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An Approach for Modeling Collaborative Route Planning in Supply Chain Simulation

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TURN NEW MODEL FOR URBAN FOOD TRANSPORTATION

AGENDA

- INTRODUCTION
- PROBLEM DESCRIPTION
- SOLUTION APPROACH
- CONCLUSION AND OUTLOOK

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- **INTRODUCTION**
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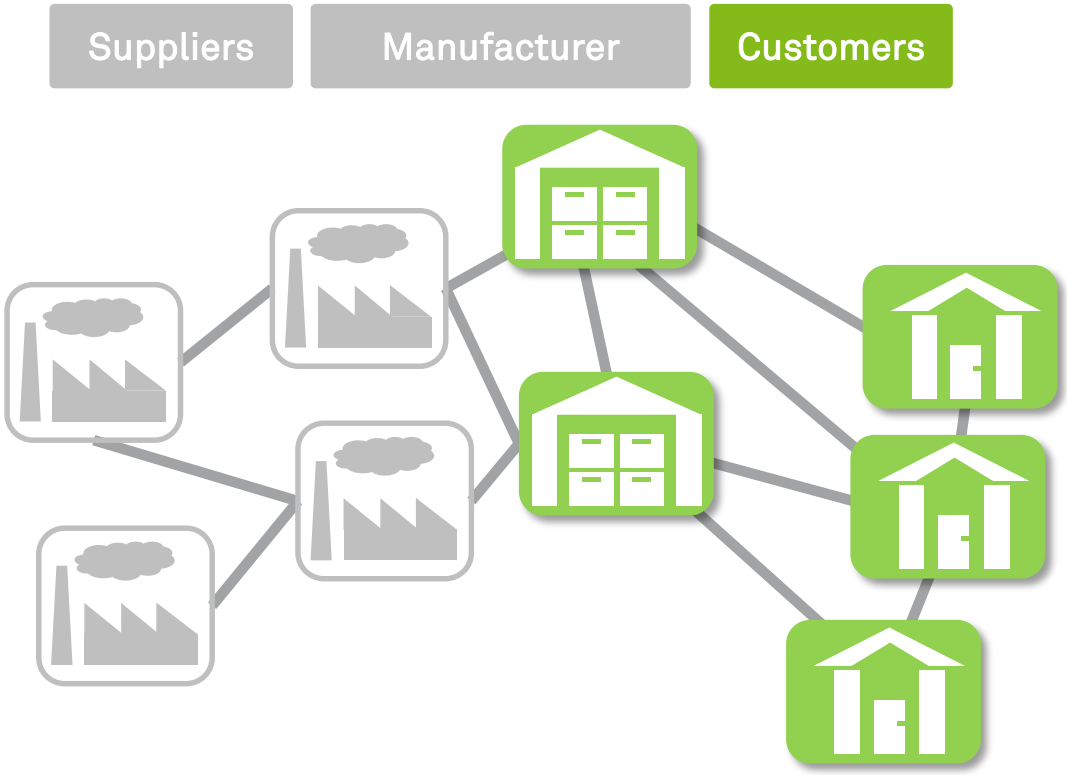
Challenges for logistics:

- Urbanization
- Increasing customer demands
- High cost pressure
- Need for innovative supply concepts

