

# A Web-based Bidding Workbench for Global Manufacturing

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**Abstract** Global manufacturing business requires a platform to support dispersed partners working together to bid for a contract. The bidding process usually involves rapid product definition in order to prepare the technical proposal that gives a competitive advantage. This paper presents our findings from the Viewbid Project of the IMS Globeman'21 Consortium, in which a web-based bidding workbench was developed and a proof-of-concept system has also been implemented.

## INTRODUCTION

With the globalisation of manufacturing industry, the core competence of a manufacturing enterprise is increasingly relies on its intellectual resources, its global and regional partner networks, and more importantly, its capability of making best use of its resources and partner networks in critical missions such as bidding. A manufacturing enterprise involved in the global manufacturing business therefore needs a platform that can support its collaboration with partners to bid for contracts. This kind of bidding processes usually involves rapid product definition and business development in order to prepare proposals that gives reliable and competitive total value solution that makes a difference for the customer in all aspects of their operations.

The IMS Globeman'21 was an international collaboration Consortium operated for 3 years since 1996 and involved over 40 industrial and academic organizations from Australia, Europe, Japan, Canada and USA. It

aimed to investigate the business practices and techniques required to operate globally distributed enterprises in the environment and under the conditions anticipated for the 21<sup>st</sup> century. The VIEWBID (*Virtual Enterprise Workbench for Worldwide Business Integration and Development*) project is one of the 14 Globeman'21 demonstrator projects. The VIEWBID project aims to develop and demonstrate the tools and methods for the design and operation of a virtual manufacturing enterprise to compete in the distributed global manufacturing environment. The requirements for such kind of bidding platform have been identified and analysed, and the architecture of a web-based bidding workbench has been proposed. A proof-of-concept system of the web-based bidding workbench has also been implemented.

### THE BIDDING PROCESS

In a globalized manufacturing environment, a typical bidding process can be described in a 5-stage development, as shown in Figure 1. People from different parts of the world are involved in the bidding. These include core bidding team members, sales, finance, customers and suppliers.

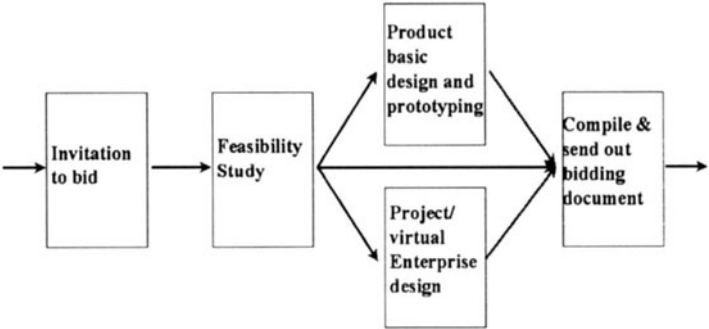
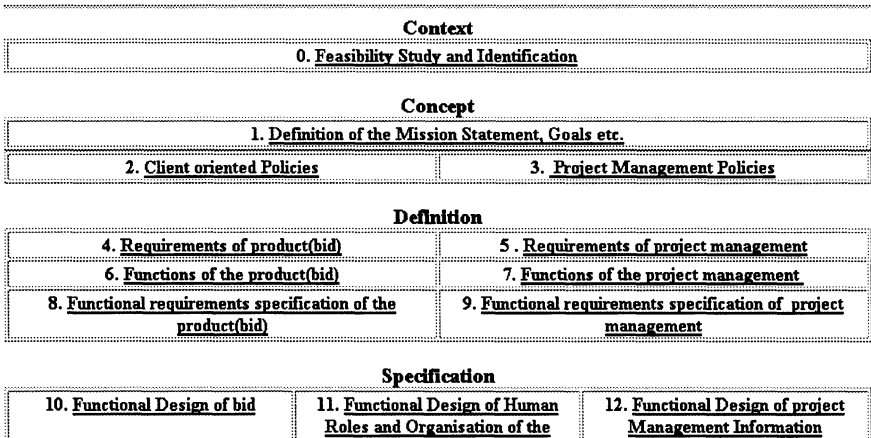


Figure 1: The bidding process

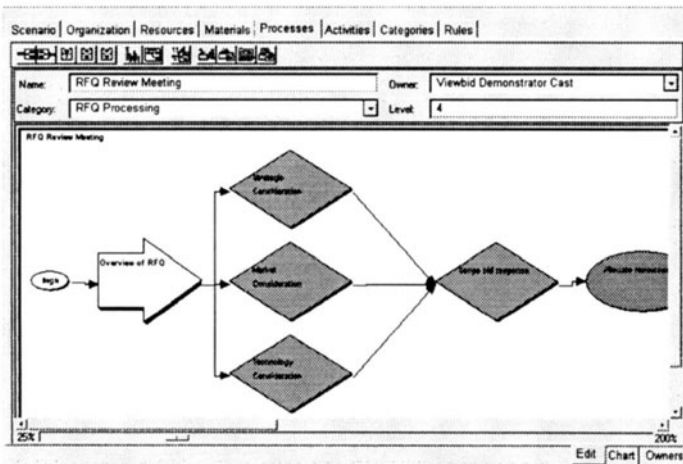
The system requirement for such a global collaboration environment is inevitably based on the internet. At the core of the system, a database comprising information of products and production, information of business partners and capability of risk assessment is required. Design of the database structure requires thorough understanding of the company's bidding process by using the PERA methodology [1,2].

