

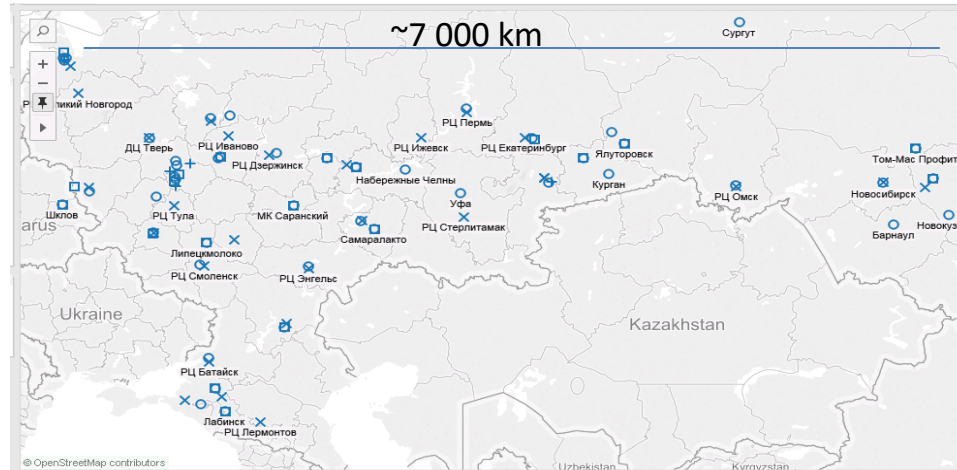
# Coupling Supply Chain Optimization and Simulation to Gain a Competitive Edge

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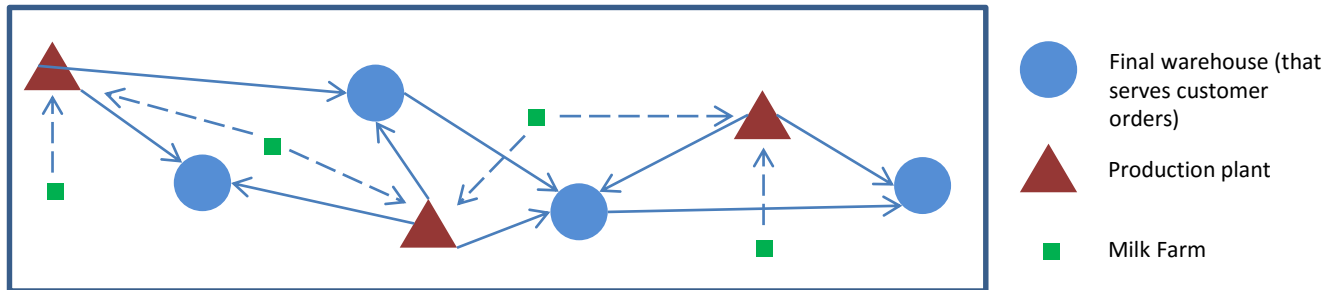
# Introduction to Danone Russia



- ~20 manufacturing plants across the country. Particular product can be produced at different plants
- ~50 warehouses across the country
- High influence of shelf life factor – shelf life 14-40 days. Must balance service level to customers (CSL) & amount of expired products (PPED)
- High influence of milk availability

- Need to determine what plant should produce what product and in what location, across time horizons
- Decision based upon many interdependent factors:
  1. Demand volumes and geographic distribution
  2. Production capacity and minimum batch limitations
  3. Milk availability and price
  4. CSL / PPED target balance
  5. Cost / profit implications
- Very difficult to calculate manually the resulting influence on whole system

# Problem: Identifying Optimal Production and Transportation Plans



**Production plan** – what to produce where and in which quantity

**Transportation plan** – how to deliver products to final warehouse, directly from the plant or via intermediate warehouses with respect to Shelf Life requirements

