



Simulating new logistics of Le Havre port

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OUTLINE

- INTRODUCTION
- LE HAVRE PORT LOGISTICS
- SIMULATION SCENARIO
- MANAGEMENT RULES
- RESULTS
- CONCLUSION AND PERSPECTIVES

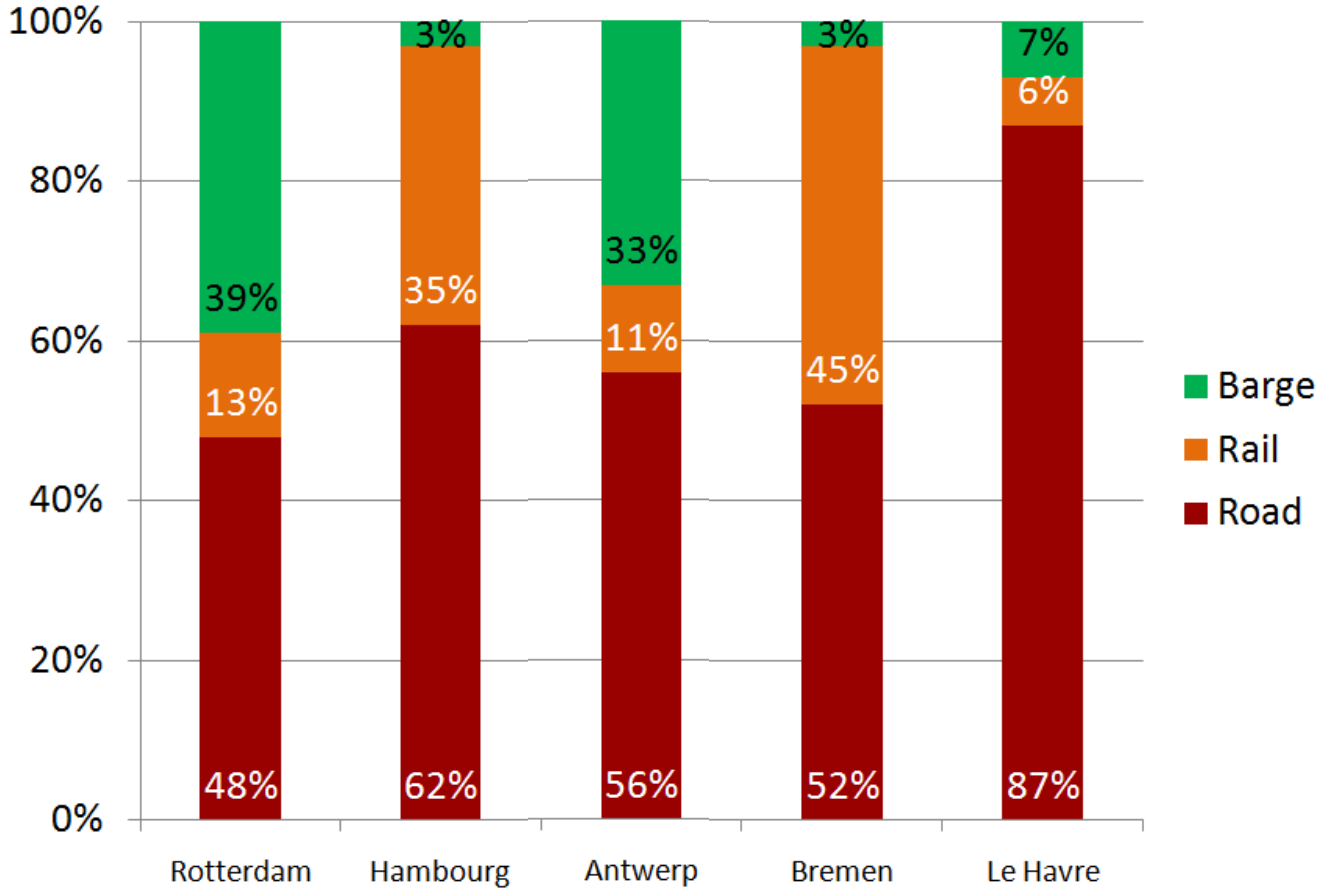
Presentation

- Leriche David
- Engineer
- PhD student
  - MAS
  - Le Havre Port (GPMH)
  - IRSEM

Introduction

- Maritime Transport 80 % world share
- Vessel capacity increase involves :
  - The need for storage in maritime terminal
  - Efficiency
  - Punctuality
- Sustainability (green transport, modal shift)