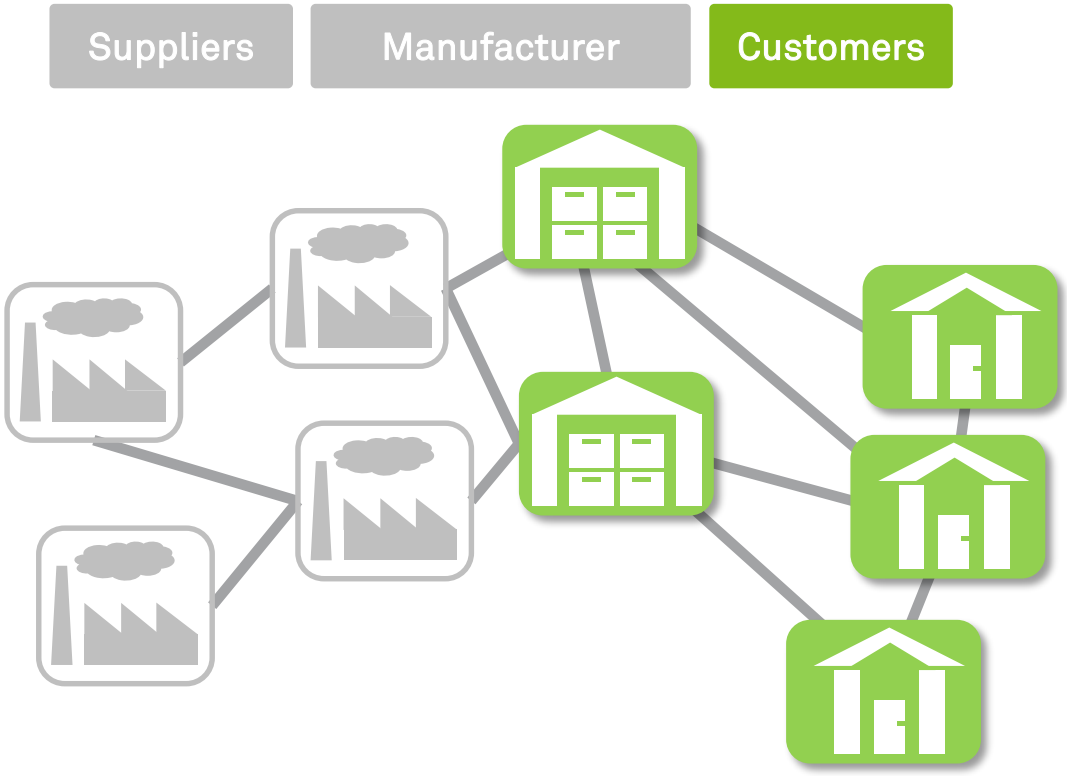


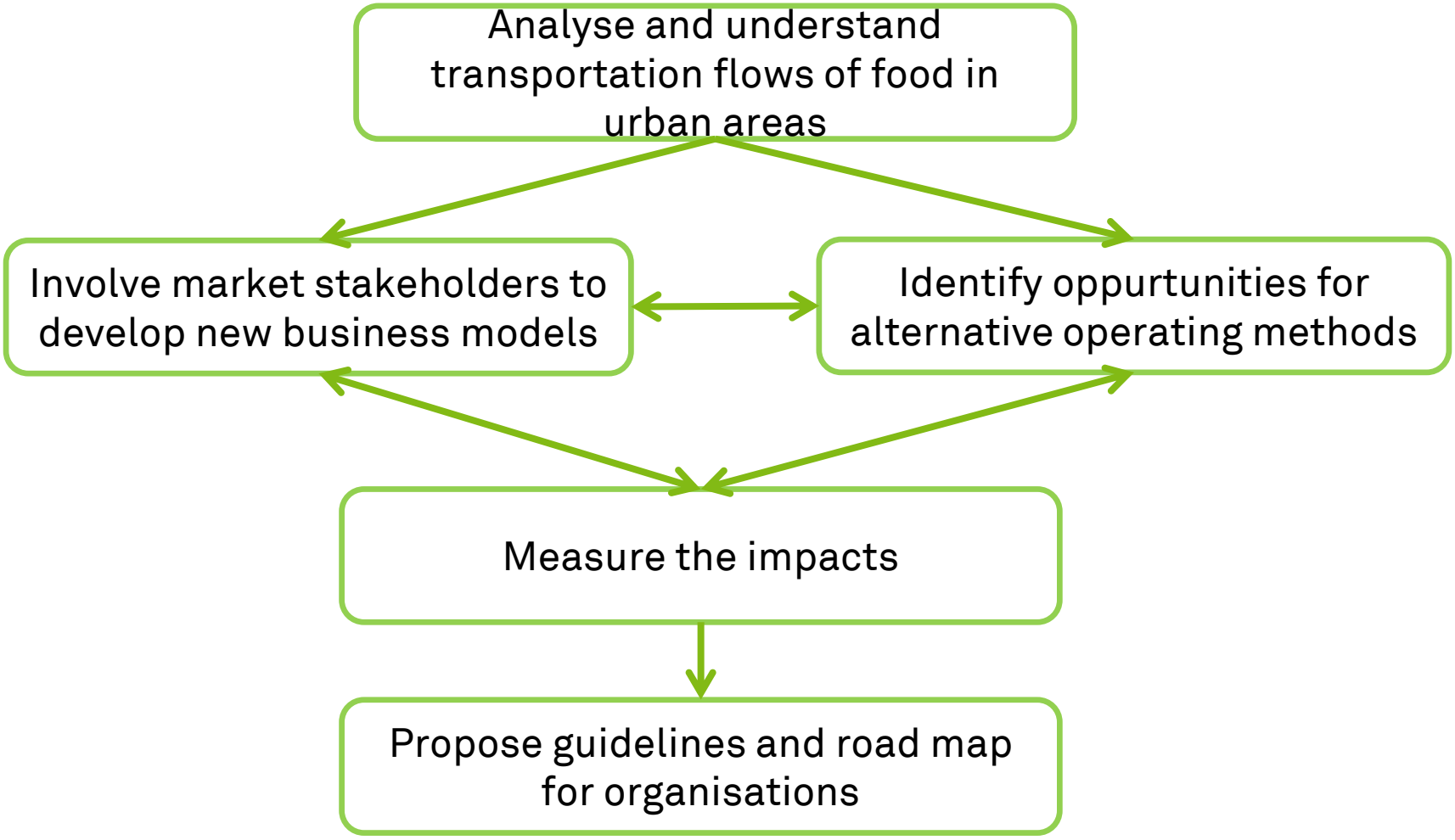
Logistics Network

Challenges for logistics:

- Urbanization
- Increasing customer demands
- High cost pressure
- Need for innovative supply concepts

Possible approach: Collaborations




Analyse and understand transportation flows of food in urban areas
Involve market stakeholders to develop new business models
Identify oppurtunities for alternative operating methods
Measure the impacts
Propose guidelines and road map for organisations

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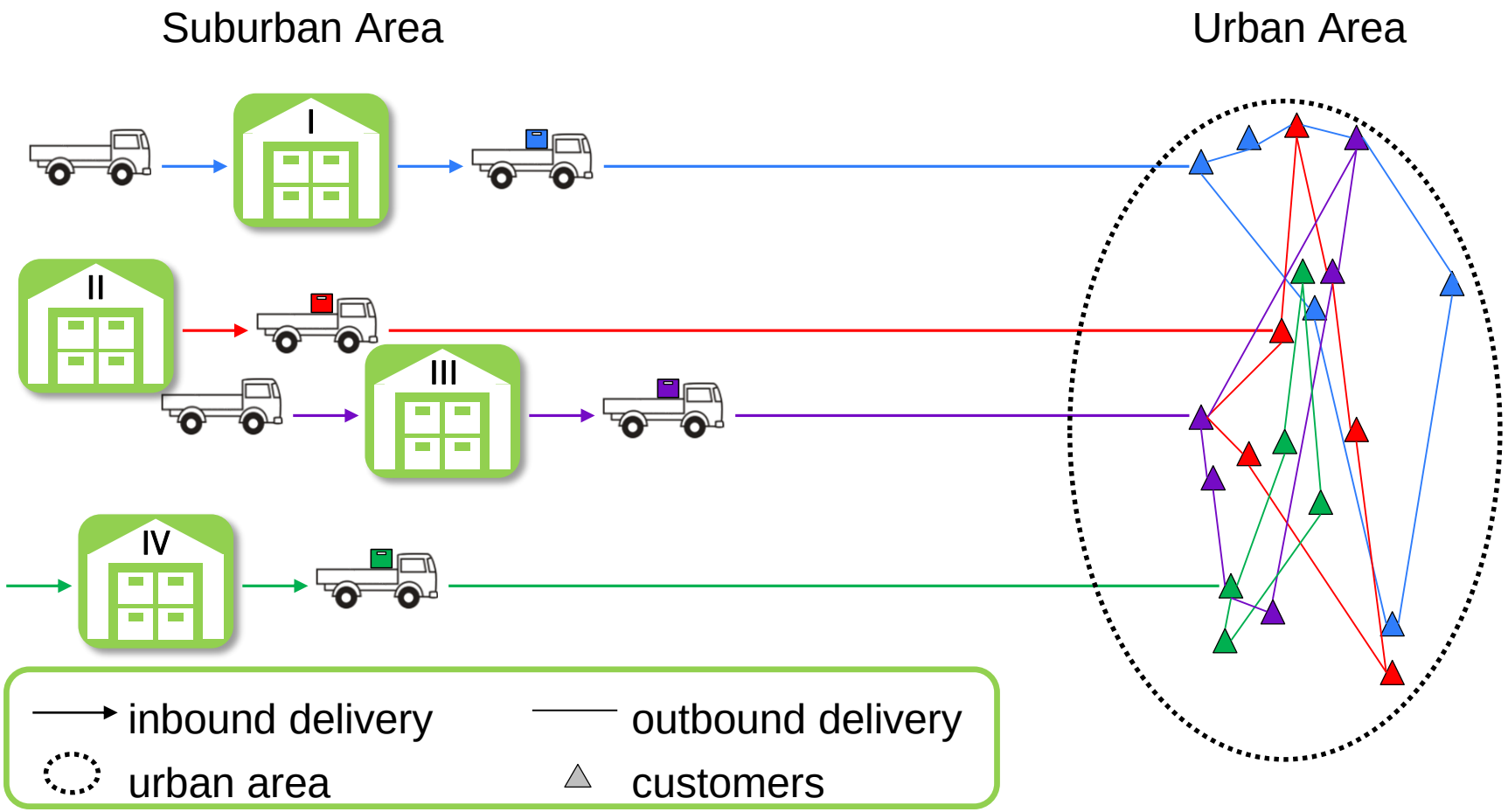
PROBLEM DESCRIPTION

