Knowledge Exchange in Collaborative Networks of Enterprises

Aleksander Moczala, University of Bielsko-Biala, Bielsko-Biała, Poland

ABSTRACT

The problem of information exchange in the inter-enterprise cooperation process design is presented in the article. Development of an innovative character of an enterprise requires facilitating the initiation, creation, and extension of cooperative links among enterprises. Collaborative design process gathers enterprises which have to achieve a common objective related to a new product – innovation by information and knowledge sharing, with a high level of activities' coordination. Development of methods and ways of data exchange in cooperation enables the creation of computer systems aiding production cooperation. System analysis of the cooperation process of enterprises, which is one of the most dynamically developing field of computer systems application in economic activity, and use of knowledge as the base of description and management described in this chapter are shown as the right approach to overcome different area specifics. Formal description of the cooperation process could be utilized also for innovation processes and links. This article could open new fields of application and research production engineering knowledge's application in computer systems.

Keywords: *Collaborative Design Process, Computer Aided Cooperation, Information Exchange, Knowledge of Enterprise, Net Cooperation*

INTRODUCTION

The Cooperation Phenomenon

Externalization - outsourcing is a way of strategic action which means subcontracting production processes and sub-processes including manufacturing of sub-assemblies by sub-suppliers, processes maintenance and failure repairing, storage, logistics, buildings security, computer service, research, training, providing services etc. outside the enterprise. If an enterprise renounces one part of added value, then mark-up, flexibility, concentration of attention, and financial outlays on the processes, which provide competitive advantage, will increase.

Tendencies to development global enterprises, creation new cooperative links are visible also in the dynamics of the need to exchange information – cooperative data. Development of cooperation requires data flow according to the elaborated standard of data exchange model of the product for cooperation at the exact time of its coming into being (Botta-Genoulaz, Millet and Grabot 2005, Rose and Girard 2007). Production cooperation process has representation and formal modeling in the literature using:

DOI: 10.4018/IJOCI.2012100105

- Graph theory,
- Game theory,
- Business processes alignment,
- Petri nets,
- Gaussian networks,
- Social network and other.

The multidisciplinary character of cooperation phenomenon is underlined and represented in the literature review including economic theory: international economics (off shoring), theory of the firm - especially information oriented (Nonaka and Takeuchi 1995)

The problem of cooperation in production is connected with innovative activities of an enterprise. The process innovations depend in part on the variety and structure of thier links to the sources of information, knowledge, technologies, practices, human and financial resources. Linkages act as sources of knowledge and technology for an enterprise's innovation activity, ranging from passive sources of information to suppliers of embodied and disembodied knowledge and technology to co-operative partnerships – described in *Oslo Manual* (OECD 2005).

Co-operation of enterprises for innovation allows to access knowledge and technology that they would be unable to utilize on their own. There is also great potential for synergies in co-operation as partners learn from each other. Innovation co-operation can take place along supply chains and involve customers and suppliers in the joint development of new products, processes or other innovations. The level of interaction along supply chains (i.e. whether linkages involve co-operation, or arm's-length exchanges of information or purchases of technology) may depend on the type of knowledge and technology.

BACKGROUND

The Modeling Frameworks and Organizational Structure of Production Processes in Enterprise

Modeling frameworks, methodologies and organizational structure and its rules of processes in enterprise concepts emerged in different application domains such as ARIS, CIMOSA, GRAI/GIM, GERAM, IEM, PERA, Open Group Architecture Framework (TOGAF) or the IDEF family of languages (described in FEA 2007, GERAM 2000, Lankhorst 2005, Williams, Rathwell & Li 2001).

The ARIS-architecture distinguishes Organization, Function, Information and Control views. It uses a graphic modeling system supported by software which models data movement and tasks (GERAM 2000, Lankhorst 2005). ARIS focuses on the analysis and requirements definition phase during the design of managerial information systems, not on the execution of business processes. Federal Enterprise Architecture (FEA) - an architectural description of the enterprise architecture of the U.S. federal government that includes various reference models, processes for creating organizational architectures that fit in with the federal enterprise architecture, and a methodology for measuring the success of an organization in using enterprise architectures (FEA 2007; Williams et al. 2001). The PERA model breaks the enterprise life cycle into "phases". While this is not the only possible "phase breakdown", it is one which has been proven in a large number of projects in many industries. It also breaks the investment approval process into a number of steps which works well for projects larger than a few million dollars. Smaller projects may combine phases to reduce overhead costs, but the deliverables between phases generally remain the same. GERAM defines a tool-kit of concepts for designing and maintaining enterprises for their entire life-history.