

Computer Integrated Logistics

Deregulation of markets, the opening of borders and individualized customer demand are the main challenges for multinationals as well as small and medium enterprises in the nineties. Logistics are identified as being central in meeting these trends. All logistic processes have an informational component and, since a growing number of parties are involved in those activities, the linking of these components is essential. The article describes the CIL approach providing a basis for an interorganisational platform for integrated logistic processes.

The need to serve global markets and to meet increasing requirements in terms of time, cost, and quality of product and service delivery have led to new concepts

by Rainer Alt and Ivo Cathomen
University of St. Gallen

of manufacturing being adopted (e.g. focussed-factory and just-in-time concepts) with logistic processes playing a key role in realizing rationalization effects and/or gaining a competitive advantage. Increased shipping frequencies and the need for up-to-date status information have led to considerable growth in the interchange of communications between shippers, shipping agents, carriers, and consignees. To an increasing extent, banks and insurance companies are being brought into this information cycle. The integrated organisation of logistics, i.e. logistics of goods, money and information, is therefore becoming a central point of concern. Substantial investments are today being made in EDI systems in the transport industry and banking business. But existing solutions are frequently limited to only sections of the shipping and/or payment chain and fail to provide for an effective interchange of information.

The CIL Approach

The Computer Integrated Logistics (CIL) concept takes a broader look at interorganisational relations. In analogy to Computer Integrated Manufacturing (CIM), CIL provides a basis for the conceptualization of an integrated information flow matched to economic and business settings as well as the technical infrastructure. Hitherto, there has been no model of integration on an interorganisational level. CIL encompasses a reference model describing the necessary logistic functionality as well as the architectural principles that are to be applied at the logic level. As a 'mediator' between the logistic requirements and the logistic information system, it is the basis for the *CIL service*, an electronic coordination platform for integrated logistics. A central element of this service is the *CIL document*, an active information object which logically accompanies the goods, contains all necessary information, and can be completed by the service providers

concerned in each specific case. According to object-oriented modeling, it incorporates information and methods which are specified in the *CIL reference model*.

Elements of the Reference Model

The CIL reference model consists of five building blocks: functions, institutions, coordination mechanisms, messages and information. The functions comprise activities in the settlement phase of a market transaction. These logistic functions are related to institutions for their production (firms) and for their coordination (firms, markets). Division of labour necessitates customer-adequate 'bundling' of functions through coordination processes. Coordination is effected through coordination mechanisms. Depending on the existence and activity of an intermediary, our model distinguishes five different coordination mechanisms and describes their characteristics. The direct search mechanism, for example, is used in most cargo community systems and implies that the intermediary only offers communication and no logistic functionality. Since coordination processes are made possible through communication, they can ideally be supported by IT. Communication is effected by exchanging messages between institutionalized functions. Messages (such as the order, invoice etc.) consist of various information elements (such as type of product, price, quantity, or time).

Views of the Reference Model

To answer specific problems, the elements are considered in combination from three different perspectives or views. These provide a framework for treating functional, institutional and informational aspects at both industry and company level. The Institutions-Functions-Coordination view treats problems of make-or-buy, identifies institutions for coordination and analyses the mode of coordination. By combining functions and messages, the second view visualizes the message flow between functions and facilitates answering design and redesign aspects of business processes and networks. The relevance of these problems is emphasized by such recent trends as lean management or outsourcing which result in an increased number of interfaces in the logistic chain. Each interface requires coordination and, consequently, communication. By applying Knowledge-Medium (KM) nets, the same syntax is used for the modelling of the first two views. This establishes a common language for the difficult inter- and intraorganisational communication of the logistic processes, i.e. the processes to be computer-supported. In the third view, availability and necessity of information for different institutions and messages are analyzed in order to optimize data supply, flow and storage throughout the logistic chain.

With a view to creating a CIL pilot service, the Competence Centre Electronic Markets is working to improve the CIL model by applying it to reference cases in its partner companies. ■

References

- [1] Alt, R.; Cathomen, I.; Klein, S.: CIL-Computerintegrierte Logistik, Working Paper IM2000/CCEM/21, University of St. Gallen 1993.

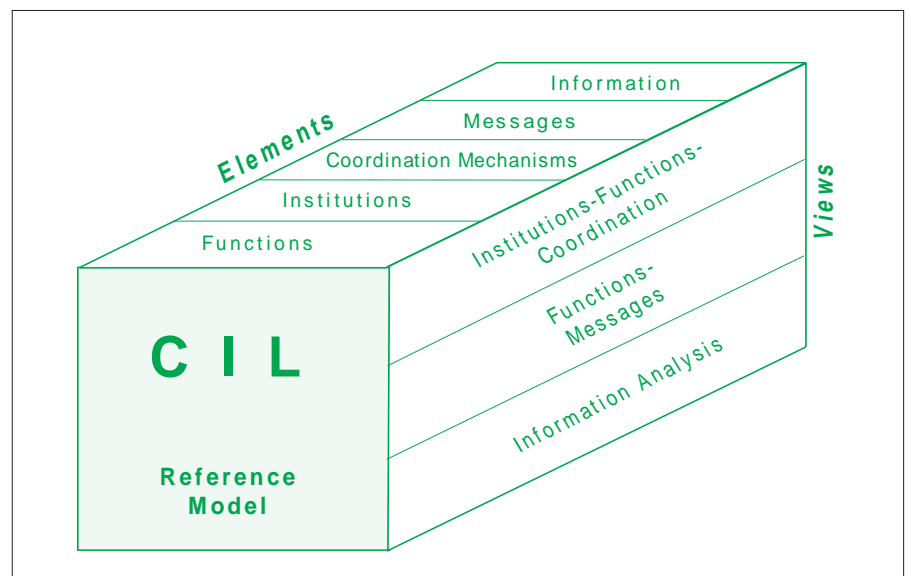


Figure 1: Structure of the CIL reference model