STRATEGIC CONSTRUCTION MODELING AND DELIVERY
INDUSTRIAL RESEARCH CHAIR

FUZZY CONTINGENCY DETERMINATOR© TOOL FOR CONSTRUCTION RISK ANALYSIS GROUP DECISION MAKING

Natalie Monzer, MSc Student
Nasir Bedewi Siraj, PhD Student
Dr. Aminah Robinson Fayek, Supervisor

ABOUT THE CHAIR

Established in January 2012 under the leadership of Dr. Aminah Robinson Fayek, the Industrial Research Chair in Strategic Construction Modeling and Delivery operates within the Department of Civil and Environmental Engineering at the University of Alberta.

The Chair brings together construction industry owners, contractors, and labour groups working in Alberta and across Canada to develop comprehensive research-based solutions to key industry problems. Giving particular attention to Canada's oil and gas, utilities, industrial, and commercial construction sectors, the Chair focuses on strategic concerns related to construction management—such as construction industry productivity, project delivery, and performance. Research undertaken includes improvements to labour productivity, structuring projects and teams, assessing owner and contractor competencies, and reducing project execution risk.

The Chair's research program takes advantage of fuzzy logic's ability to capture and quantify the many subjective uncertainties that challenge construction projects. Researchers combine fuzzy logic with other forms of uncertainty modeling, artificial intelligence, and simulation techniques to develop advanced decision-support tools and approaches.

PROJECT PARTNERS

NSERC CRSNG

Capital Power

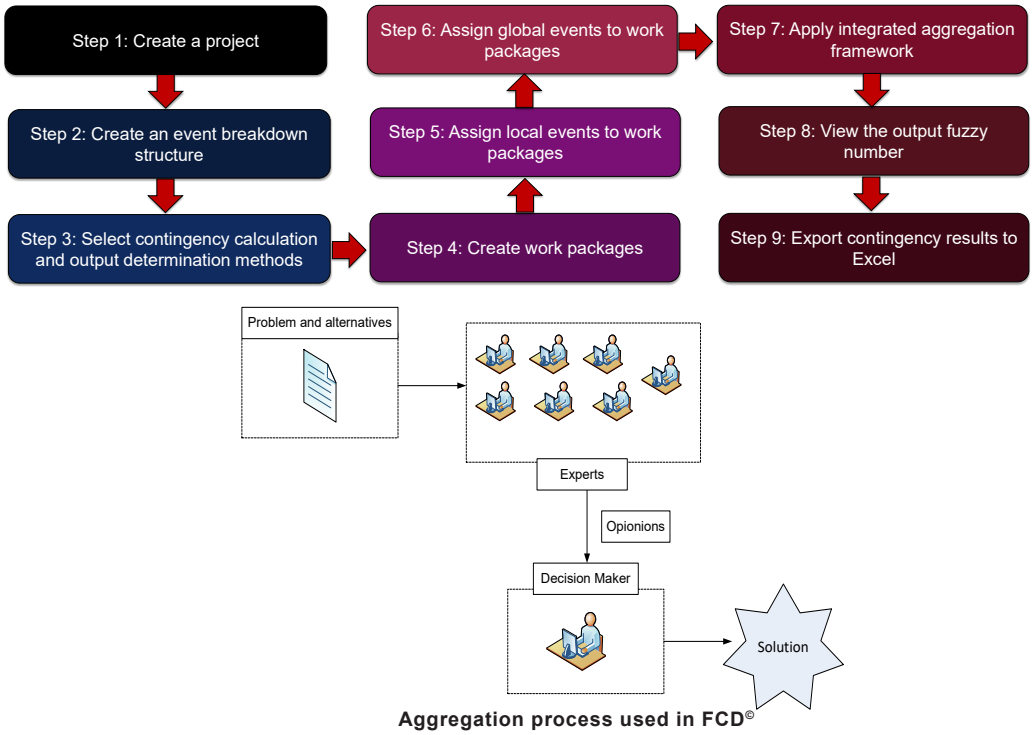
BACKGROUND

- Risk analysis in construction often requires experts' opinions and utilizes group decision-making methods.
- Fuzzy logic allows for the probability and impact of risks and opportunities to be processed linguistically (i.e., using expert judgment).
- The Fuzzy Contingency Determinator© (FCD©) is a fuzzy arithmetic-based risk analysis tool that facilitates group decision making.

OBJECTIVES

- Develop a contingency determination procedure capable of handling subjective uncertainty that arises when experts assess risks and opportunities.
- Address both critical risk and opportunity events in determining work package and project contingencies.
- Substitute the costly consensus-reaching sessions with the FCD© tool integrated aggregation framework.
- Automate the process of combining experts' opinions in group decision making while accounting for their different levels of risk expertise.

USING FUZZY CONTINGENCY DETERMINATOR TO ASSESS WORK PACKAGE AND PROJECT CONTINGENCY



Aggregation process used in FCD©

INDUSTRY APPLICATIONS AND BENEFITS

- Develop optimization model for selecting most suitable aggregation operator.
- Incorporate different representation formats for experts' opinions into the integrated aggregation framework.
- Generalize FCD© (including integrated aggregation framework) for widespread industry use.
- Account for the correlation between risk and opportunity events and incorporate functionality into FCD©.

Tel: 780.492.1205 | **Fax:** 780.492.0249 | aminah.robinson@ualberta.ca | **www.strategic-construction.ualberta.ca**
7-203 Donadeo Innovation Centre for Engineering | 9211-116 St. NW | University of Alberta, Edmonton, Alberta, Canada | T6G 1H9