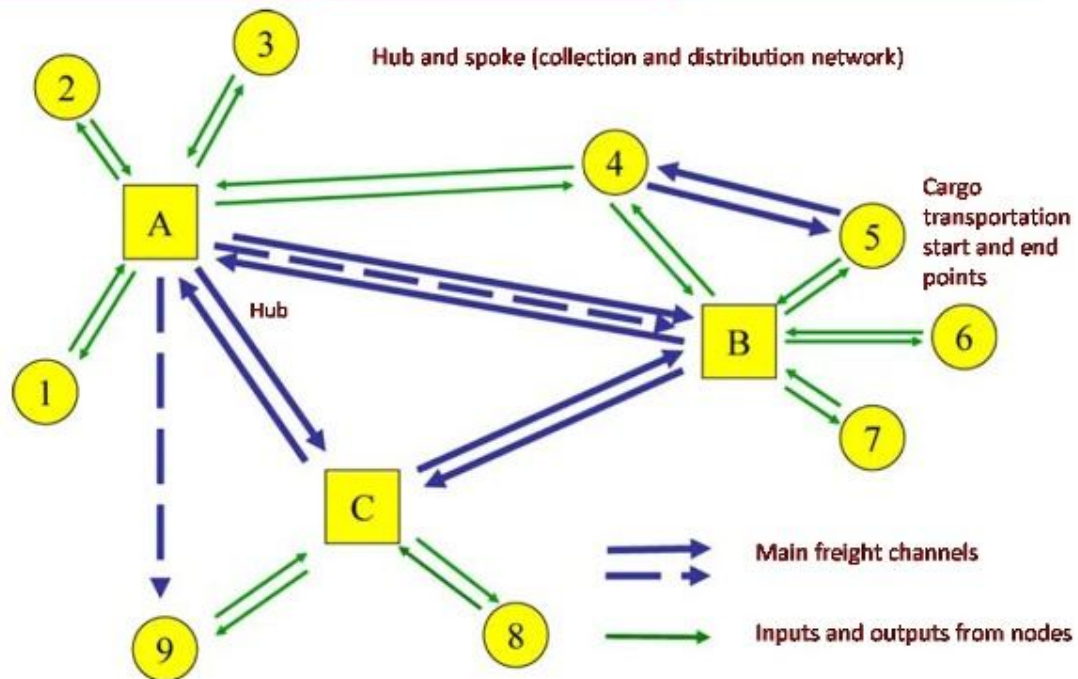

Intermodal Logistics Research

Loading machines and mobile technology optimization problems

Gábor Kovács
Budapest University of Technology and Economics
Department of Material Handling and Logistics Systems

Transport infrastructure characteristics



Transport infrastructure characteristics

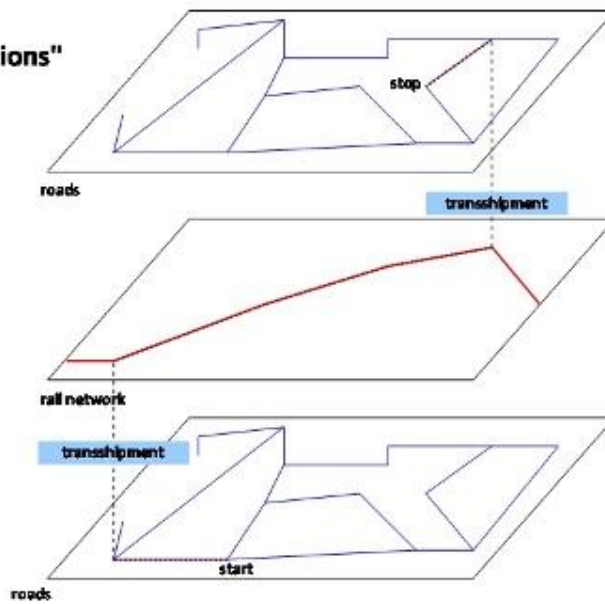
Optimizing the delivery routes (in the „Hub and spoke“ structure)