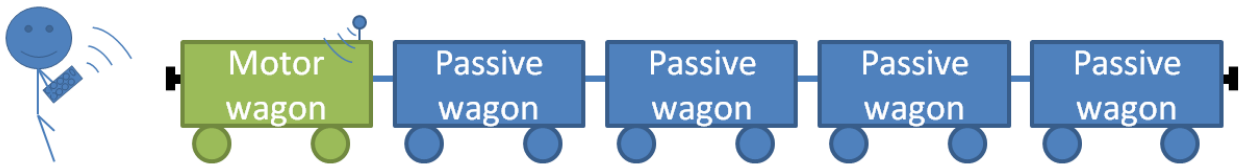
Modal split (2008)



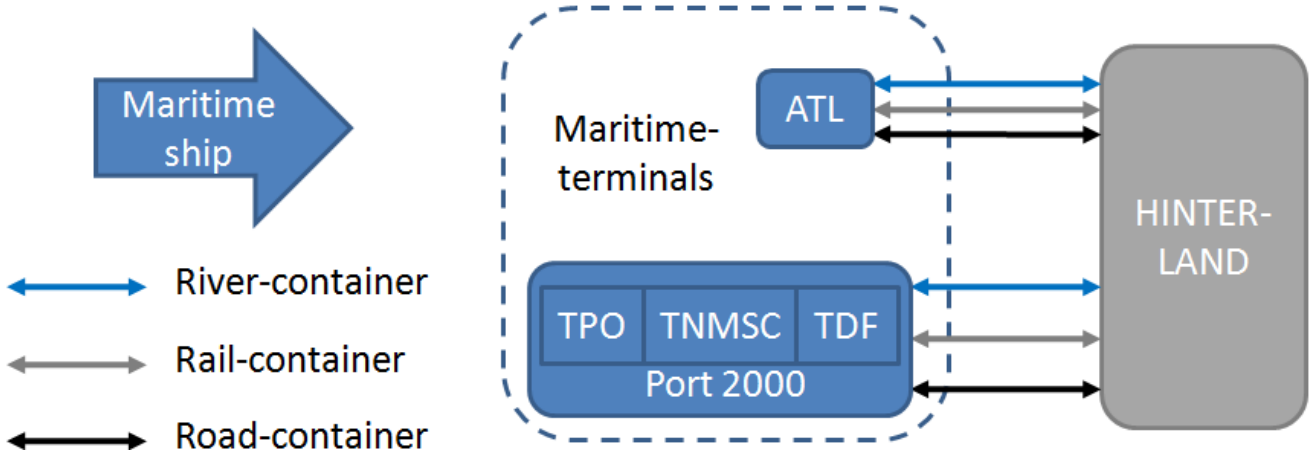
http://www.developpement-durable.gouv.fr/Rapport-sur-la-desserte.html

DCAS Project

- Promote rail transport through the introduction of new logistics organizations
- Remotely operated railway coupon, automatic un/~coupling for maneuvering in the ITE

