Zeitschrift: IABSE reports = Rapports AIPC = IVBH Berichte
Band: 83 (1999)

Artikel: Active integration concepts based on a communication standard
Autor: Schneider, Ulrich / Beucke, Karl
DOI: https://doi.org/10.5169/seals-62938

Active Integration Concepts Based on a Communication Standard

Ulrich SCHNEIDER
Computer Scientist,
Bauhaus-University
Weimar, Germany

Ulrich Schneider, born 1966, received his computer science degree at Bauhaus-University Weimar. He is currently finishing his Ph.D. in Computer Aided Engineering at the same institution.

Karl BEUCKE
Professor
Bauhaus-University
Weimar, Germany

Karl Beucke, born 1951, received civil engineering degrees from Ruhr-University Bochum, North Carolina State University and University of California Berkeley. He is now a professor of Computer Aided Engineering.

Summary

Many civil engineering tasks are supported by specific software systems for a specific application. Integration of engineering information is often approached as an exchange of digital data between separate application software systems via standardised data exchange definitions.

Current approaches assume a "passive" involvement of the engineering user. The user basically asks for a complete set of digital information to be transferred into a standardised "data exchange format" which then can be used to be read by another engineering application software system.

In this paper a method is proposed which much more resembles traditional ways of utilizing engineering information generated in separate processes. Functionality is provided for "actively" transferring specific aspects of engineering information defined in the context of a specific application into another context of a separate application. This is achieved on the basis of a standardized communication technology. This process can furthermore be enhanced to support a revision control of engineering information modified in one context and utilized in a separate one.

Keywords: application integration, data exchange, semantic object model, information integration, active integration

Abstract

Engineering processes are characterized by many separate solution processes which are carried out in parallel by different engineering teams. Solutions are communicated via technical documents which are used to transport information between these teams.

Conventionally, an engineering user of technical documents interprets visually information on these documents and selectively extracts information needed for reuse of this information or of specific aspects of this information in producing or updating another document. Thus, the engineering user "actively" interprets the semantic meaning of information on a document and again actively selects the desired information for use in the context of another document.

Standard methods for data exchange do not support this process but rather transfer all information indiscriminately into a predefined format. This implies that data within a source document needs to be converted into a "standardized exchange format" and based on this format new data will be created in a target document.

Securing consistency of information is virtually not supported at all in either one of these two

approaches. In the conventional process the engineering user is totally responsible for comparing documents and for deciding on necessary actions to be taken. Standard data exchange methods technically allow for strategies with that respect but there is very little work done to solve this problem.

When comparing advantages and disadvantages between the two approaches it can generally be concluded that the conventional approach is very flexible, well established in the design process and better suited for continuous considerations of minor revisions. However, there is a lot of effort associated with reentering information which was already entered in the context of a separate task. This, of course, leads to a lot of redundant information which needs to be maintained. Information integration is a difficult and time consuming task. Data exchange methods work well for generating a new technical document. Initial information can be transferred quickly and safely. However, it allows for very little flexibility and strategies for revision management and for handling redundant information are generally not provided.

The key idea of the approach presented in this paper is to combine conventional approaches of information integration for technical documents with data exchange methods. The active involvement of an engineering user in the process of information integration requires enhanced methods of data exchange. The assumption is made that two application software systems are used to generate and maintain two separate sets of information (engineering models). These two systems may be used concurrently by a single engineering user. Both contain information which is redundant as a whole or in certain aspects, i.e. some information is derived from one system for use in another. The user running both systems can "actively" control what information is needed from the source system and transfer associated data into a target system. This process is documented for tracking dependencies between information in separate models. Thus, two major tasks can be identified: transferring data between separate applications and securing consistency of information transferred.

In this approach, the necessity to standardize the semantic object model of objects that are part of the integration process is not given anymore. The reason for this fact is the need for the user to interpret actively any data that is part of the integration process. The prerequisite for this approach is the requirement that all applications make its object description publicly available and the integration software supports creating new objects dynamically, i.e. objects description and status.

The utilization of a standardized communication relating to the exchange of objects, the manipulation of selected objects, and the notification mechanism needed for securing consistency for the process of information integration of engineering documents offers new prospects. It can be shown that it allows an engineering user to be actively included in the process of information integration, thus combining the advantages of two approaches currently used for these purposes.

The result is the definition of an integration software which relies on these technological concepts. The integration software must be customized for use in a specific configuration of selected applications on the basis of the correspondent object models. Once, this definition has been made – defining a specific configuration – it can be used repetitively for the purposes of information integration between a specified configuration of engineering applications. This would offer prospects for a real advancement in the process of integration information of engineering documents.