As-is situation



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PROBLEM DESCRIPTION

Assumptions: How we can improve urban transport?

- Through collaboration increase in profitability (e.g., reduction of transport costs)
- Addressing the challenges of city logistics (e.g., protection of the road infrastructure)
- Higher ability to deliver
- Improving perception of the companies

➢ Achieving economic, environmental and social goals

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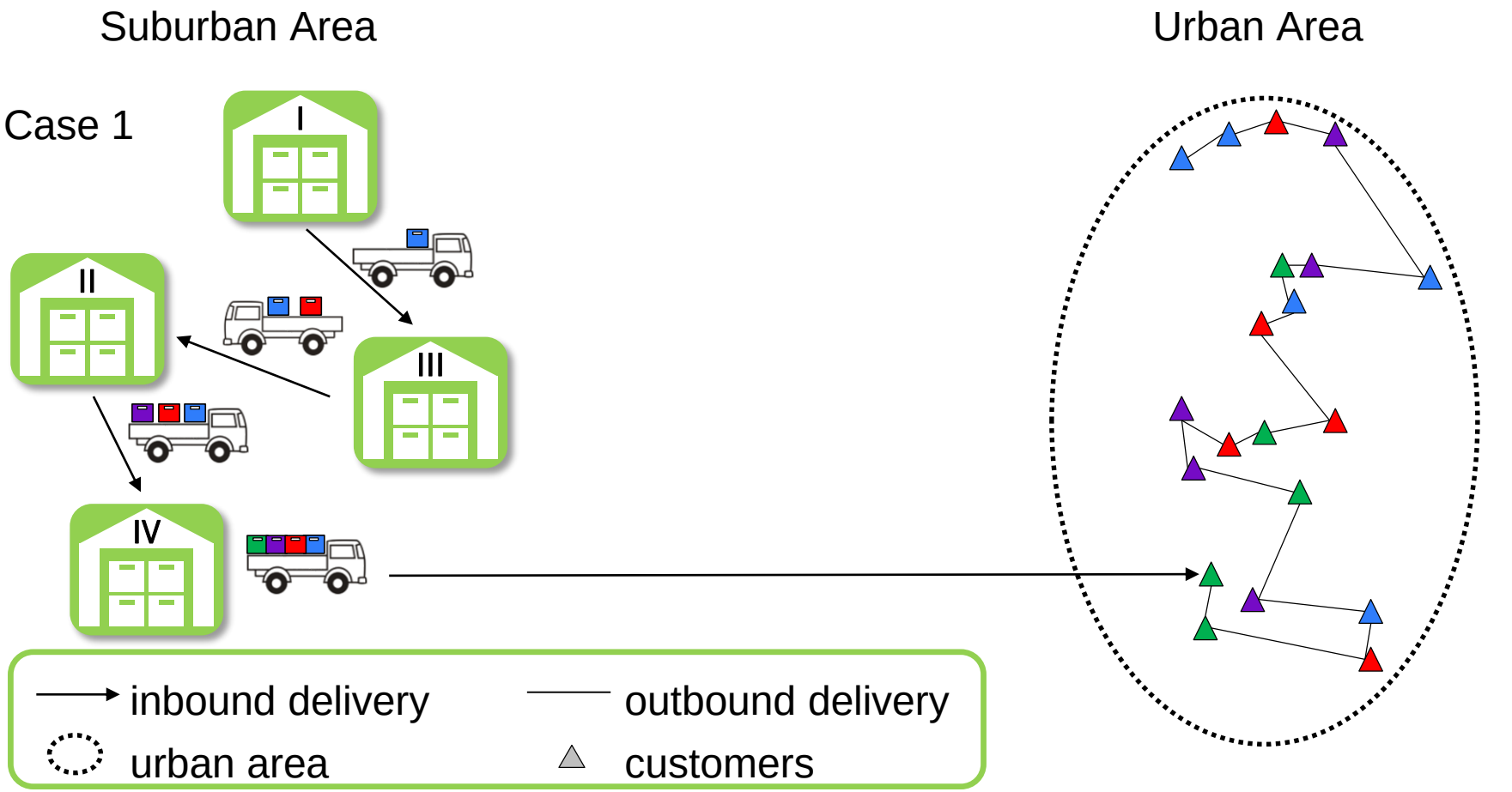
SOLUTION APPROACH

Common vehicle fleet (to-be situation)



