SIMPLAN

The bridge
to reality

SimChain

Supply Chain Simulation as a Service

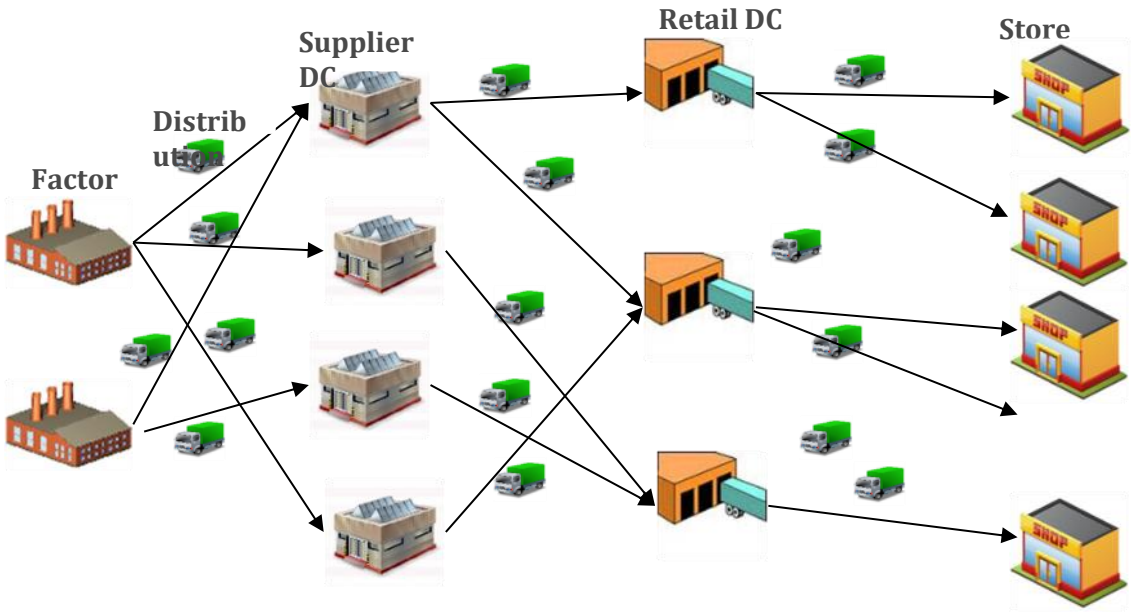
Dr. Till Fechteler

SIMULATION SOLUTIONS FOR
PRODUCTION AND LOGISTICS PROCESSES

Contents

Introduction

- **How many** company locations are necessary?
- **Where** should these company/warehouse locations be situated?
- **What size** should the company locations have?
- How should my company's **transport relations** be organized?
- What **delivery cycles** are needed?
- What **service level** can I achieve for customers?

