BRE Trust Centre for Sustainable Engineering

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Key Facts and Research gap

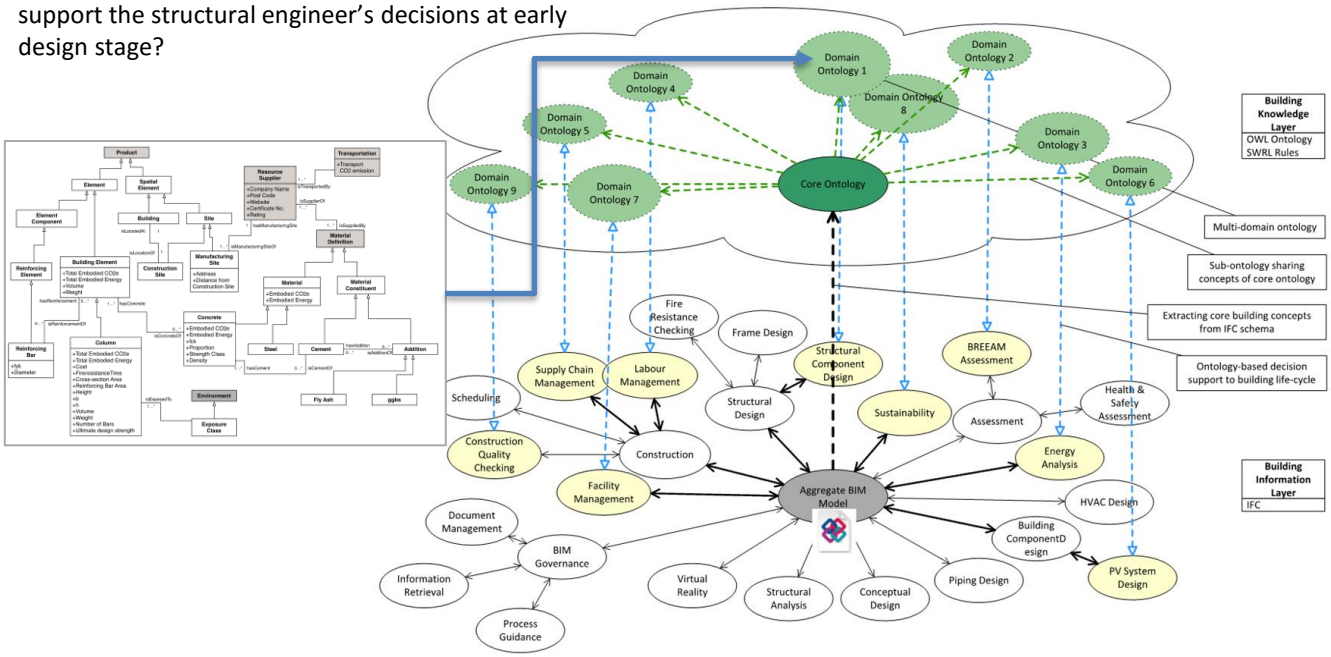
In conventional structural design, there is a lack of efficient computer-aided tools for managing fragmented knowledge and information associated with sustainability in structural design, qualifying the design solution with quantitative terms, holistically considering multiple criteria and providing design options with potential sustainable benefits at early stage.

Research Aim

1. Identify domain knowledge of building sustainability and structural design;
2. Establish a knowledge model capturing design information and knowledge using ontology and rules;
3. Implement a design decision-support prototype system based on knowledge model;
4. Validate prototype system using structural design case;
5. Demonstrate the validity of this system framework for other applications of AEC domain.

Overarching Research Questions

How ontology and other Semantic Web techniques can be used to model sustainability related knowledge to support the structural engineer's decisions at early design stage?

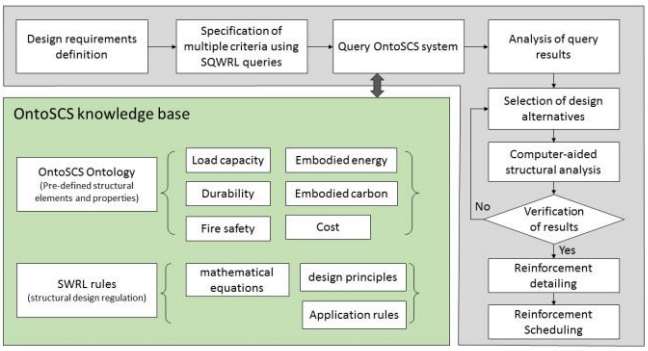


OntoSCS ontology for holistic sustainable structural design

Research Approach (Methodology)

- Use ontology to integrate structural design domain and sustainability domain by modelling the shared concepts and inter-connected relationships;
- Use SWRL rules to represent structural design criteria and conduct structural design calculation;
- Use SQWRL queries for multi-criteria selection of structural components to realise holistic consideration.

Research outputs



Title: An ontology-based holistic approach for multi-objective sustainable structural design

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