Common "objective functions"

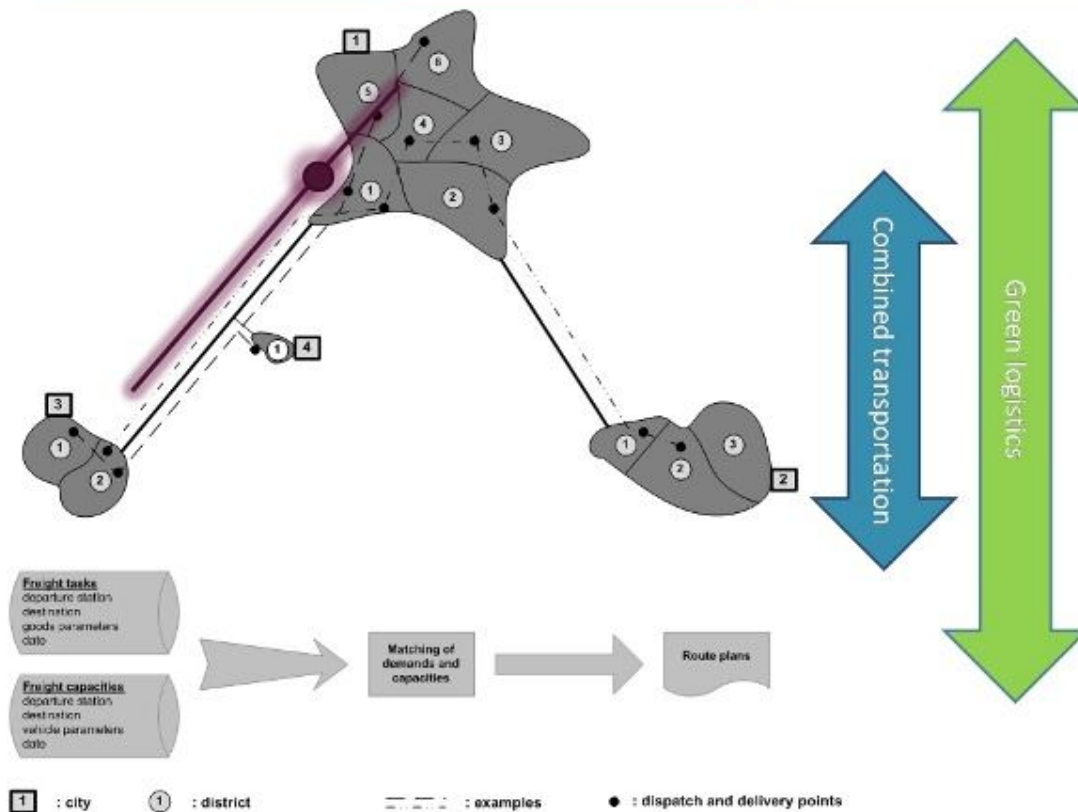
Total delivery time → min

Shipping costs → min

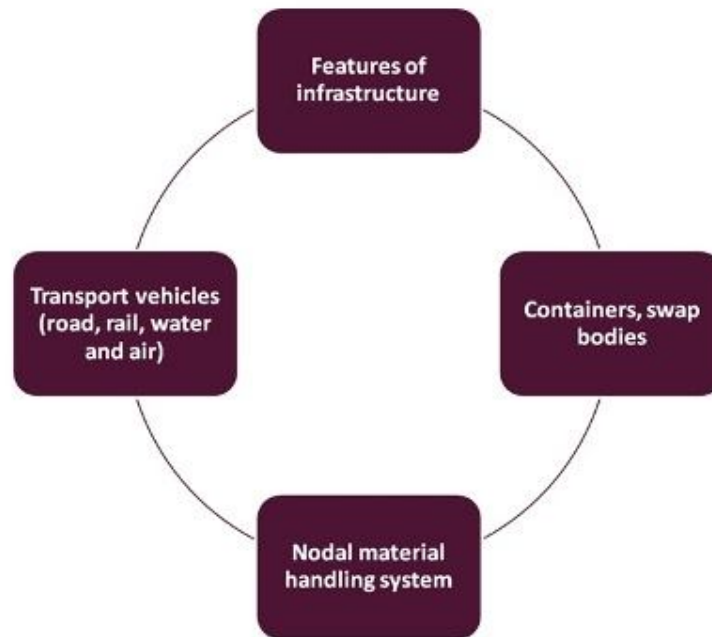
Transport distance → min



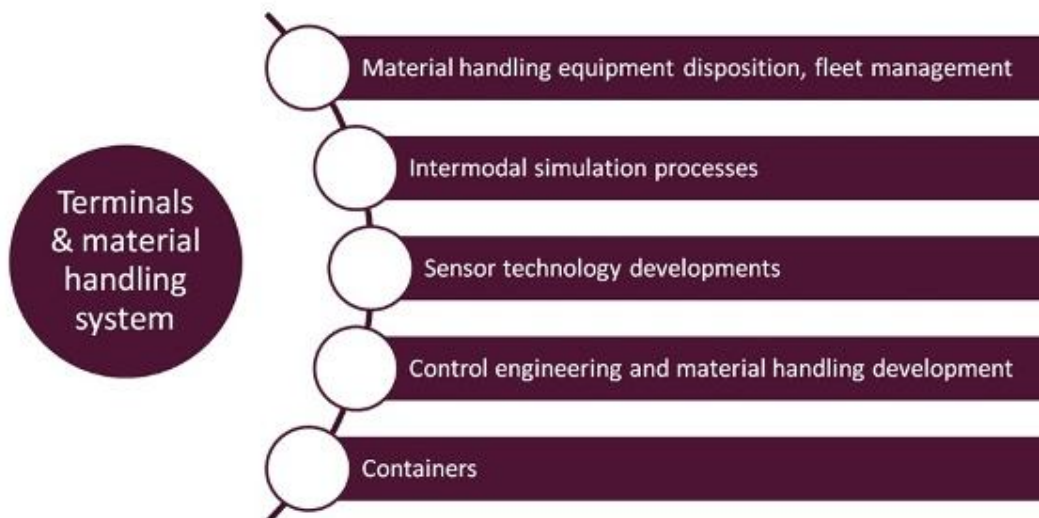
Electronic freight and warehouse exchanges



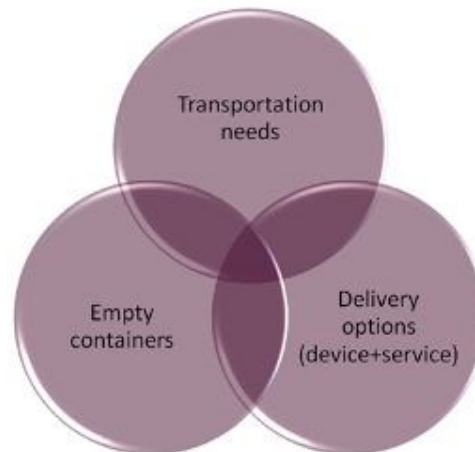
Intermodal hub components



Technical aspects of the system



Areas of intermodal containers development

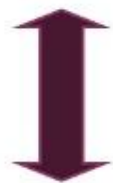


Container fleet management: Multi-criteria decision supporting problem

- Type of containers,
- Location requirements,
- Time requirements,
- Costs,
- Utilization,
- Predicted demands,
- ...

Container layout optimization

Containers should be in optimal position!!!