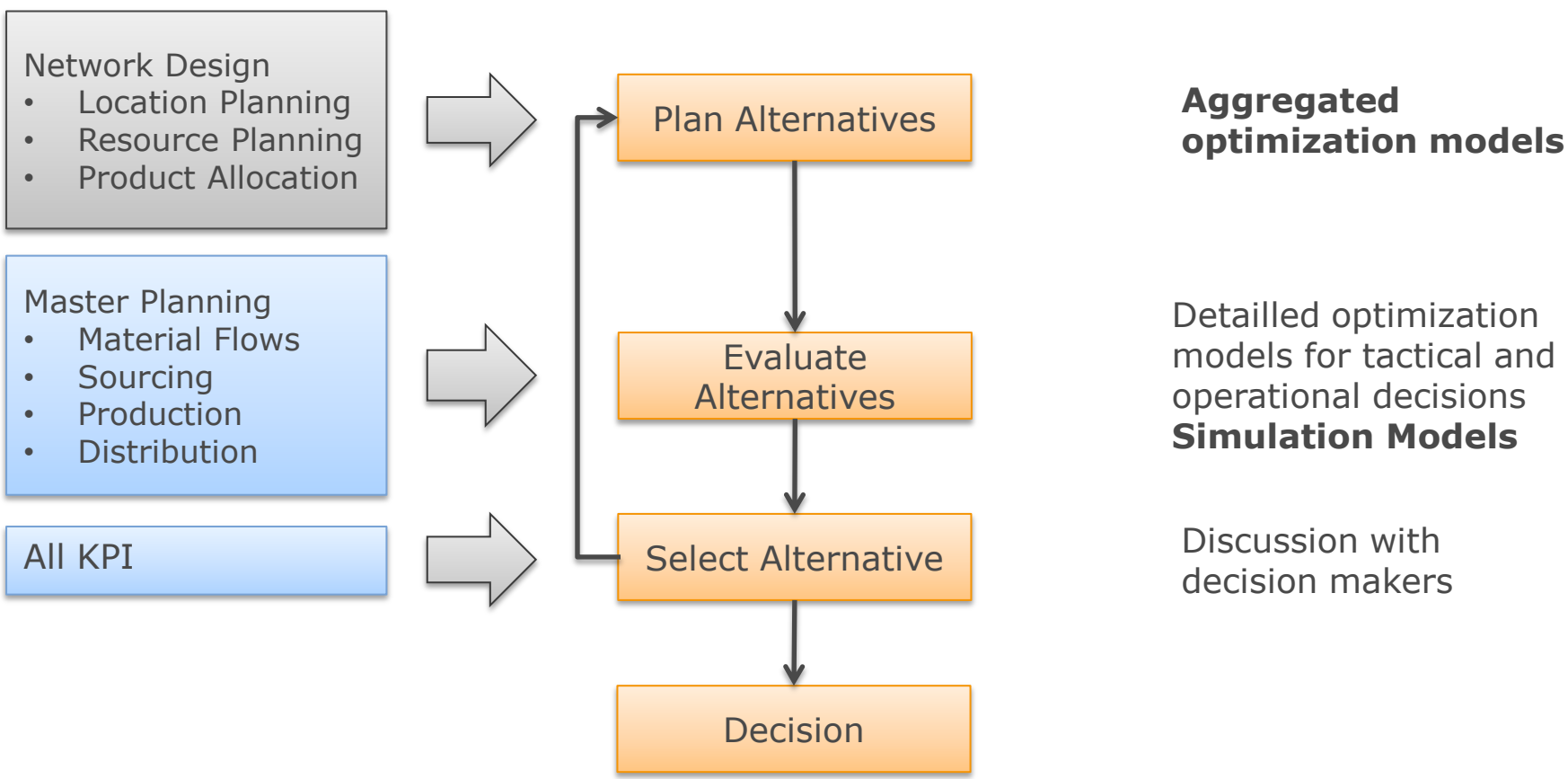


- **Strategic** Supply Chain Planning
  - Assess different supply net configurations (locations, transport relations)
  - Assess changes in supply net over time (how does a site shutdown in 4 years affect the chain?)
  - Assess assignment of capacity (production, warehouse)

- **Tactical** Supply Chain Planning
  - Assess product allocations to production/warehouse sites
  - Evaluate policies (push, pull, planning cycles, …)

- Supply Chain **Operation**
  - Assess short term changes in market demand
  - Assess consequences of external events (breakdowns, strikes, …)

Introduction
Simulation in the Network Design Process



Comp. Goetschalcks und Fleischmann (2008)

- **Goal**: Analysis of the dynamic behavior of complex value chains
  - *Stochastic factors*: forecast errors, production times, transport times and replenishment times
  - *KPI*: service level, costs, inventory

- **Delimitation** from classical material flow simulation
  - Location as a „building block"
  - No detailed modeling of production processes as well as intra-logistic processes
  - High importance of information and planning processes

- **Basic application areas**
  - Network design
  - Master planning of sourcing, production and distribution (e.g. specification of planning algorithms)

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Modeling Approach

SimChain History

2002 – Joint venture of SimPlan and ICON

- Building block library based on Plant Simulation
- Generic modeling approach
- Interface to ICON tools (monitoring and collaboration tools)