**Total costs** = Production costs (COGS) + Transportation costs + Warehousing costs

**KPIs:** CSL, PPED on final warehouse

**Sourcing problem definition:**

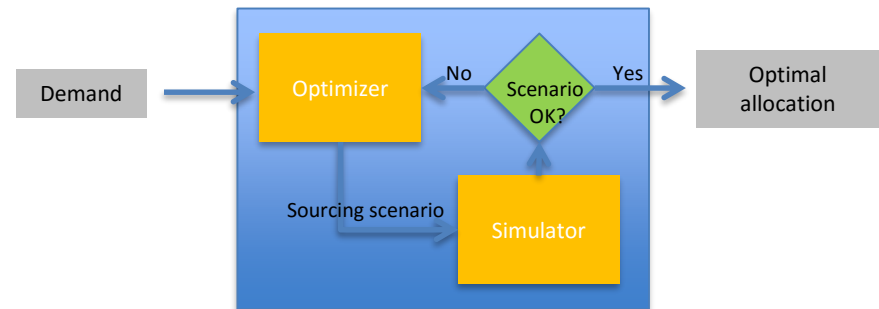
*Identify optimal combination of production and transportation plans that minimize total cost while keeping KPIs on targets*

Assumptions set for finding optimal plans:

- ✓ Plants / warehouses locations are fixed
- ✓ Warehouse capacities are fixed
- ✓ Overall production capacity is fixed (we can move production equipment from one plant to another but we can not increase overall capacity)

## Solution: Network Optimization & Simulation

- Wanted to use optimization to model entire supply chain and identify optimal production/ transportation allocation in terms of total costs
- Optimization allows only rough accounting for expiration factor
- Combined optimization / simulation solution accurately checks CSL & PPED balance and production feasibility

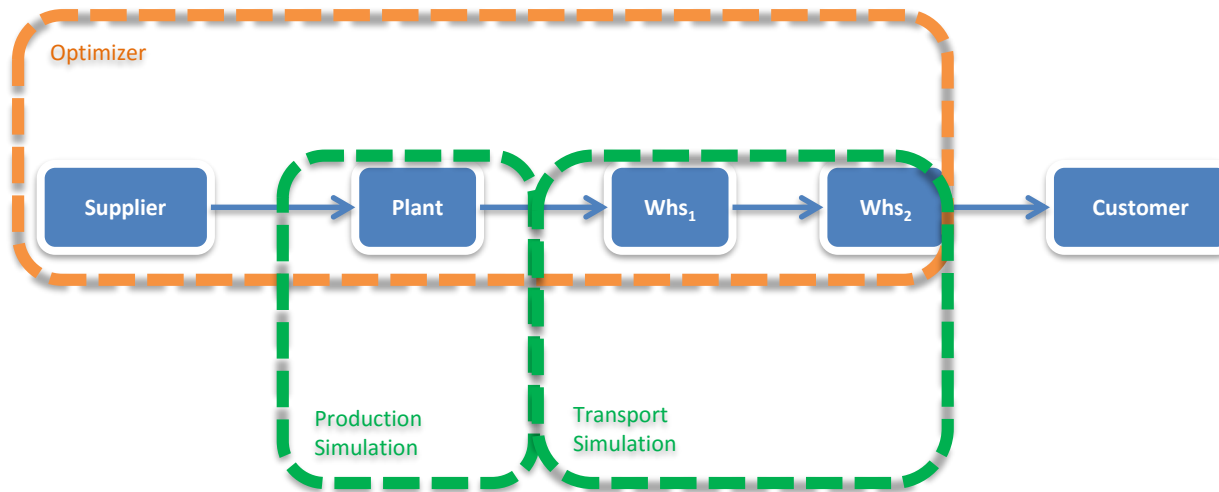


**Optimizer:** uses deterministic mathematical modeling (Linear programming techniques)

**Simulator:** uses discrete-events modeling

This allows for very precise prediction of Supply Chain behavior

## Solution Design (Functional Coverage)



Network optimization results in scope

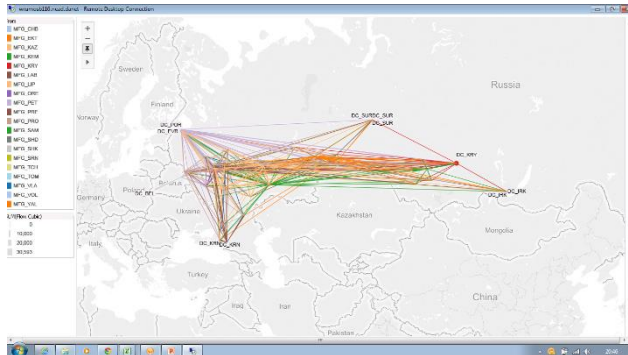
3 logical blocks covered:

- Industrial
- Transportation/ WHS
- Milk sourcing

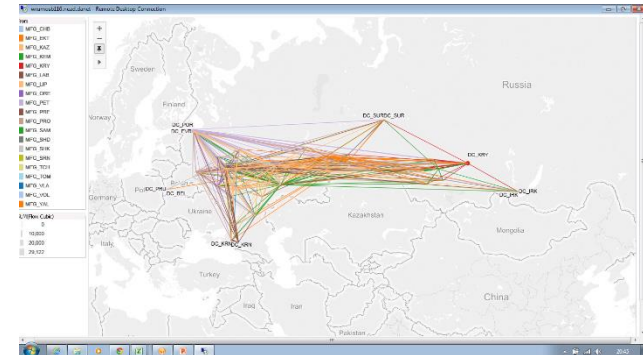
**WE failed in Production Simulation**

**The rest is successful**

As-is network



One of the optimization scenarios



### Biggest benefits from the tool:

1. We are able to find solutions that bring savings that are not evident by glance (see pictures above)
2. The system gives a sense of what are the “big forces” that drive overall supply chain results
3. We better can better manage what we understand

### What we do with the tool:

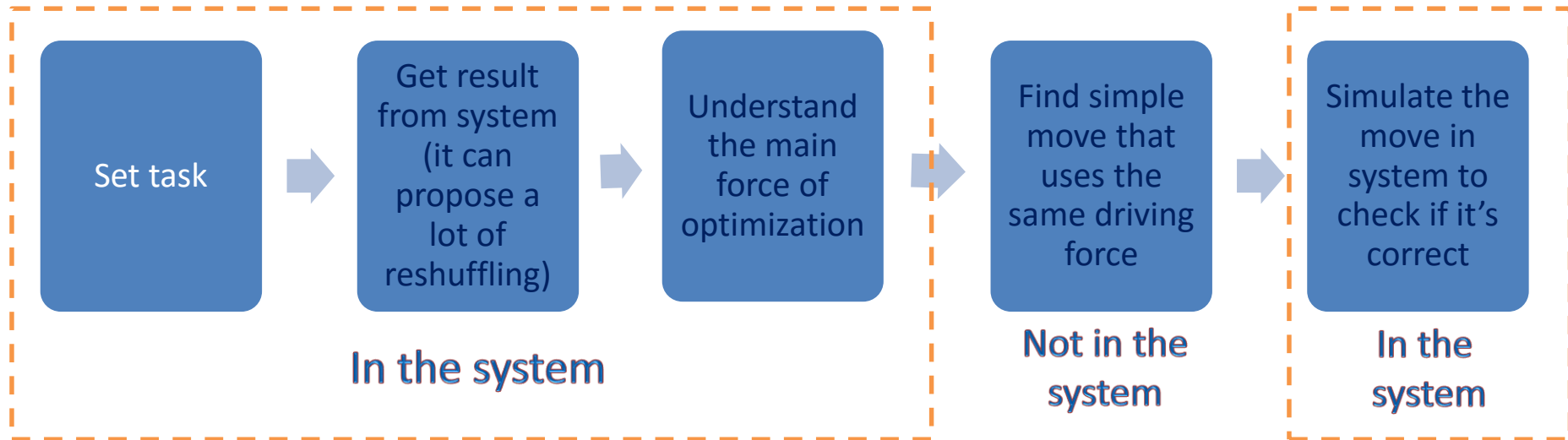
1. Monthly capacity check within S&OP process
2. Special business cases calculations (“what would happen if we do this...” calculation)
3. Strategic analysis of optimal production footprint

### Success drivers:

1. Incorporated milk price and availability into production decisions
2. Detailed modeling of production process allowed for precise capacity calculation



# How to Work with Strategic Optimization





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