Supply Chain Challenges and ITS Solutions

Bernhard Friedrich
Institute of Transport, Road Engineering and Planning
University Hannover
Issues

• Increasing Demand
• Limited Capacity
• Imbalance between Modes

• Congestion
• Poor Quality of Service
• Reliability being challenged
• Impact on Traffic Safety
• Environmental Damages
Challenge - Growth in Demand

Development of Transport in EU15

Legend:
- Passenger transport (pass-km)(1)
- Goods transport (ton-km)(2)
- GDP (constant price)
- Car ownership (car/1000 inhabitants)
Challenge - Growth in Demand

Index 1970 = 100 bzw. 1991 = 100

- +46%
- +22%
Challenge - Limited Capacity

* Wiedervereinigungseffekte
** ab 1994 revidierte Fahrleistungszahlen

Quellen: KBA; DIW; Statistisches Bundesamt, BAST, Intraplan
Challenge - Imbalance

Modal Split
Freight Transport in EU15

Legend: road  rail  inland navigation  pipelines  others
Challenge - Imbalance
Challenge - Imbalance

KV-Mengen Schiene/Staße
in Mio. t

Quelle 2000: Hacon
Challenge Clean Environment

Forecast CO$_2$-Emissions, Germany
Challenge Safety
Solutions

• Reduce Demand =>
  Reduce Growth + Reduce Welfare

• Extend Capacity (Clear Bottlenecks)

• Balance Use of Modes

• Balance Loads within Networks

• Enhance Efficiency and Safety

ITS
Balance Use of Modes by ITS

Foster Combined Transport by Means of

- Freight and Logistic Centres
- European Train Control System ETCS
- Waterway Information System ELWIS/ARGO
- Toll Systems
Balance Use of Modes by ITS

Foster Combined Transport by Means of

- Automatic Identification of Goods
- Tracking and Tracing
- RFID
Enhance Efficiency by ITS

• Fleet and Freight Management Systems

Example Flexible Delivery Addresses (INVENT):

• Reduction of Distance Travelled up to 12.5%
• Reduction of Time Travelled up to 5.5%
Enhance Efficiency by ITS

• Fleet and Freight Management Systems

Example Dynamic Route Planning (INVENT)

• Reduction of Distance Travelled
• Reduction of Time Travelled
• No Delays in Delivery
ITS - Measures

• Improved Use of Existing Infrastructure
  – VDS, VMS, Dynamic Navigation
  => better balanced assignment of traffic to the network
Enhance Safety by ITS

- Variable Message Signs

Example Bavaria

<table>
<thead>
<tr>
<th>Less Accidents</th>
<th>Less Accidents with Injuries</th>
<th>Less Injured Persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 35.9%</td>
<td>- 34.4%</td>
<td>- 31.0%</td>
</tr>
</tbody>
</table>
Enhance Safety by ITS

• Hazard Messaging
• Safe Speed + Safe Following
• Lane Support
• Collision Mitigation

Example INVENT-Project
Perspectives

• ITS already contributed to a safer and more efficient use of the existing infrastructure
  => Intensify use of these technologies
• New technologies are available or close to market
  => Foster introduction
Summary

• Challenges to be managed
  – Till 2015 growth in transport volume ~ 40%
  – Rising imbalance
• ITS already significantly contributed to manage situation
• New solutions are in place or close to market and need to be used