2004 – Further development by SimPlan

- Several project related extensions for different industries

2010 – Re-Design in cooperation with ZF Friedrichshafen

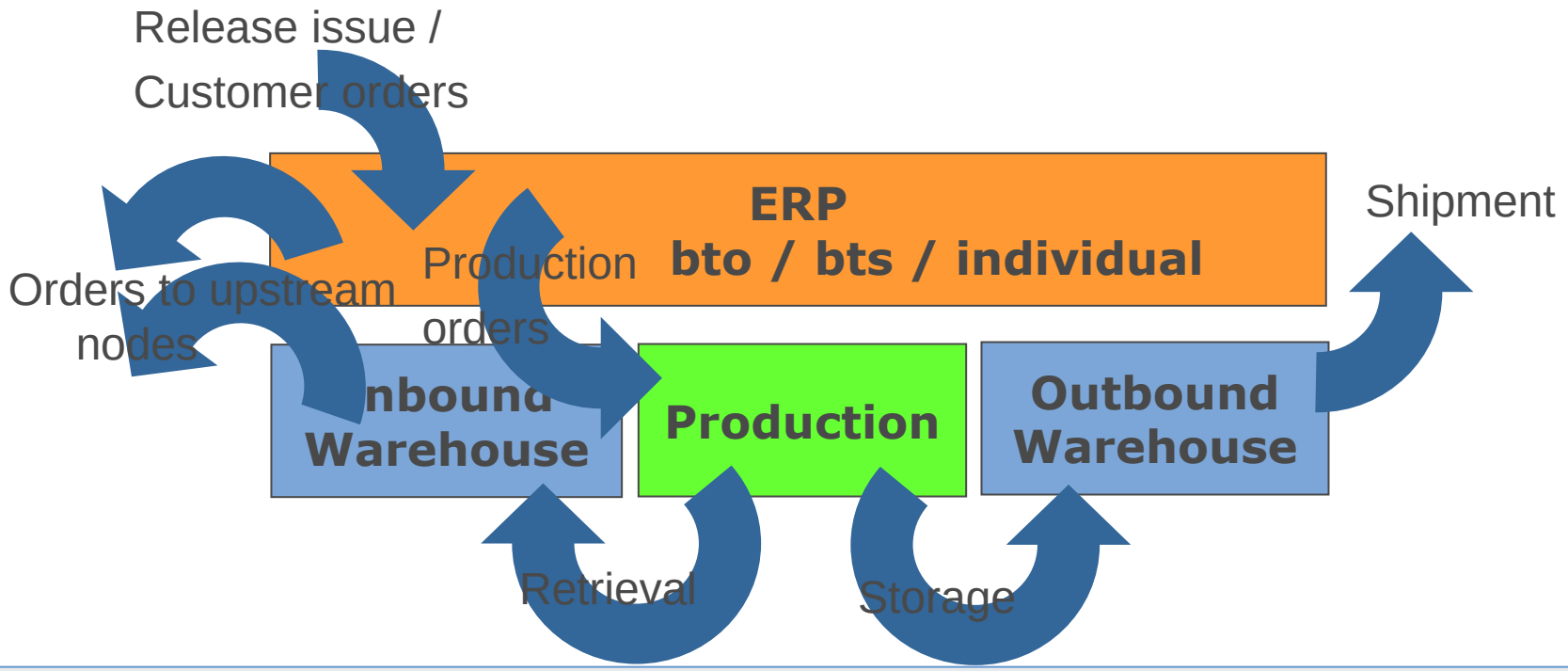
- Development of a database application for the modeling of simulation scenarios and the evaluation of simulation results

2012 – e-SAVE (European funded research project)

- Simulation of sustainable supply chains
- Extension to consider the requirements of the FMCG industry
- Development of a Web Application

Plant Simulation Building Blocks

- *Customer* (with a given but changing demand)
- *Sites* (production sites and warehouses with MRP functionality)
- *Hubs* and *plain Suppliers* (sources with a replenishment time)
- *Transport Relations*