Blocks World Problem – artificial intelligence

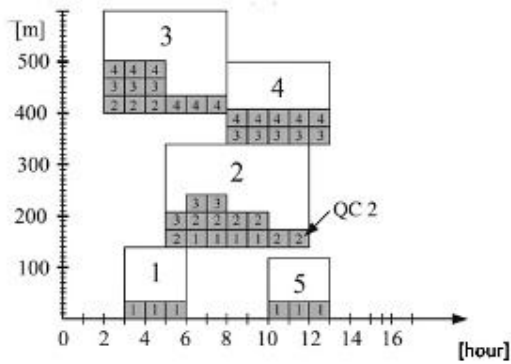
Minimize transshipment

Minimize waiting time

Minimize lead time



Position, timing of loading, assigning cargo handling equipment



Features of the problem

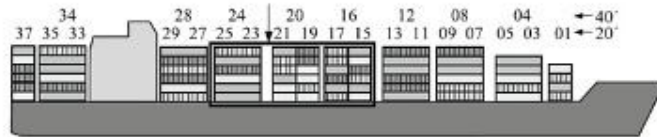
Continuous time and space layout

Static or stochastic weather data

Cranes assign (fixed or variable)

Spatial constraints on the movement of cranes

Division of the ship



Rubber tyre gantry cranes (RTG) allocation

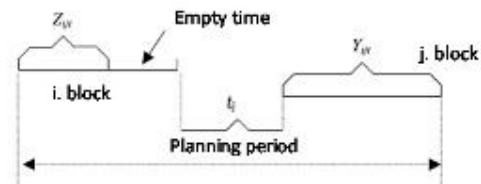
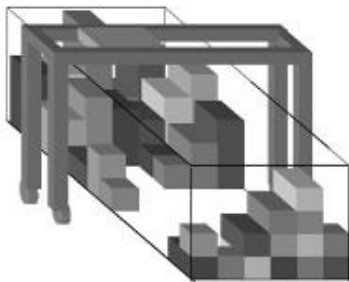


