### Domain of Expertise: Logistics

**Scheduling Material Flows in Logistics Networks**

**Integrated Approach!**

**Scheduling**
- Allocating tasks to scarce resources over time. (B13)

**Routing**
- Decisions concerning space in a network. (B8)

**Interdependency of both in several optimization problems:**
Capacity or availability of resources changes over time depending on the routing of the tasks. This has influence on the schedule which again affects the routing.

**Interesting issues**
- Degree of interdependency between routing and scheduling
- Optimization potential of integrated treatments
- Complexity
- Influence of structures in practical instances
- Approximation algorithms (maybe by modest separation)
- Game theoretic approaches
- From static to dynamic conflict graphs
- Suitable relaxations or decomposition approaches for integer programming models

**App: Steel Logistics**
- Scheduling of several cranes in a steel yard in order to transport steel slabs between various locations.

**App: Kiel Canal**
- Control of bi-directional ship traffic through the Kiel canal where regulations concerning entering, safety distances, passing, overtaking, and waiting at sidings induce capacities for the canal segments.

---

**Industrial Cooperation**
- PSI Business Technologies
- Salzgitter Fachstahl GmbH
- WSA Kiel-Holtenau

**MATHEON Cooperation**
- B13 (preparation of the Kiel canal cooperation)
- B18 (flows over time)
- B23 (robustness issues)
- C30 (scheduling laser welding robots)

**External Cooperation**
- MPI Saarbrücken (scheduling aspects)
- U Milan (split-delivery routing)
- NTNU Trondheim (split-delivery routing)
- TU Darmstadt (integer programming aspects)
- CWI Amsterdam (game theoretical aspects)

**Outreach**
- www.dfg-science.tv