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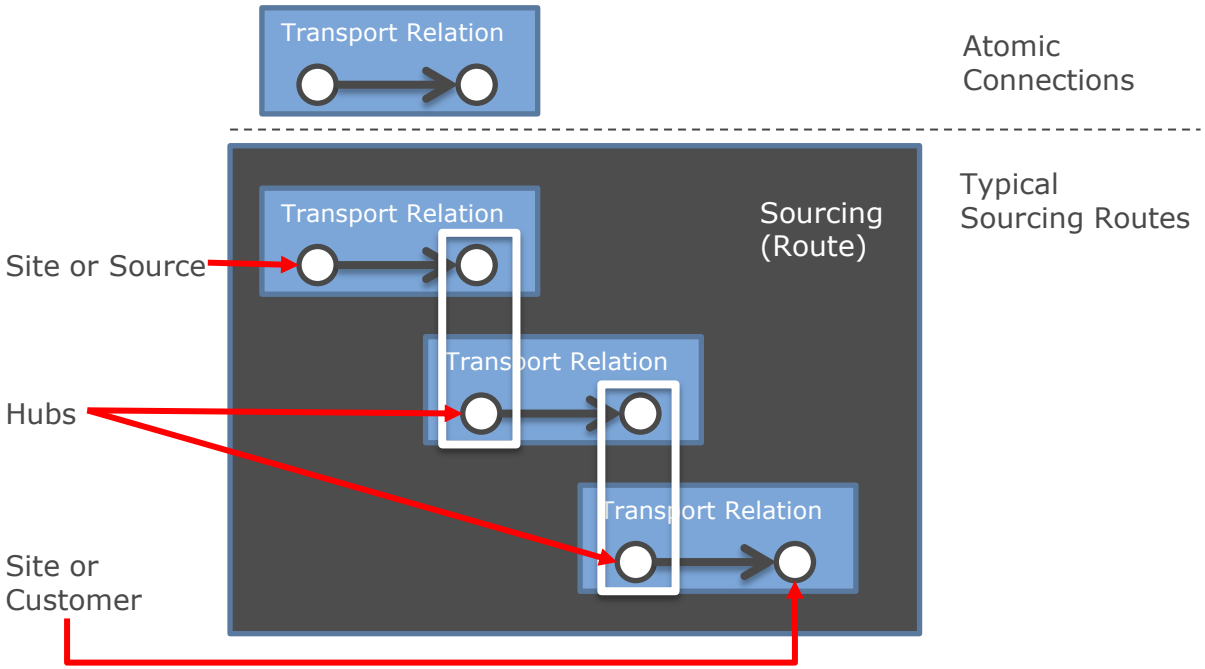
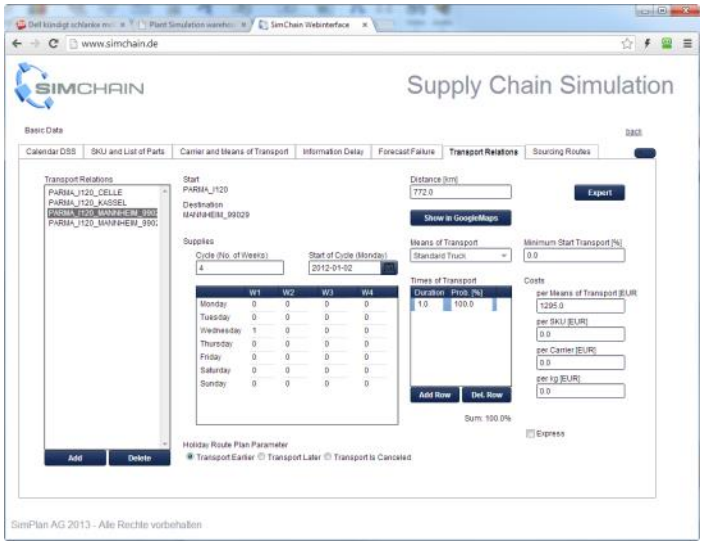
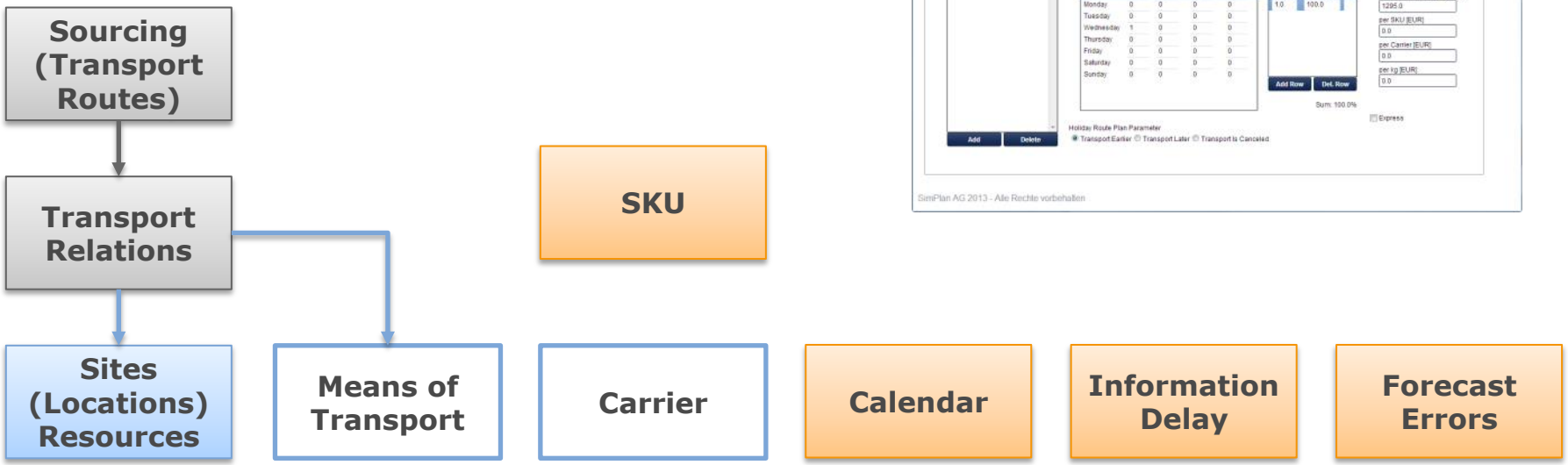


