Capturing Existing Corporate Knowledge for Computer-Directed Design

Enabling Information Infrastructure

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Problem Statement

Abstract design knowledge is hard to capture

- **Motivation:**
  - Historical data informs rational decisions and supports CAD processes
  - Brain Drain: Important abstract knowledge disappears when practitioners retire

- **Challenges:**
  - It is difficult for a person to explicitly describe their own abstract design knowledge
  - Translating implicit design knowledge into a data schema
Approach & method

1. Interview designers in interested I/UCRC companies to establish baseline information needs.

2. Update existing design knowledge archival systems/approaches.

3. Populate a prototype design knowledge capture system with a set of non-proprietary industry design knowledge.

4. Run verification cases for design problems using the archived design knowledge to ensure that adequate information is present to support new design problems.
Current state of practice & research

- Product Data Management (PDM) and Product Lifecycle Management (PLM) systems excel at handling concrete design knowledge
- Capturing rationale is typically secondary to producing a design
- Design repository and catalog design research lays the groundwork for an initial design knowledge schema
- Design rationale capture research provides baseline research methodology
Deliverables & benefits

- Prototype repository for corporate knowledge capture and reuse
- Prototype information schema
- Capability to retain and reuse experts’ abstract design knowledge
- Capability to facilitate analogical search and transfer (i.e., finding similarities between old and new problems, and suggesting historically-relevant solutions)
Project plan

- **2014:**
  - Establish baseline information needs using interviews
  - Adapt existing systems to support new types of knowledge

- **2015:**
  - Populate prototype repository with industry design knowledge
  - Conduct baseline trials to test repository effectiveness

Estimated Start Date: January 1st, 2014

Estimated Knowledge Transfer Date: September 30th, 2015
How ours is different

- Existing PLM systems are good at managing detailed design information
- Our project focuses on reusing abstract knowledge
  - Domain Experience
  - Design Rationale
  - Design Heuristics
  - Tribal Knowledge
Industrial relevance

- Existing PDM and PLM systems offer means to integrate data (e.g., requirements, specifications, CAD)
- Capture of corporate engineering knowledge is needed to alleviate the problem of lost capability as employee designers retire or change careers.
- Knowing the critical types of design knowledge to capture is expected to streamline the process of recording data and maximize the usefulness of reuse in new situations.