### Research Themes



# Productivity Modeling and Analysis

#### BACKGROUND

Productivity is a constant concern of the construction industry. Through our research, we are developing tools and guidelines to help construction organizations record, measure, track, and improve productivity. Our partners—construction owners and contractors working on commercial and industrial projects—have been invaluable participants in our productivity studies. The data and expert knowledge that they have provided have been used to (1) identify the most significant factors influencing construction productivity at both the activity and project levels, (2) distinguish between the factors that affect labour- and equipment-intensive activities, and (3) identify the most significant factors affecting crew motivation and performance.

## OBJECTIVE, METHODS, AND DELIVERABLES

Our current objective is to develop a productivity database tracking system and an artificial intelligence (AI) decision support tool that will help improve productivity and increase certainty when estimating project costs and schedules. The productivity database tracking system will provide a standard approach for collecting and storing productivity data and measuring and tracking productivity during construction. AI techniques, including fuzzy logic, data mining, machine learning, and expert systems, will be integrated to develop the artificial intelligence decision support tool. Fuzzy logic will be used to model and reason with subjective data and expert knowledge; data mining will be used to detect patterns in the data; machine learning will be used to map the factors and practices that affect productivity to productivity values; and expert systems will be used to recommend productivity improvement strategies. The AI decision support tool will use the data and expert knowledge stored in the database to support construction practitioners in predicting productivity for future projects and suggesting productivity improvement strategies for ongoing and planned projects.



#### **BUSINESS IMPACT**

Decision-making in construction is complex, as it involves subjective reasoning, uncertainty, and the consideration of numerous interacting factors. Through this project, we will provide practitioners with tools to help them make decisions that will improve construction productivity and increase certainty when estimating project costs and schedule, improving project performance and capital effectiveness. The products of this study are designed to introduce immediate and significant innovation to the processes of the construction industry, leading to increased economic growth, sustainability, and global competitiveness for the Albertan and Canadian construction industries.