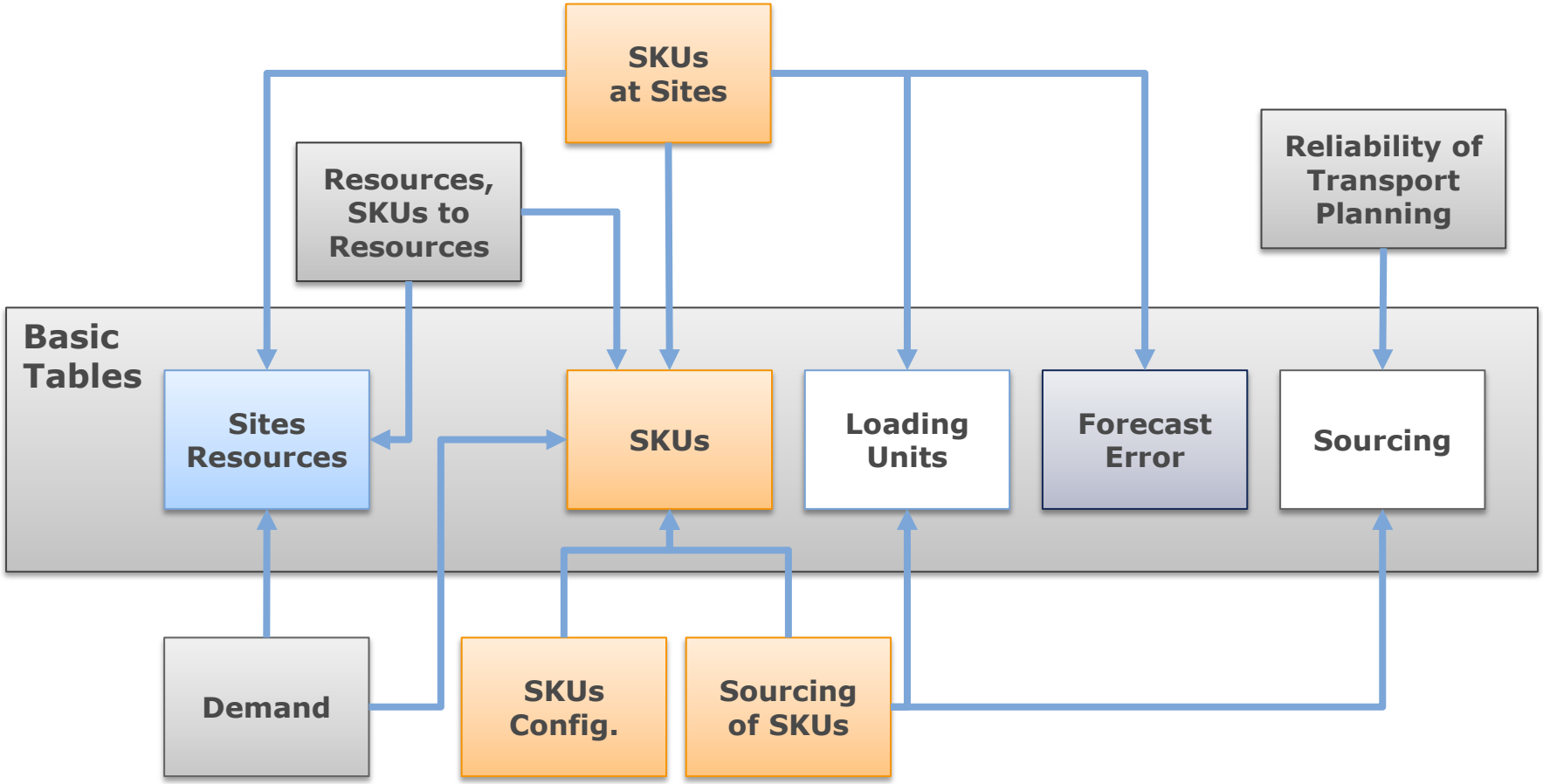
Basic Data Tables are used for the modeling of the basic structure of a supply chain