# VIEWBID Bid Preparation Project Guideline (With Risk Management and Quality Assurance Procedures)



*Figure 2: Bidding project guideline using PERA methodology*

The PERA (Purdue Enterprise Reference Architecture) methodology provides a guideline for the analysis of the bidding process in product design and development projects. The formalism in the PERA methodology provides a generic listing of these tasks that must be carried out in order to achieve enterprise integration. It allows views in market, plant, product, resources, stakeholder and technology to co-exist. Figure 2 shows the top part of the Bidding Project Guideline developed using PERA Methodology.



*Figure 3: The Bidding process modelling using FirstSTEP Designer*

Based on the Project Guideline, we modelled, simulated, and analysed the bidding process, and identified the information and functional requirements for a bidding workbench. As shown in Figure 3, an enterprise modelling tool FirstSTEP Designer from *Interfacing Technology Corp.* was used to model the bidding process.

## SYSTEM ARCHITECTURE

Based on the requirements identified in the bidding process modelling, A web-based bidding workbench architecture was developed, as depicted in Figure 4. This architecture is based on the Virtual Enterprise Workbench Architecture [3], which is jointly developed with VRIDGE Project -- another Globeman'21 Demonstrator.

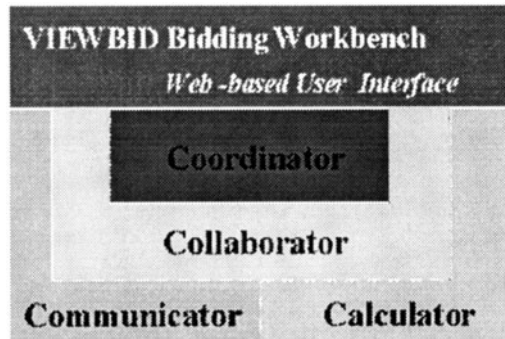


Figure 4: Viewbid bidding workbench architecture

The VIEWBID bidding workbench provides two layers of functionality: the virtual enterprise workbench for supporting the design and operation of a virtual enterprise, and the distributed bid preparation platform.

At the first layer, the workbench provides four major function modules: the Coordinator, the Collaborator, the Communicator, and the Calculator.

The Coordinator provides the tools for bidding process management:

- team design and operation support;
- corporate knowledge management facilities such as partner profiles, contacts, capabilities, etc.;
- daily project supervising, monitoring, and supporting tools; and
- risk management and quality assurance tools.

The Collaborator provides the tools supporting dispersed teamwork during bid preparation:

- sharing and exchange of product and production information;
- review and release of product and production information;

- revision and change management of product and production information;
- configuration and co-authoring of the bidding document.

The Communicator provides the essential facilities for bidding team communication:

- secure IT infrastructure for dispersed teamwork;
- central information repository; and
- access control and session management.

The Calculator provides the tools for calculation during bidding:

- cost estimation;
- risk analysis and assessment;
- simulation of the best, worst, and most-likely cases; and
- formula-based calculations.

At the second layer, the workbench provides a bidding document co-authoring platform. This layer is tailored to suit the specific requirements of a bidding team. It includes three major modules: the bidding document configuration tool, the bidding document component editor, and the bidding document synthesising tool.

The bidding document configuration tool provides facilities for defining a framework or structure of the bidding documents, which specifies what kind of information should be included in the bidding document, the possible source of the information, and the bidding decisions or costing guidelines.

The bidding document component editing tool is mainly a web-based word processor for editing the sections and chapters of the bidding document by re-using or modifying the component from the previous bids or creating a new component.

The bidding document Synthesising tool is used to compile the final bidding document based on the specified bidding document configuration, and all the necessary components, and finally delivers the complete set of the bidding document.

## **IMPLEMENTATION AND CONCLUSION**

A proof-of-concept system of the VIEWBID bidding workbench has been implemented. Figure 5 shows a snapshot of the bidding document component editing tool.

The system was implemented using Java, and made use of the Lotus eSuite Devpack Java applet library to develop the web-based editing tools.

By demonstrating the proof-of-concept bidding workbench to our industrial partners, we get a better understanding of user's requirements for

the bidding workbench. It also helped us to formulate a new project to further the research to develop a more intelligent bidding workbench with enhanced corporate knowledge management functionality. This new project is currently continued as part of the IMS Globemen Project.

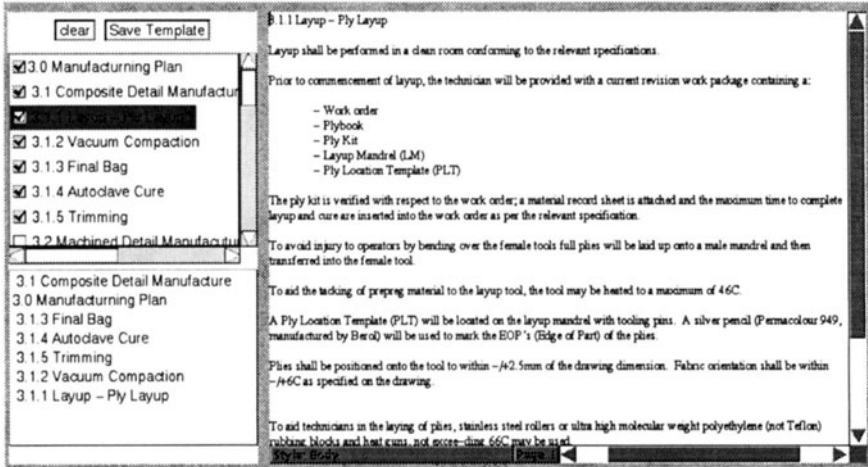


Figure 5: A Snapshot of the Component Editor

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