Features of the problem

Dynamic traffic

MIP (mixed integer programming) problem

Slow movements of cranes - waste of time



Optimizing of storage area cranes movement



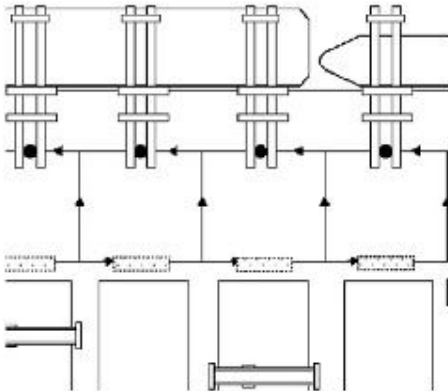
Features of problems

Partitioning problem

Container layout problem

Similar to RTG

Driverless trucks disposition, traffic control



Features of the problem

Disposition – minimizing the waiting time of cranes

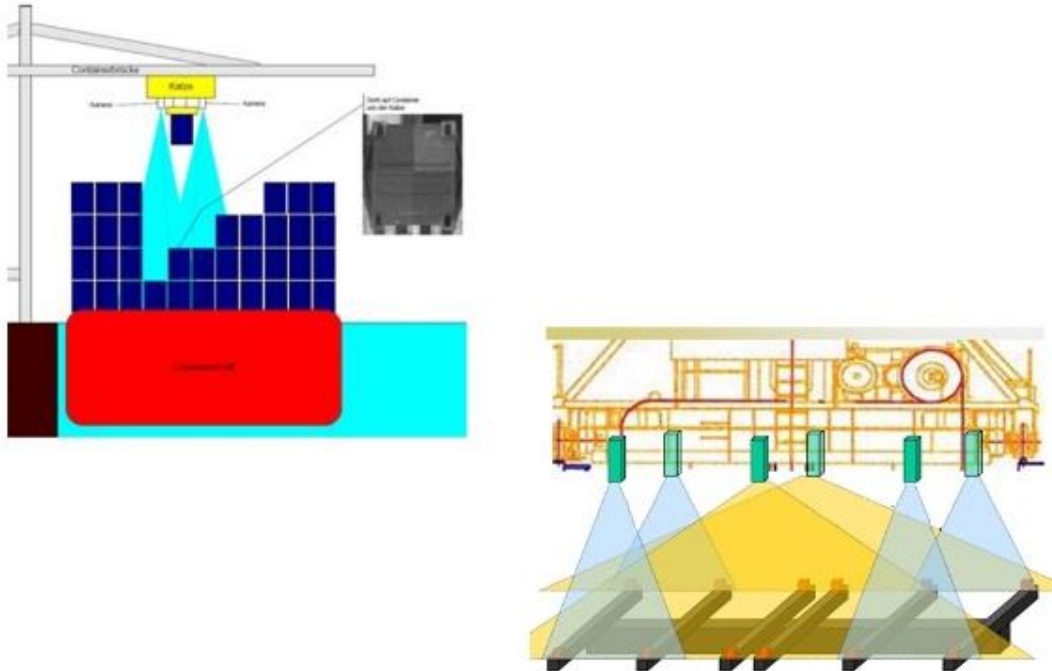
Route planning – minimizing time and distance