- **Configuration Data Tables** are used to set up the simulation model
- Procedure:
  1. Select **locations** (sites, hubs, customers)
  2. Select **SKU**
  3. Specify **demand** (quantities, forecast errors)
  4. Assign **SKU to sourcing options** (from customer to site)
  5. Assign **SKU to sites** (days of inventory, loading units, planing algorithms
  6. Specify **resources** and assign **SKU to resources**
  7. Set up **reliability of transport planning**

Linkage of basic data and configuration data tables



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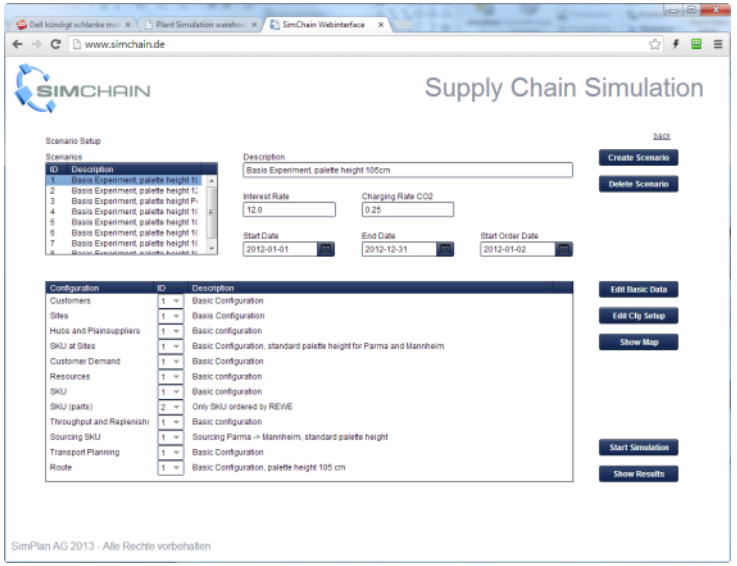
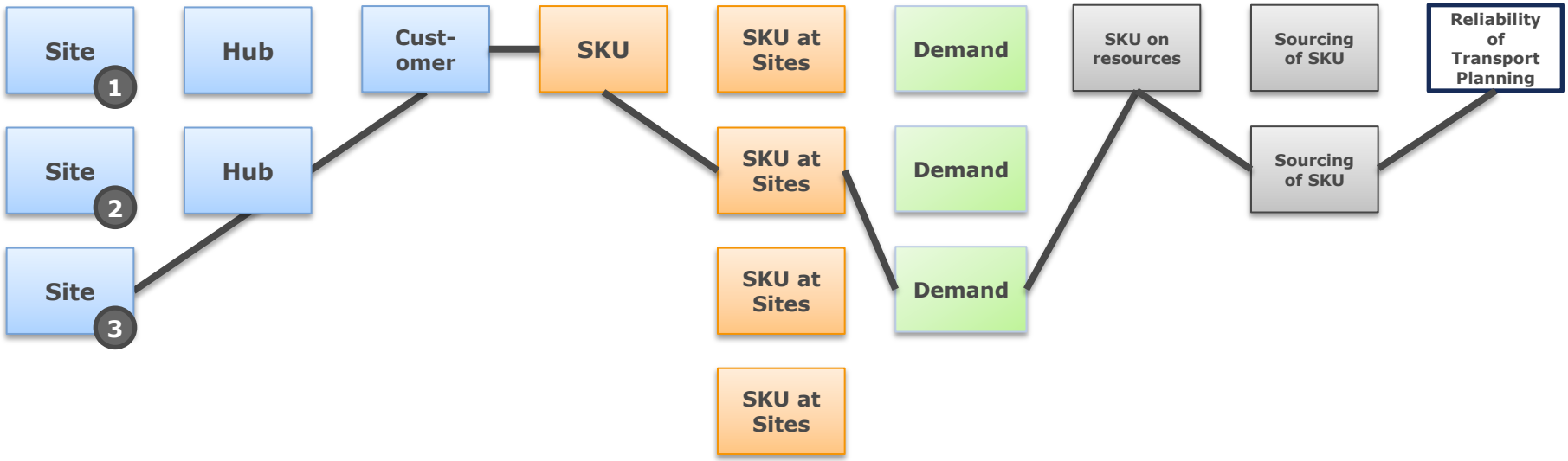
Modeling Approach – Data Model