SOLUTION APPROACH

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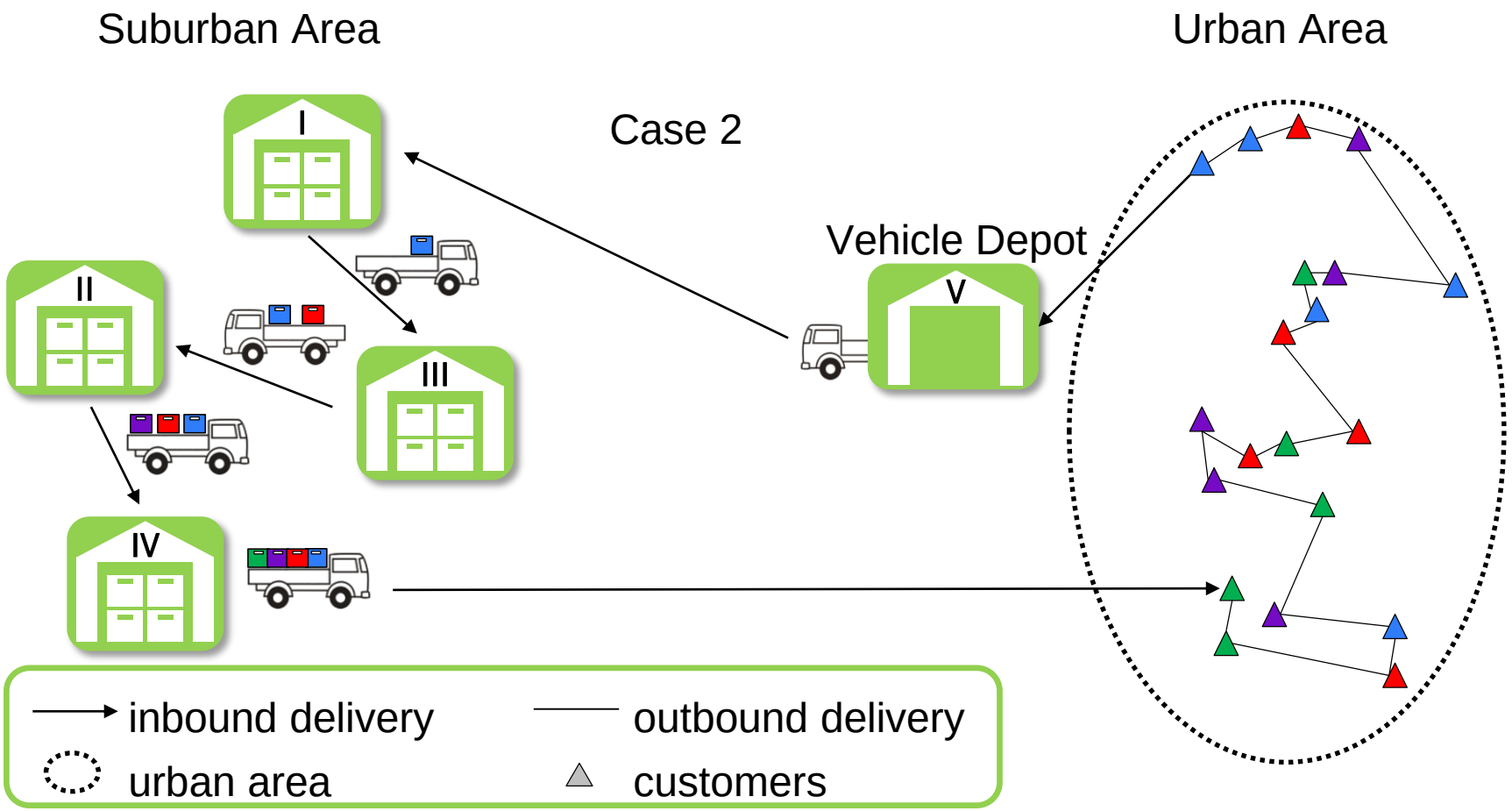
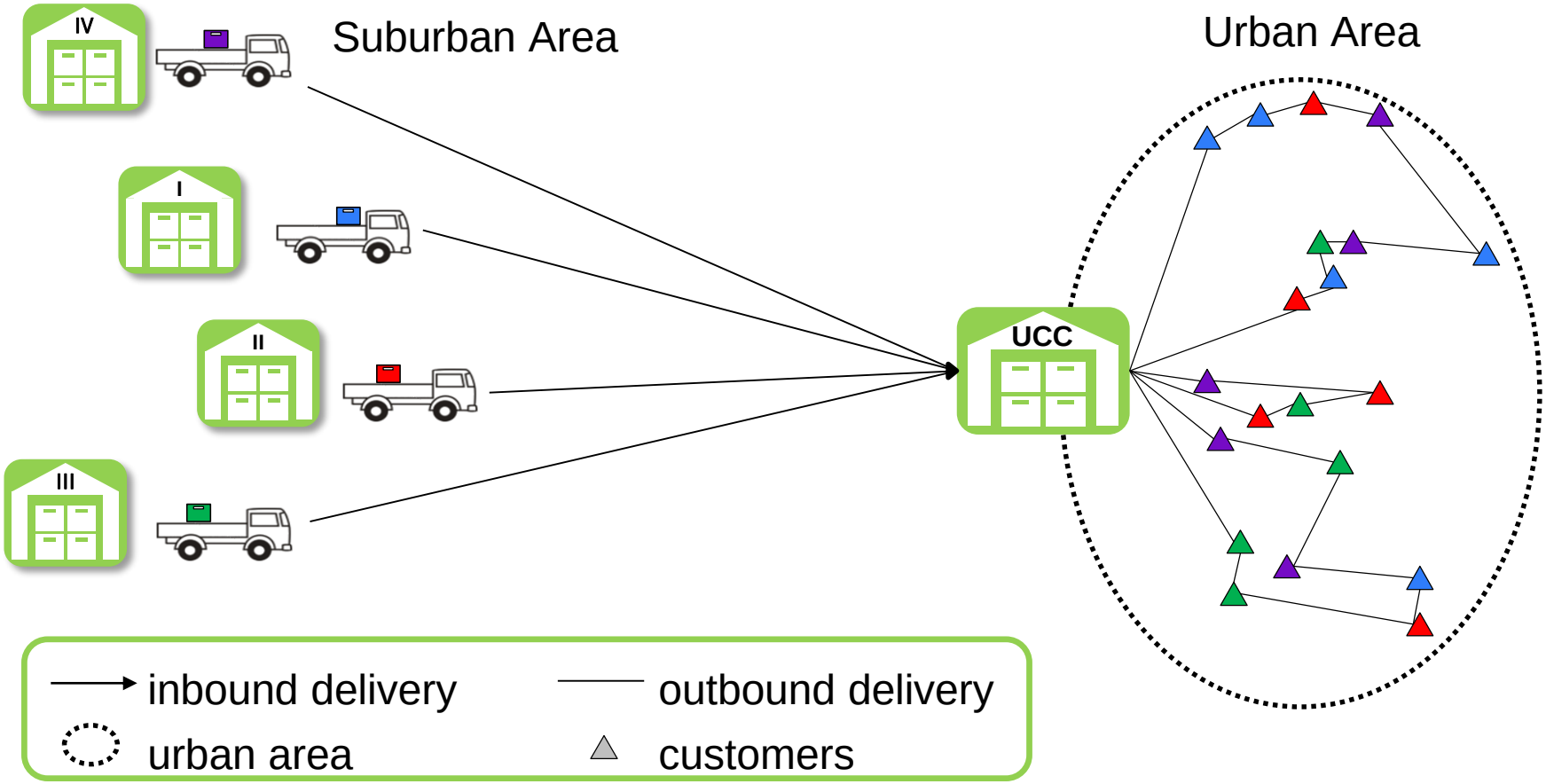


