DOCUMENT MODELS AND CONCURRENT ENGINEERING

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Abstract

Documents form the major means of dissemination of information in the construction industry. They are currently the source of all building information that many professionals in the industry see about the building. They are also the repository of many design decisions and the record of decisions made on the developed building. However, product models in the construction industry tend not to incorporate models of documents and documentation. Integrated design systems also often neglect aspects of the design process such as the handling of documents in the project, as they are mainly developed for the exchange of information about the physical aspects of a building design. In this paper, a model of documents developed for use in the ESPRIT funded ToCEE (Towards a Concurrent Engineering Environment) project (Scherer et al. 1995) is described along with the implementation environment used to manage documents in a project.

Introduction

In an integrated design and construction system there is great scope to tie many aspects of the building development process into the integrated system. Current systems manage information about the physical elements of the building. With this information already captured and managed in an integrated system there is benefit from associating other aspects of the design and construction process with the physical model. By managing documents in an electronic form it is possible to tie them to design versions and better manage the flow-on effects of modifications to the physical model. It is also easy to identify which documents are current or determine the documents which contain the reasons for particular design decisions.

In the ToCEE project, an all-encompassing view is taken of what constitutes a document. Every transfer of information to an actor is accomplished through a set of documents. In practice this means a document may be any of the following:

- drawing files (plans, elevations, sections, details, etc)
- contract administration (e.g., change orders, site information request, variation orders)
- design documentation (sketches, presentation drawings, etc)
- faxes
- e-mail
- phone calls
- an expert or colleague's advice
- input to CAD tools, simulation tools, and knowledge based systems
- product samples (e.g., colour boards)
- manufacturers catalogues/product information
- schedules of products
- time plans/activity schedules
- standards
- codes of practice

By tying this information into the product model developed for ToCEE, it will always be possible to determine the relationship between a product and the documents in which it is referenced, as well as to determine the relationship between a document and the products

referenced in it. The history of document revisions is represented in the model, as well as the inputs which led to the contents of a document (e.g., amalgamation of previous documents).

In the implemented design and construction system, the document system is closely tied with the processes in the project. In this way, the relationship between a document and the current state of the product model is always able to be calculated. With several actors working concurrently on a project, it is necessary to manage the status of documents being worked upon in the same way that the product model is managed for concurrent design. Thus the status of each document is maintained, including who is currently working on the document, along with the associated rights of the various actors to modify the document.

The electronic management of documents in this manner leads to further utility in a concurrent environment. For example, with a modelled flow of control it is possible to ensure that modified documents are passed immediately through to all actors who need to be informed of the changes. As well as maintaining a tighter control of the flow of information in a project and the sources of the information, having all documents represented electronically with most of their contents captured electronically in their entirety opens up new ways of searching for information. For example, it becomes possible to use full text search to identify documents mentioning specific topics, or to find all documents which make mention of a particular artifact in the building.

In this paper, the full requirements of the document model are outlined, as well as the methods of managing documents in the implemented integrated system. The benefits accrued from managing documents electronically are highlighted, and the impact on users of such an implemented system considered in terms of the useability of the final product.

References
Scherer et al. (1995) http://bbbsr1.bau.tu-dresden.de/tocee/