A Scenarios is a set/combination of configurations:

- No redundant data storage
- Copies of configurations
- Clearness regarding individual scenarios through configurations





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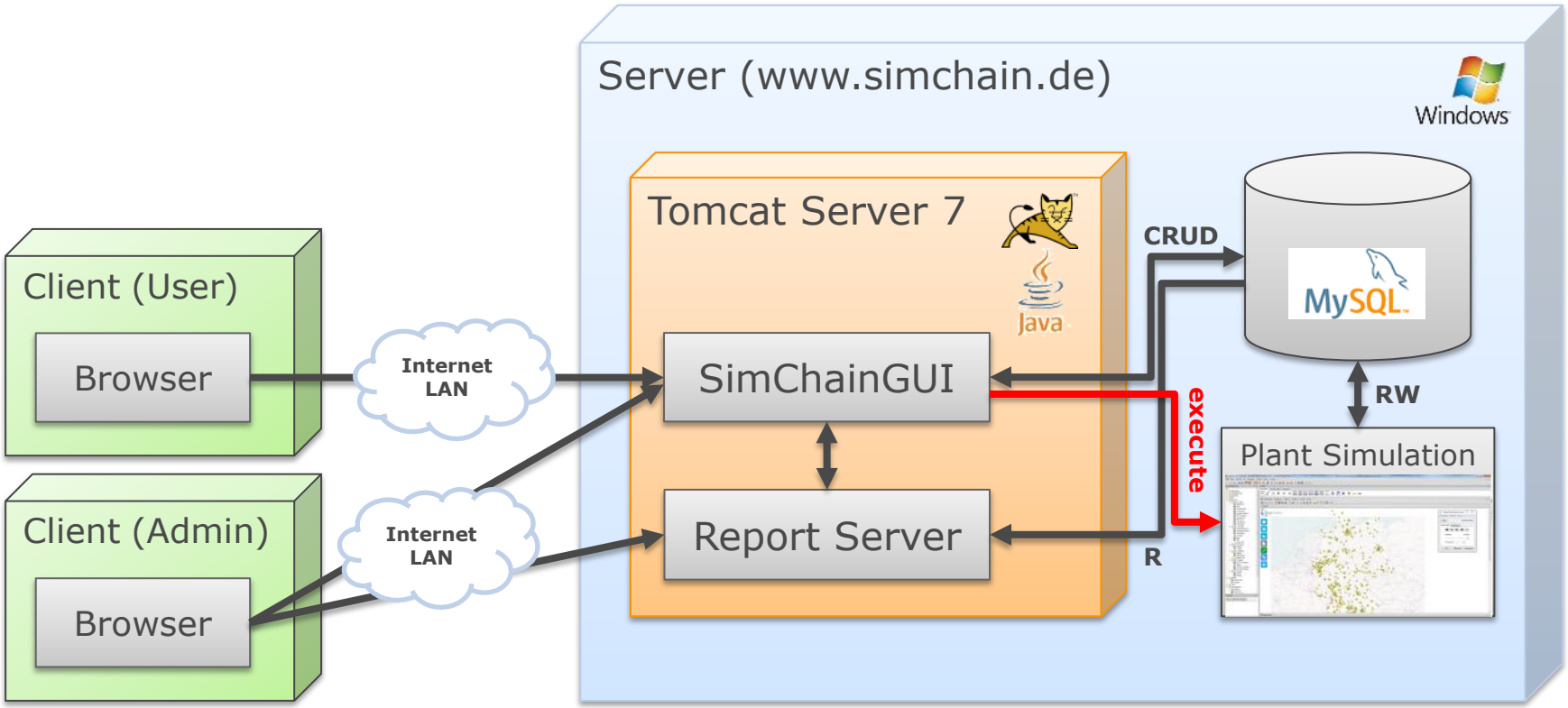
Architecture

SimChain Architecture



Summary and Future Plans

Summary and Future Plans

- **Summary**
  - SimChain is a sophisticated tool which enables the user to evaluate the dynamic behavior of supply chains (especially during master planning)
  - It has been ranked beneath the Top 3 tools for the planning of supply chains by an independent consultancy company
  - More reliable planning of supply chains by consideration of stochastic factors
  - The development of a web application enables SimPlan to provide supply chain simulation as a service

- **Future Plans**
  - Go live with a beta version of www.simchain.de and enable access for selected partners
  - Development of a license and fee model for simulation as a service

Thank you for your attention!