SOLUTION APPROACH

Urban Consolidation Centre (UCC) (to-be situation)

- Bundling of goods flows



SOLUTION APPROACH

SimChain (1/2)

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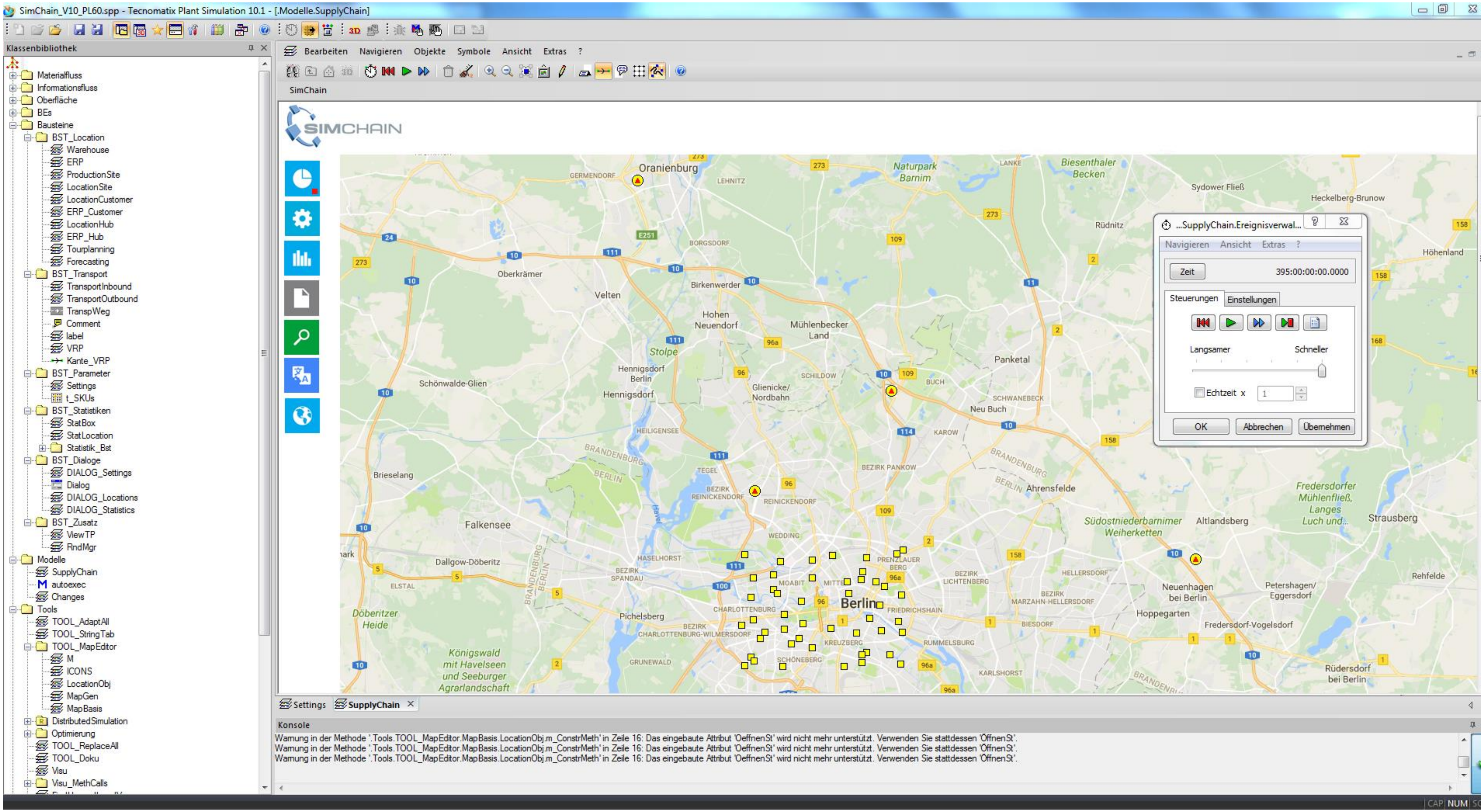
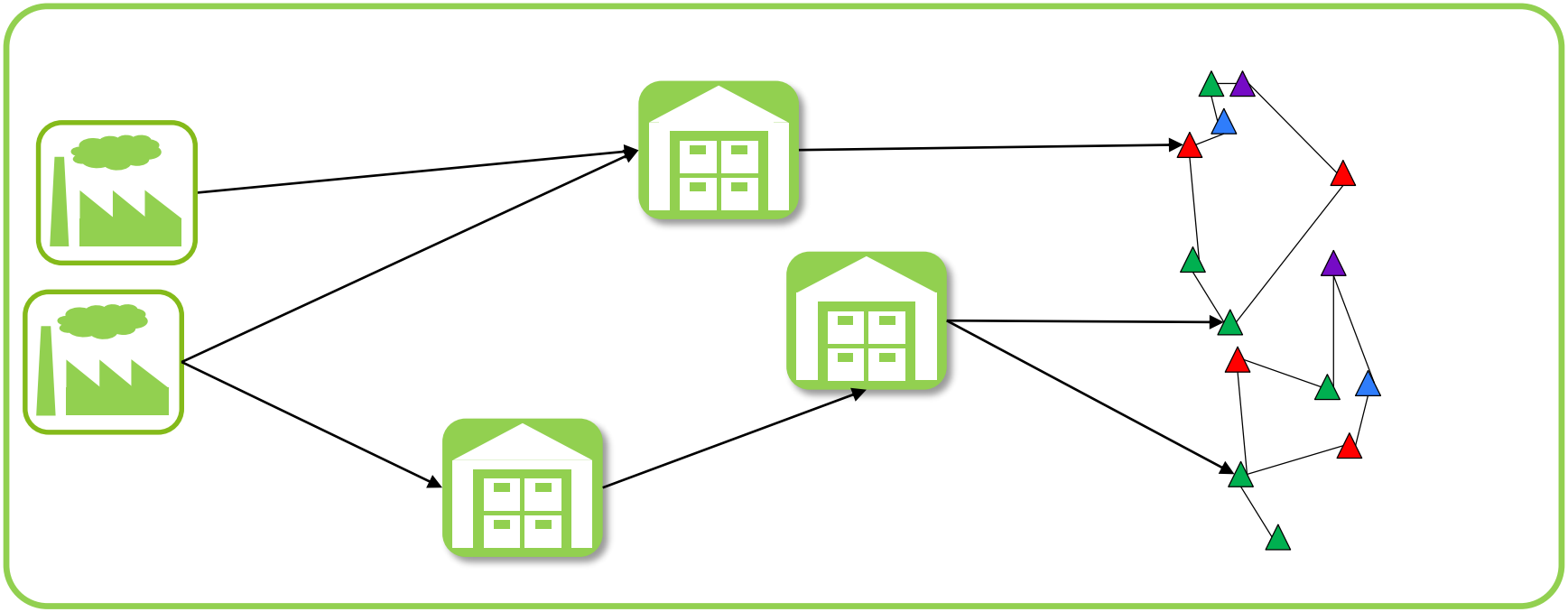