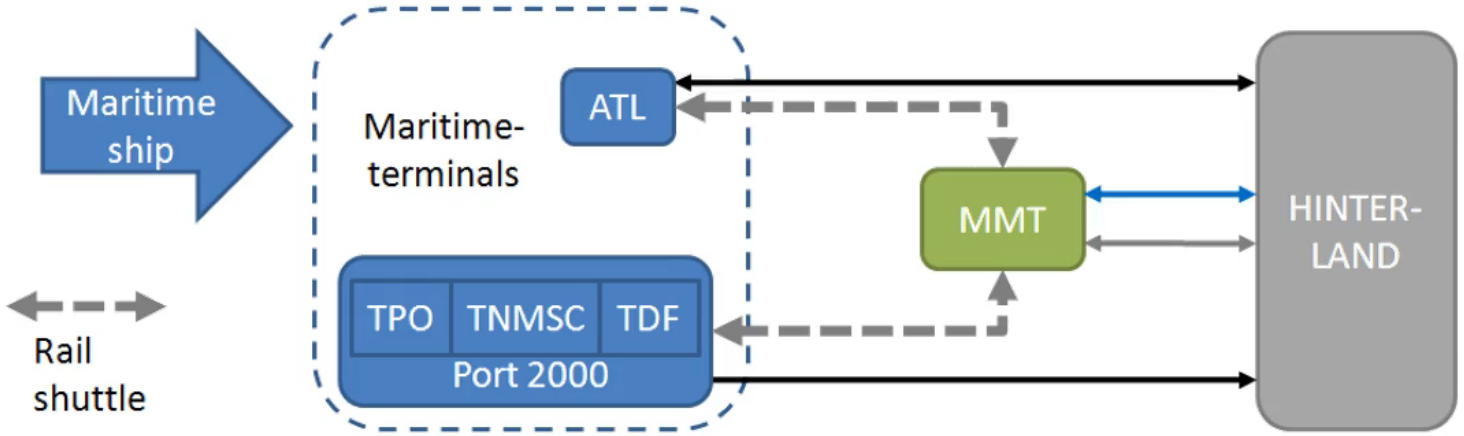


Current logistic System



MT : Maritime-Terminals

Future logistics

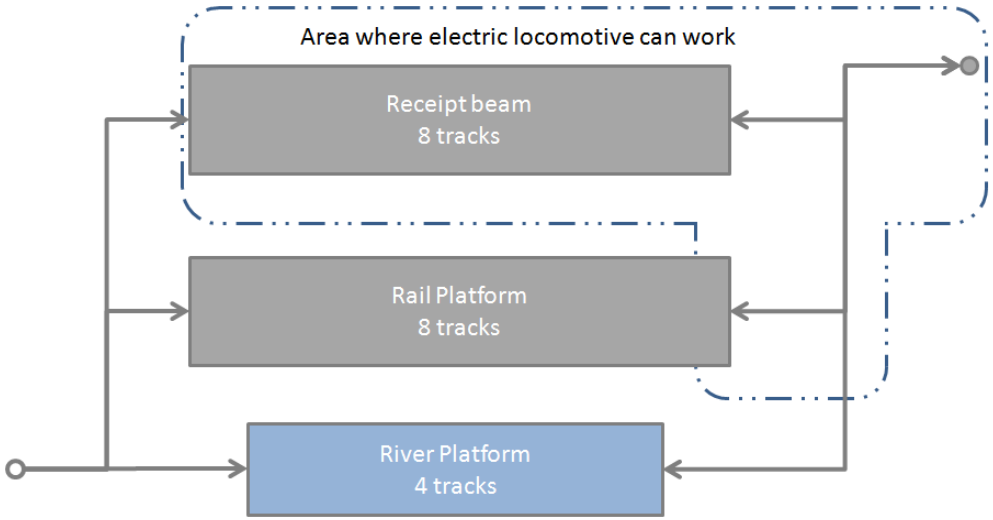


Container from/to hinterland

MMT Multi-Modal Terminal



Multimodal terminal design

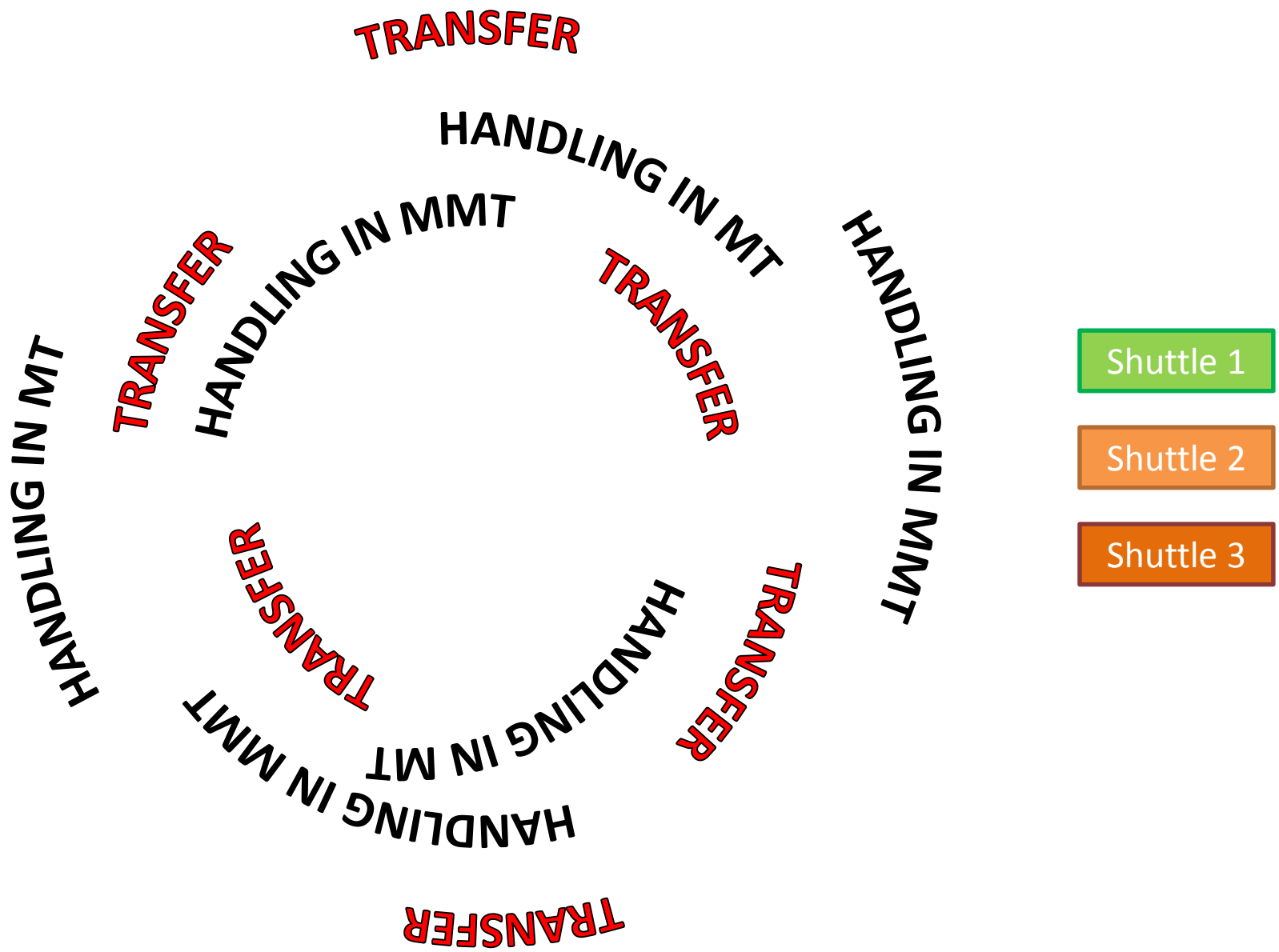


Motivation

- Understanding the new system :
  - Cost
  - Number of containers in time
  - Filling rate of shuttle
  - Number of handling per container
- Communicate pedagogically with stakeholders

