

Autonomous Onward Carriage in Forward Logistics

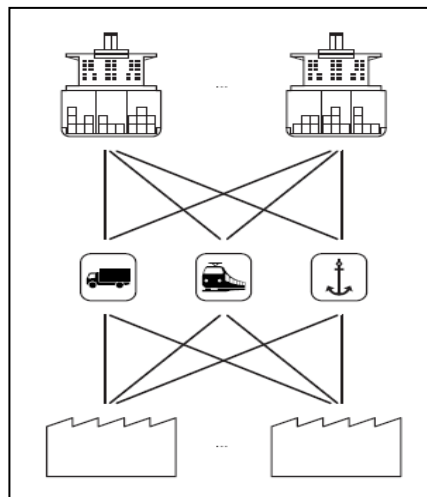
A Multiagent-Based Approach

This research project aims at optimising forward logistics processes. In particular, it addresses the field of onward carriage. An approach with autonomous software agents is applied.

Recently, the area of transportation logistics underwent significant changes. This continuing trend manifests itself in increasingly dynamic processes and an increasing need for agility and flexibility. Common objectives are: shortening the so-called time-to-market as well as just-in-time delivery. These developments are accompanied by increasing complexity and dynamics in the underlying processes. As an example, manifold suppliers from all over the world have to be coordinated in order to satisfy the time constraints mentioned above. A promising approach to address these requirements is a paradigm shift towards autonomous logistics.

The starting point for this research project lies in real world logistic processes which are hitherto centrally organised. Their practical examination forms the foundation for subsequent investigations from a more theoretical point of view. To this purpose, the Tchibo company acts as a partner. Their concept of offering customers “a new experience every week” necessitates complex logistic demands and dynamics. Moreover, all products of weekly changing topics have to be transported on time from

the producers in the Far East to the shops throughout Europe. Today, Tchibo's planning and scheduling is carried out in a centralised way which leads to a high complexity due to the number of logistic objects and their parameters.



The fact that the dispatch is currently handled manually with computer support is an additional challenge. In this context an (at least partial) autonomous planning and scheduling on the part of the participating logistic objects seems promising.

Due to the great number and complexity of forward logistics processes, controlling and monitoring them with conventional approaches has only a minor degree of efficiency. Moreover, especially the optimisation of the involved processes is problematic. By contrast, multiagent systems enable

the modelling of complex processes, which become more comprehensible by this procedure. To achieve this, decision-making in autonomous logistic processes is implemented with agents. In particular, this requires simulating a great number of participating agents in order to create a highly detailed real world model. In order to simulate logistic processes, the agent-based simulation framework of the collaborative research centre on autonomous logistics (SFB 637) is applied. The major participating entities are shipping containers, warehouses, container terminals, and transport relations.

This research project aims at developing a simulation of logistic processes with multiagent systems. To this end, a case study on Tchibo's forward logistics processes has been conducted. On this basis an agent-based simulation of the dispatching of containers is implemented. Within this context, it is necessary to determine to what extent autonomous control of the participating entities is a promising approach for optimisation. Another question is how far key figures, e.g., fill levels of warehouses, can be improved when an (at least partially) automated dispatch already starts when loading the respective containers in the Far East.

Dr.-Ing. Arne Schuldt
Dipl.-Inf.
Faculty of Mathematics/
Computer Science

Verden, Germany
Finished in May 2010



International Graduate School for Dynamics in Logistics
Contact: Dr.-Ing. Ingrid Rügge
Universität Bremen, c/o BIBA
Hochschulring 20, 28359 Bremen, Germany
www.logistics-gs.uni-bremen.de
info@IGS.LogDynamics.de