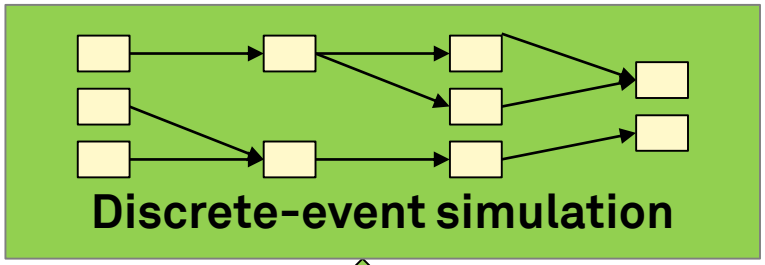
SimChain (2/2)

- Building blocks for the creation of the model

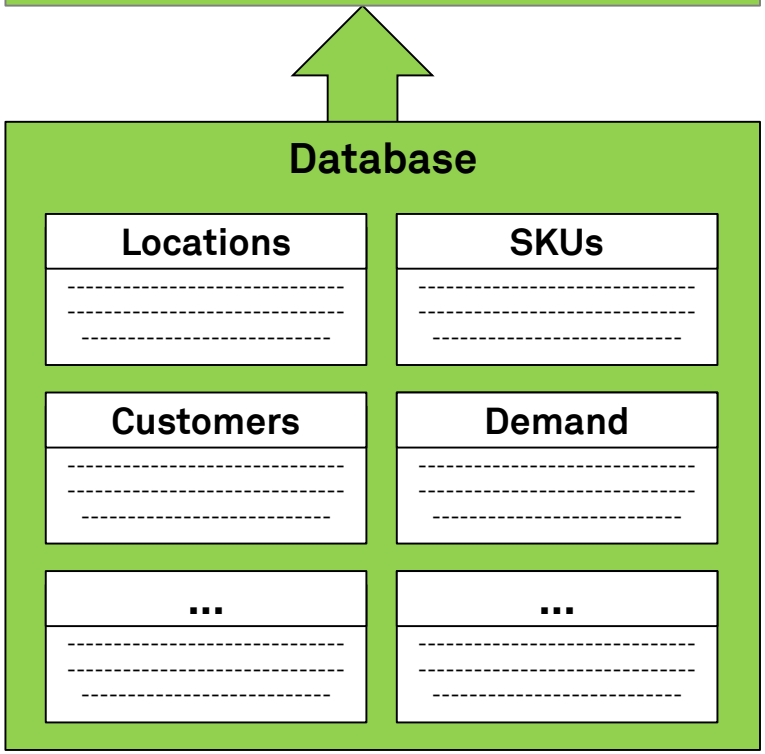


SOLUTION APPROACH

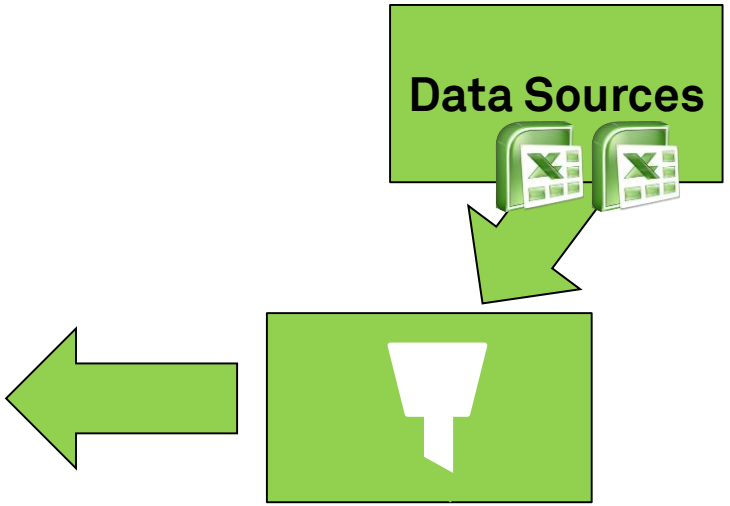
Automated instantiation of a data-driven simulation model