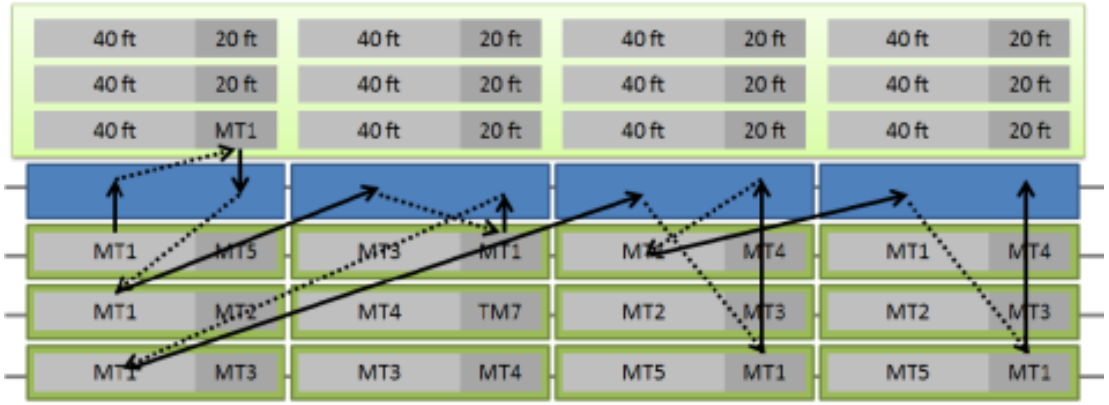
Methodology

1. UML approach
2. Management rules definition
3. Build a hybrid model in AnyLogic tool :
   - Multi-agent system
   - Discrete Event system
4. Performance evaluation

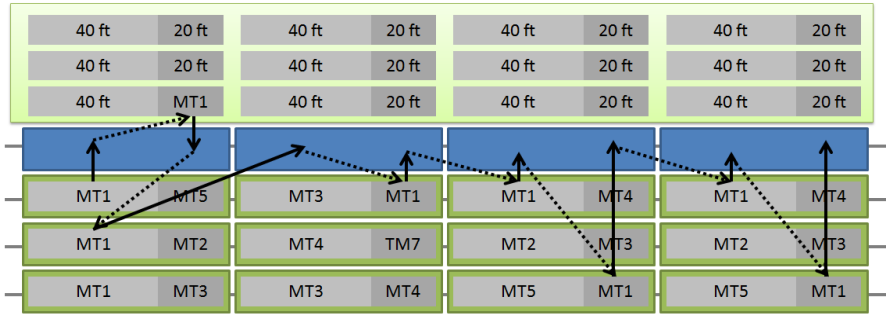

TRANSFER
HANDLING IN MT
HANDLING IN MMT
TRANSFER
HANDLING IN MMT
TRANSFER
HANDLING IN MT
TRANSFER
HANDLING IN MT
TRANSFER
HANDLING IN MMT
TRANSFER
Shuttle 1
Shuttle 2
Shuttle 3