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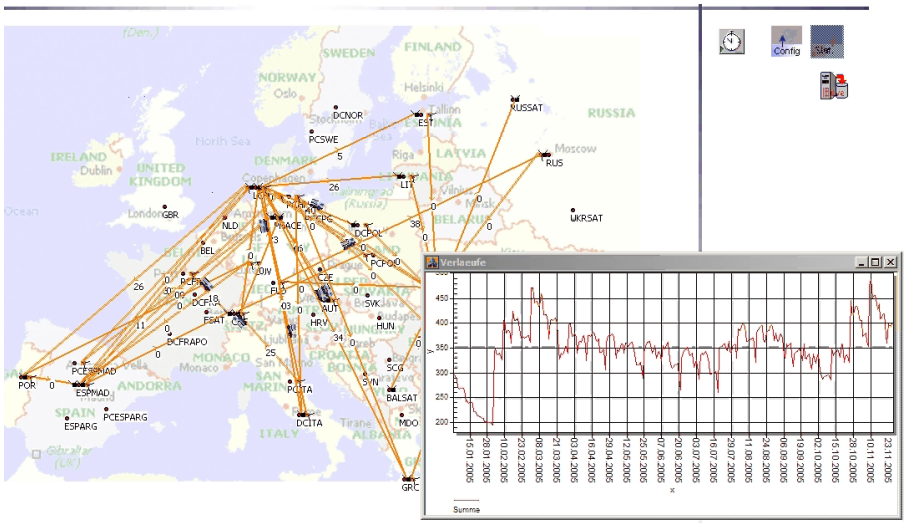
Addendum

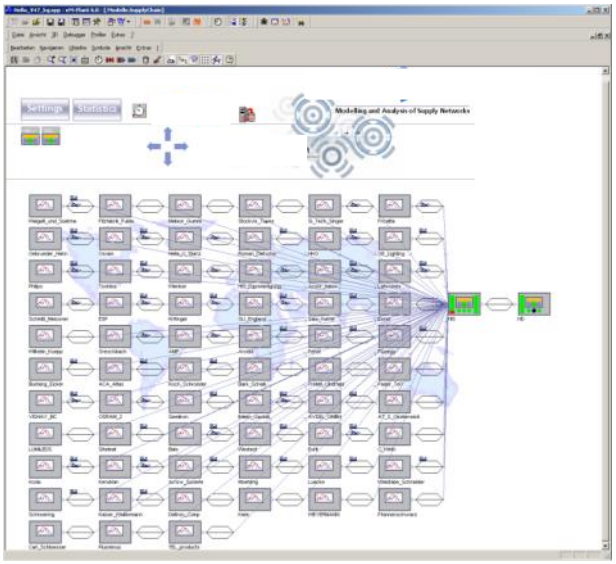
References
Network Planning

- Network Planning at a big cosmetic manufacturer
- Subject of study
  - Consideration of 50 locations (production sites and warehouses)
  - 12.000 Articles (35.000 article allocations)
  - Different article types (incl. promotions)
- Target of the project
  - Evaluation of different optimization tasks regarding the decrease of stock (until 2010)
  - Dimensioning of (future) warehouses



References
Network Analysis

- Network Analysis at a lighting manufacturer
- Subject of study:
  - 78 Articles incl. their BOM
  - Production site and 63 suppliers
  - Resources (in-house production, 5 home work groups, picking and transport)
  - Approx. 125.000 delivery schedules (from the year 2003)
- Experiments/Results
  - Implementation of a realistic model of all relevant processes
  - Evaluation of strategies regarding decrease of stock
  - Evaluation of strategies regarding increase of throughput
  - Variation of ordering frequencies
  - Variation of the fixing of customer orders



- Subject of study
  - ➔ Complete German business of a big food manufacturer:
    - 529 Customer locations
    - 2 Sites (production site Italy and a German distribution center)
    - 282 SKUs (stock keeping units / trading units)
    - Real order data from 2012 (13218 orders, > 140.000 order lines)
- Target of the project
  - ➔ Evaluate the influence of changing pallet heights
  - ➔ Evaluate different order patterns (customer behavior)
  - ➔ Find the best location of a central warehouse in Germany