Automatic instantiation of a data-driven discrete-event simulation model

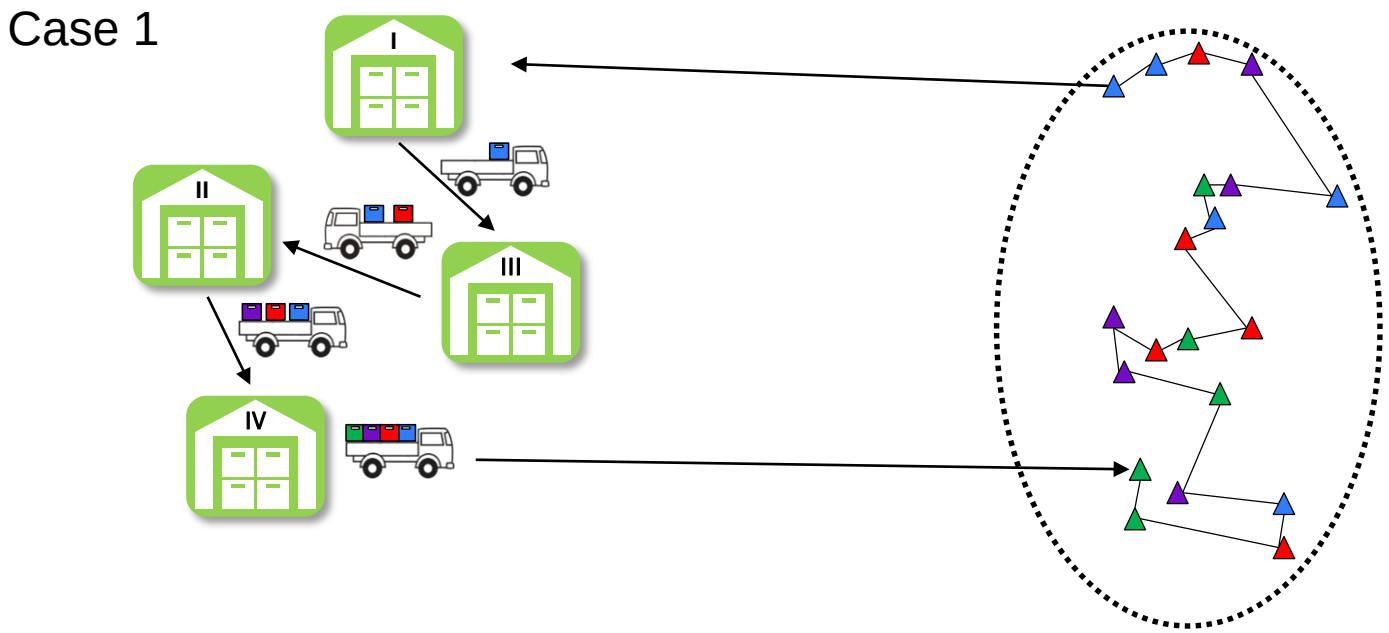


Data pre-processing



Simulation Scenario / Case 1

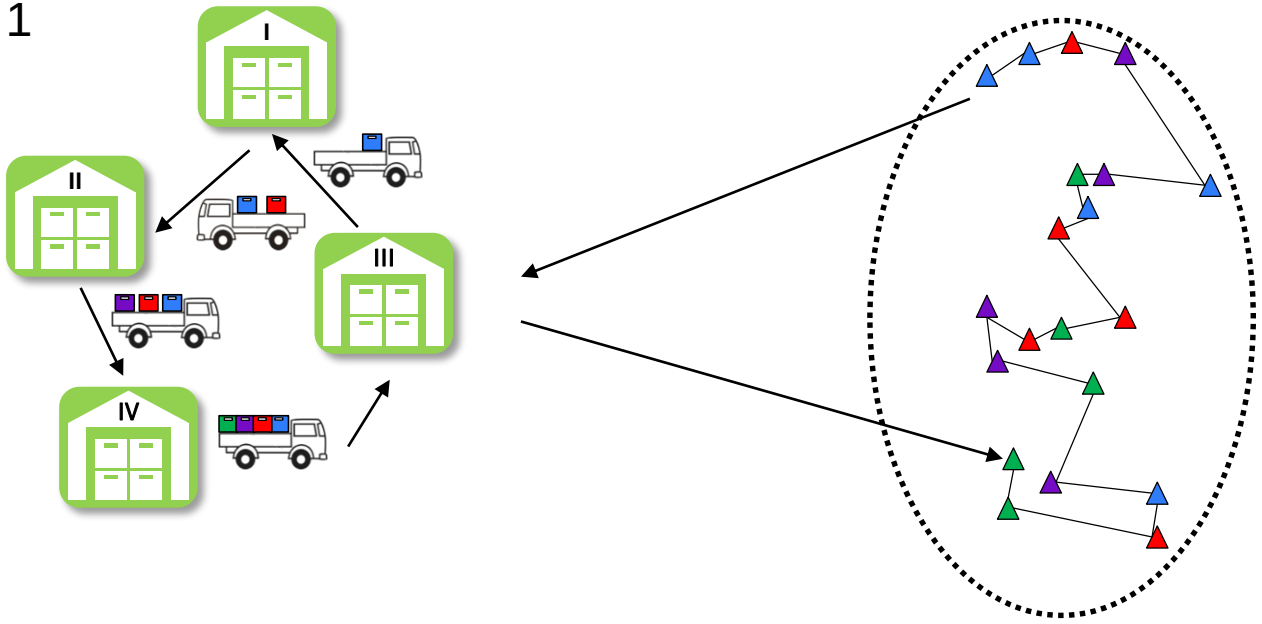
- Collaborative tour planning can be seen as a classic VRP



Simulation Scenario / Case 1

- Transferring idea to SimChain
- Depot has to be the start- and endpoint

Case 1



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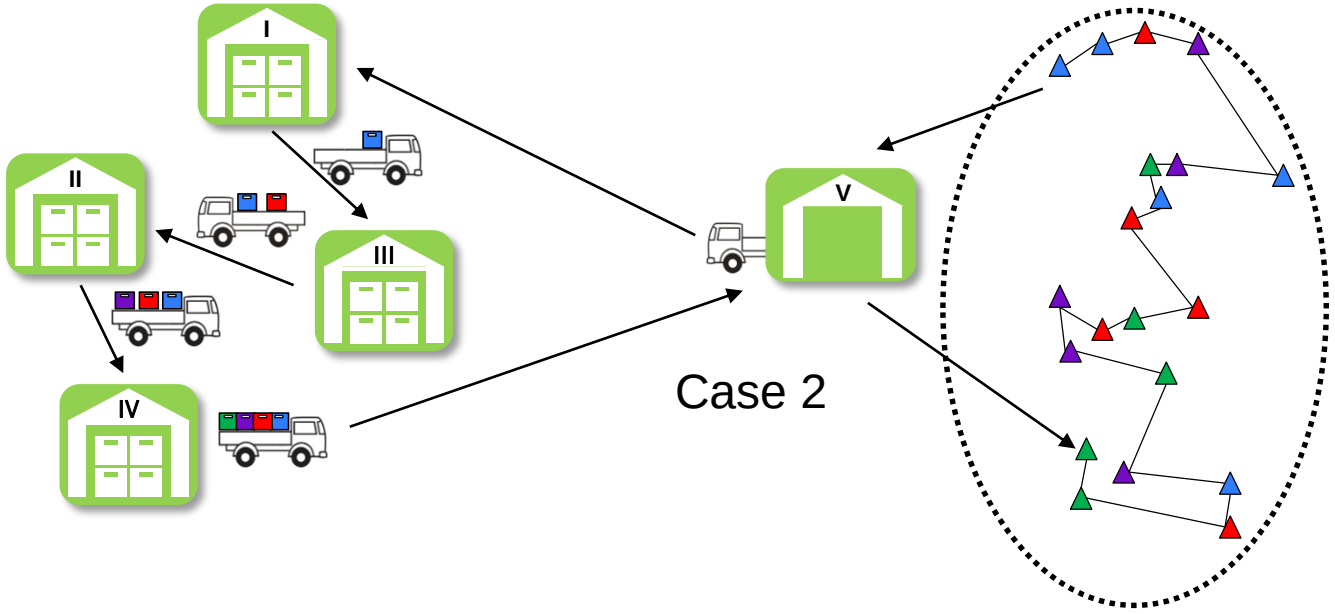
Simulation Scenario / Case 2