Handling rules in rail yard

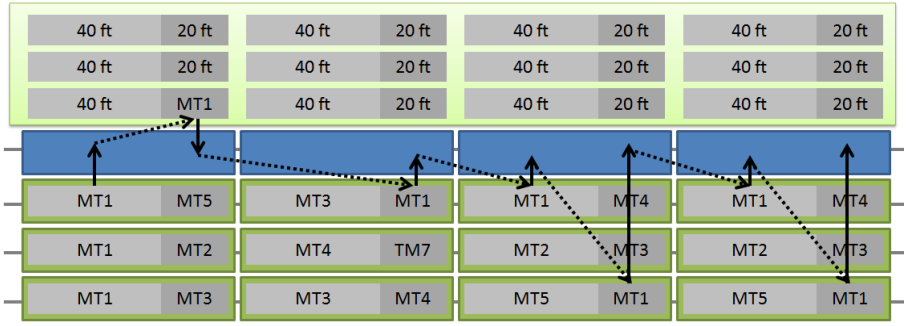
Left to left



Less distance



Less distance without come-back



Parameters optimization progress

Freight trains assignment by:

$$P_i = \frac{\alpha_1}{ed_i} + \frac{\alpha_2}{dt_i} + \frac{\alpha_3 \cdot nc_i}{\sum nc_i}$$

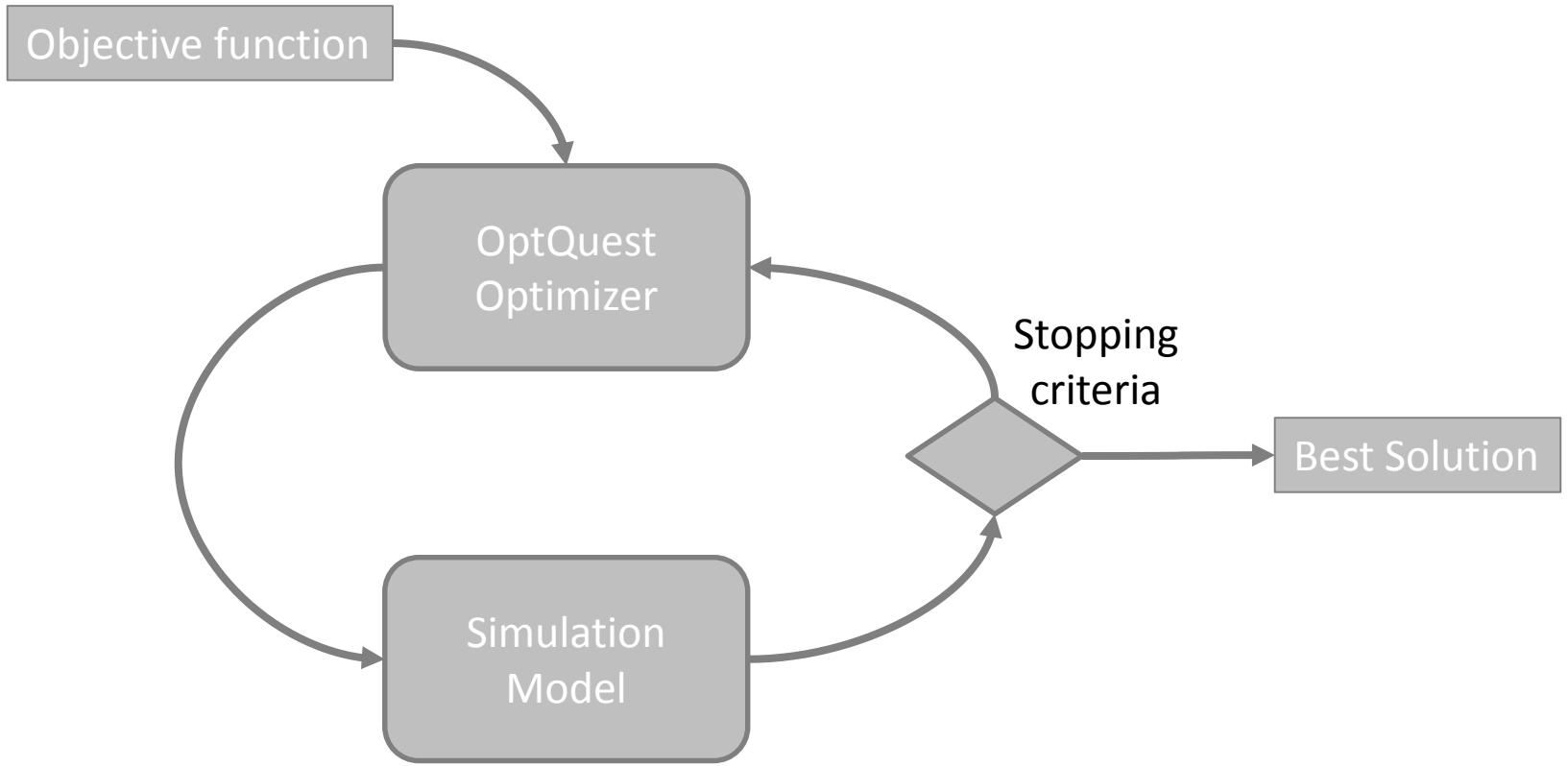
$$\alpha_i / i \in \{1,2,3\} \quad \sum \alpha_i = 1$$

