/3 to 1/2 project costs: productivity in decline | Uncertainty: numerous interacting factors determine productivity | “Connect the dots” between subjective factors & productivity |

- Labour shortage: Need to optimize
- Labour costs: 1/3 to 1/2 of project costs, productivity in decline
- Uncertainty: numerous interacting factors determine productivity
- Connect the dots between subjective factors and productivity
Alberta: high cost (19%) & schedule (17%) growth

Project magnitudes & multiple parties

“Identical” projects: different outcomes

Critical factors not modeled: human nature, skill sets, key personnel

Challenge in transferring “lessons learned”: experience & past projects
Assessing Competencies & Reducing Risks

Most bankruptcy from construction (2007-09) (16%)

Contractor & owner competency

More people leaving than entering: need to capture expertise

Modeling human & subjective factors critical to decision support
Sample Research Projects

- Labour productivity modeling
- Career paths of tradespeople
- Structuring projects and teams
- Owner versus contractor roles
- Contractor pre-qualification tools
- Project risk analysis
Value of IRC to Industry

- Innovative approaches & tools
- Greater understanding of strategic issues & decisions
- Collaborative research to transform whole industry
- Increased investment: construction & resource development
- Skilled HQP: productivity & performance
- Training industry leaders
- Increased capture & transfer of knowledge & technology
Thank you

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Questions & Discussion

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