- Collaborative tour planning is a classic VRP
- Vehicle depot has to be the start- and endpoint



SOLUTION APPROACH

Simulation Results

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- Time period 3 month
- 7424 orders

Scenario	Description	Average Distance (km)	Deviation (percent)
No Collaboration	Current state	149	±0
With Collaboration (common fleet) Case 1	Warehouse I as Depot	155	+4
	Warehouse II as Depot	126	-15
	Warehouse III as Depot	147	-1
	Warehouse IV as Depot	124	-17
With Collaboration (common depot) Case 2	Vehicle Depot V	116	-22

SOLUTION APPROACH

Urban Consolidation Centre (to-be situation)

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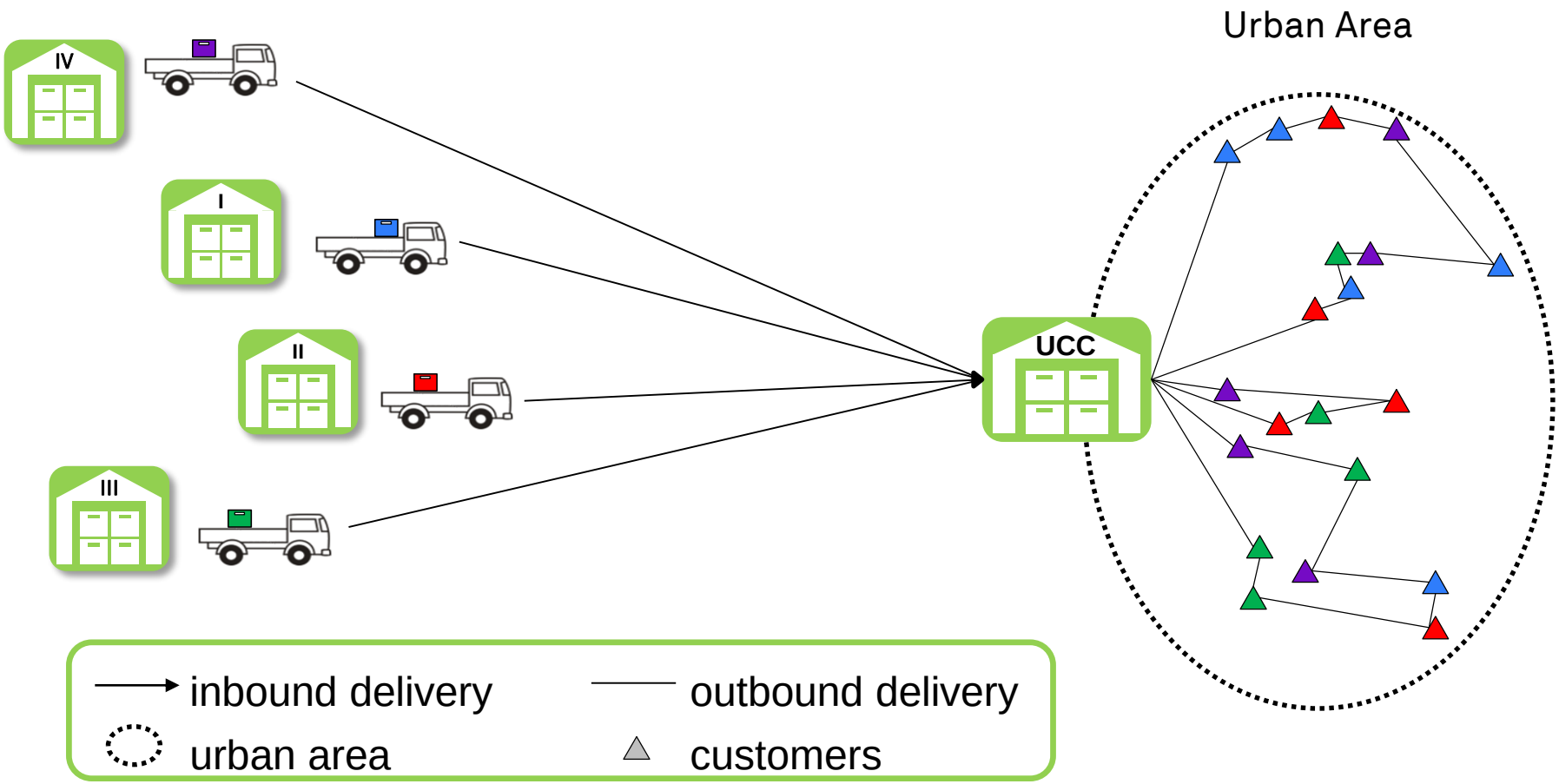
- Bundling of goods flows



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CONCLUSION

- Problem of collaborative planning can be classified as a VRP
- Vivid and effective
- Quick and easy algorithm
- First results show that collaboration with a common fleet decreases travelled distance by up to 17% (Case 1)
- The application of a commonly used vehicle depot (Case 2) decreases travelled distance by 22%

OUTLOOK

Further research is required

- Modification of tour planning algorithm (Case 1)
- Larger record of data
- Finding the best location for the vehicle depot
- Execution of the UCC scenario
- Development of organizational and business model

Thank you for your attention.

Questions?

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