α_1 Export deadline

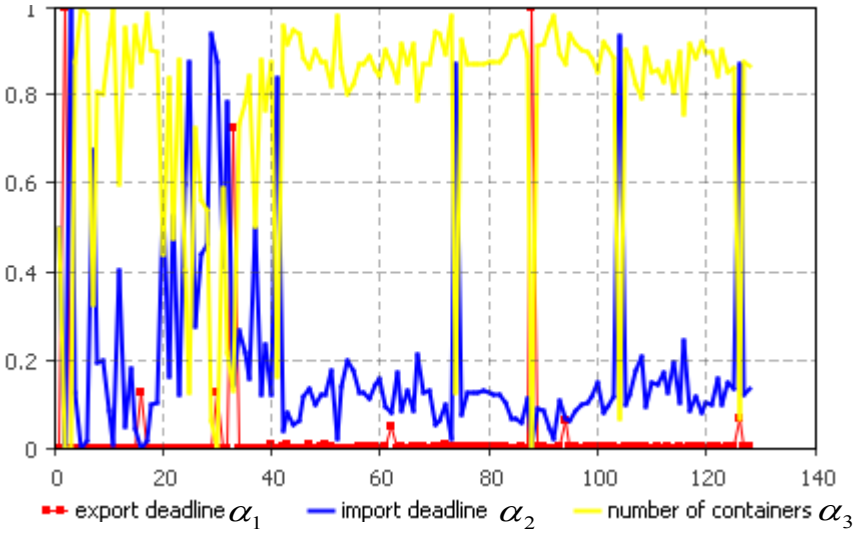
α_2 Import deadline

α_3 Number of container

Optimization approach

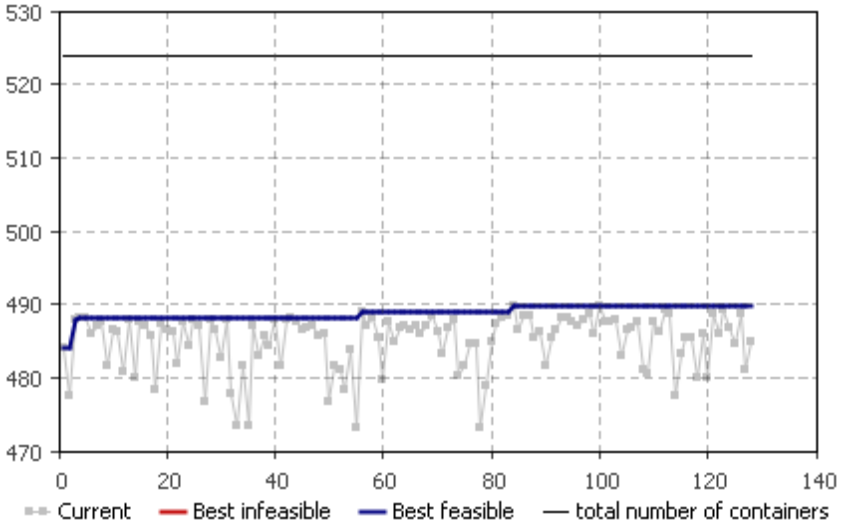


Objective function progress



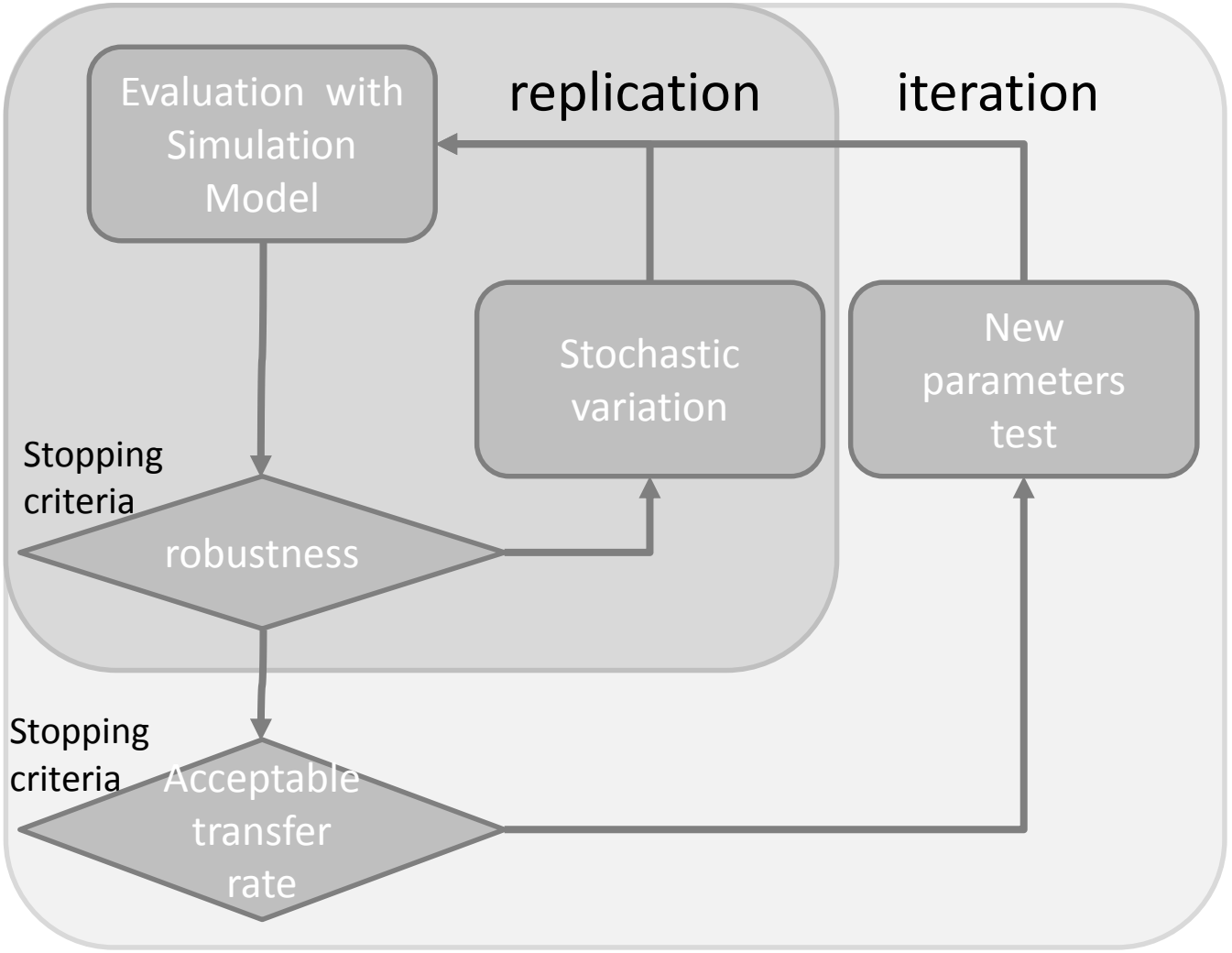
Nb iteration

Nb container

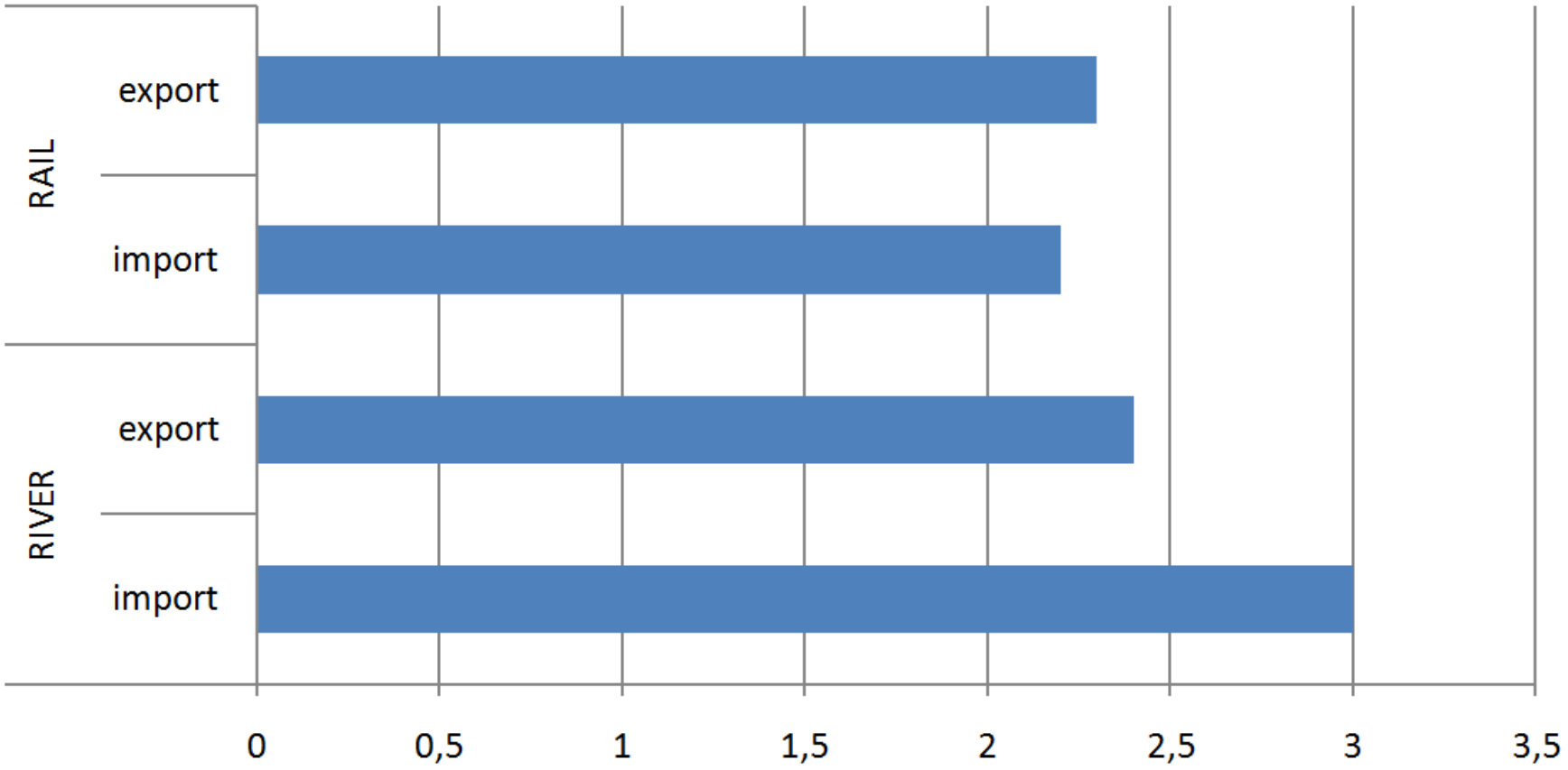


Nb iteration

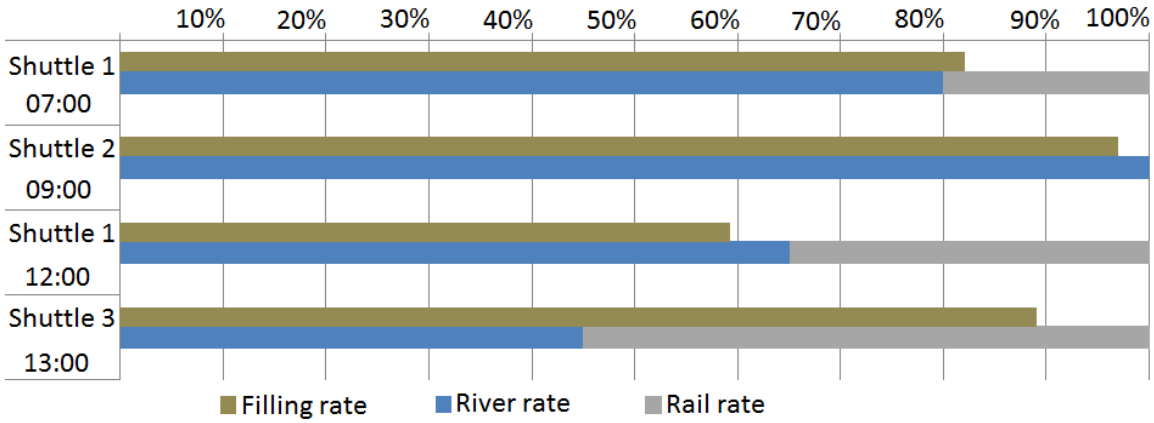
Output generation



Number of handling per container