Conflict-free traffic management

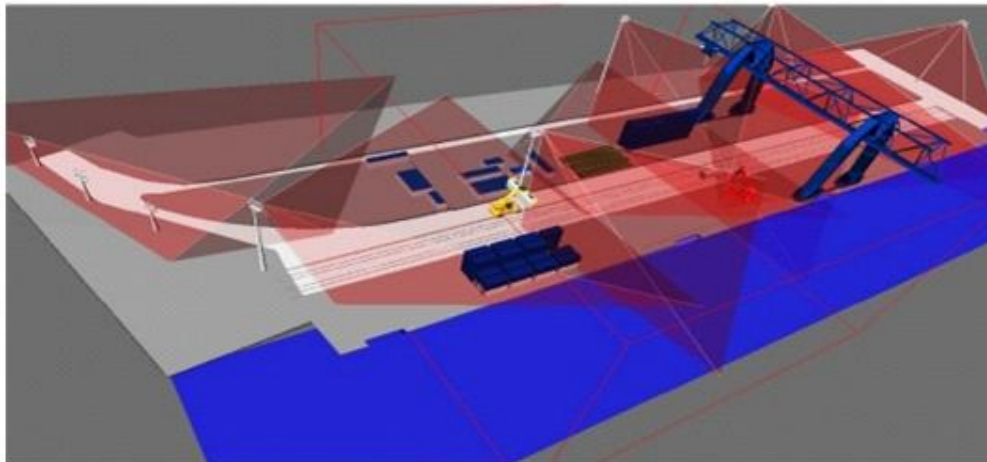
Flexibility



Automatic camera positioning system

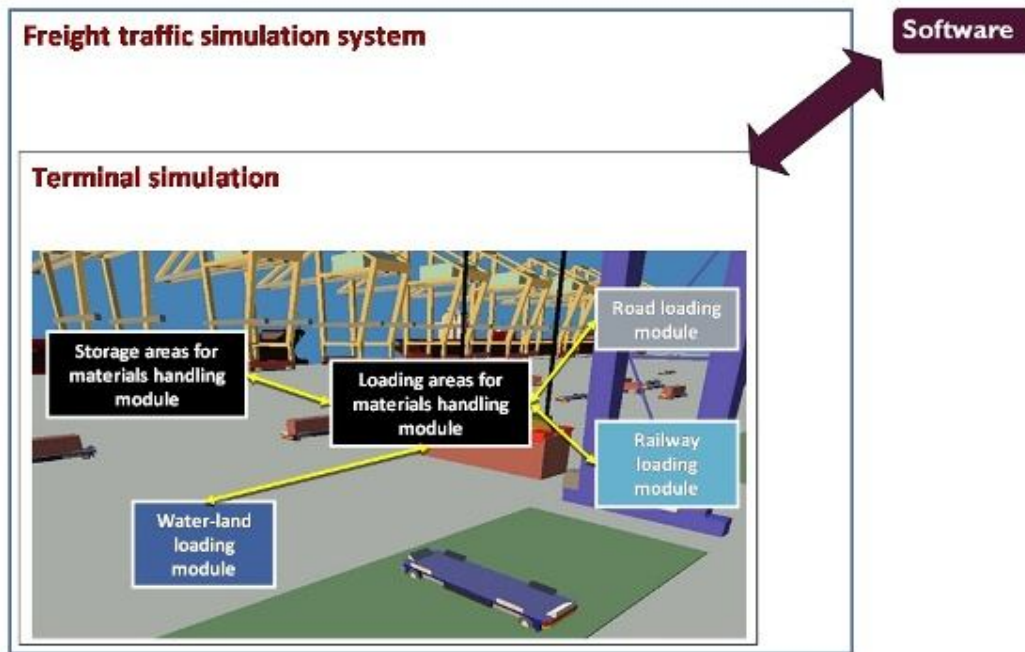


Container terminal traffic monitoring

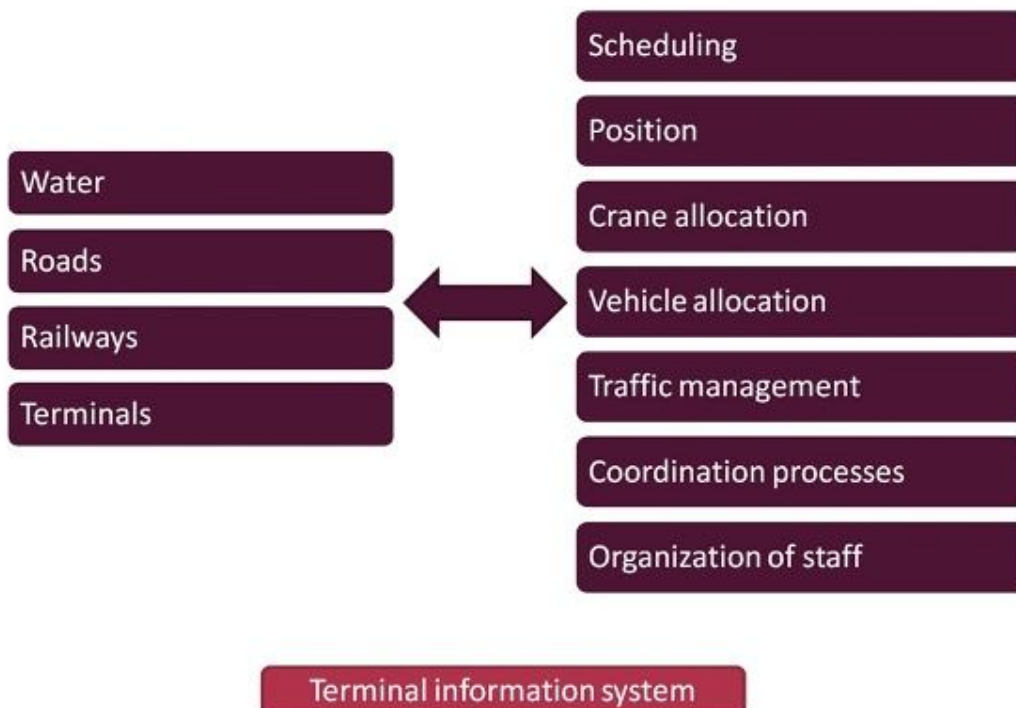


Various sensors (Camera + WiFi)

Intermodal nodes simulation



Synchronizing and optimizing intermodal terminal handling systems



**Thank you for YOUR
attention**

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