

# AN AUTOMATED APPROACH FOR DEVELOPING INTEGRATED MODEL-BASED CONSTRUCTION PROJECT HISTORIES TO SUPPORT ESTIMATION

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Problem Statement

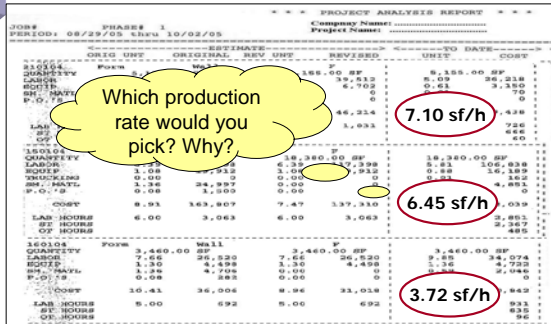


Figure 1. A page from a cost report

- Estimators need **activity specific contextual data**, showing the conditions under which activity production rates were achieved in past projects
  - Contextual data** is currently **limited** in past project historical databases and documents, and **not stored** in a way to support **integrated analyses**
  - Estimators need to view activity specific historical data in multiple levels of details
- Problem associated with having limited contextual data:
- It results in **inaccurate estimates** due to estimator's bias (Akinci 1998, Staub-French 2003) and **cost overruns** (Paek, 1993)

Vision

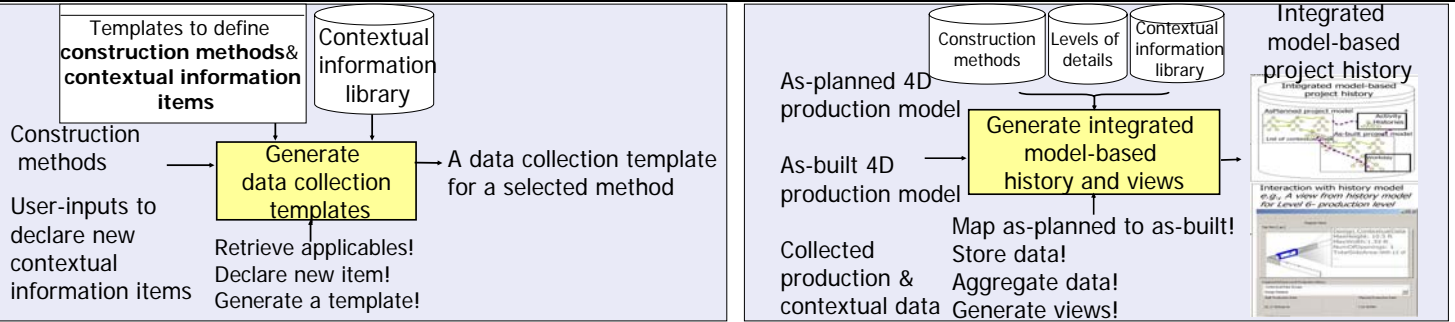


Table 1. Levels of details identified

- Contextual information requirements of estimators were identified
- Data interaction requirements of estimators were identified
- Formalism for customization of data collection templates enabled:
  - Construction method-specific declaration of contextual information
  - Retrieval of applicable contextual information from a library

Table 2. Validation results for retrievability

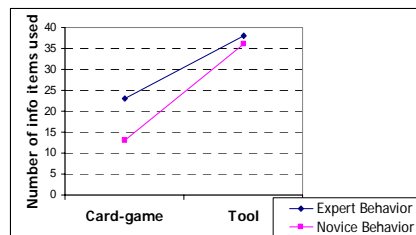
Construction method	Precision	Recall
Average of test results for Case 1	99%	100%
Average of test results for Case 2	Varying component type	97%
	Varying material type	99%
	Varying equipment type	100%
	Varying labor type	98%
	Combination	94%

Table 3. Benefit of using history models

	Info pull (Card-game)	Info push (Tool)
<b>Mean # of information items</b>		
<b>Expert</b>	23	38
<b>Novice</b>	13	36

- Formalism for developing integrated project histories enabled:
  - Mappings between as-planned and as-built project models
  - Augmenting integrated project models with collected production data
  - Aggregating daily data stored in workdays to required levels

Integrated model-based project histories can accelerate learning of novice decision makers in construction



Level of detail	Graphical depiction on an example
Level 0	
Level 1	
Level 2	
Level 3	
Level 4	
Level 5	
Level 6	

## Contributions

- Estimators' contextual information requirements identified for three construction activities
- Estimators' data interaction requirements with historical production and contextual information
- A formalism to customize data collection templates to be utilized at job sites
- A formalism for developing integrated model-based construction project histories

## Publications @

<http://www.ce.cmu.edu/~skizilta/projectDescription.htm>