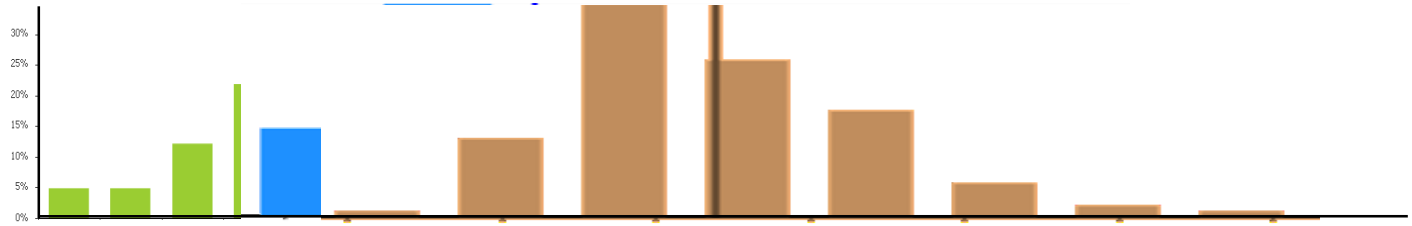
Shuttle filling progress



Cost per container

Less distance

Less distance without come-back Left to left



Conclusion

- Test different management mode of future logistic pattern with multimodal terminal
- Simulation results were used to validate the economic equation
- Performance indicators given by the simulation are a valuable source for the Port Authority to make good predictive study of operations management

perspectives

- optimize management rules of simulation model
- seek improvements and more efficient exploitation
- adapt the simulation tool to use it in operation :
  - as a tool for resource reservation on the horizon of a week
  - transform the simulation model to a decision support tool in the real-time operational decision.



ı for your attention !

Questions ?