ProSim
SIMULATION & ANALYTICS

Warehouse & Route Planner

Optimized warehouse and route pl
anning with AnyLogic & PowerBI

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About ProSim GmbH

Simulation
Development of customized simulation tools and decision models

Development of data-based optimization algorithms to increase efficiency
Optimization

Web applications
Custom application development designed to address specific requirements

Structuring, integration, and automation of various processes.
Digitization

Sales & Consulting
Sales and consulting forbusiness applications such asProffix and EVOPRO.

Implementation and maintenance of business software.
Implementation & Maintenance

Training & Support
Training and support for users and system administrators of the software.

Technical operation, security management, and updates for the software systems.
Technical Operations

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Client Context & Core Problem

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Client Context:

- **Confidentiality statement:** This presentation uses anonymized data and does not reference the client by name
- **Multi-branch**, nationwide **B2B distributor** serving construction & industrial customers nationwide
- High **same-day/next-day service** expectations across all regions

Core Problem:

- **Too many** local warehouses with **overlapping inventory**
- **Aging facilities**. Refurbishment decisions pending
- **Fleet mix misaligned** with real demand pattern
- → Uneven service quality and **rising operating costs**

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Client Context & Core Problem

- 6 warehouses in Switzerland operating independently
- Every warehouse stocks all product groups → broad assortment everywhere
- Decentralized logistics with redundant inventories across sites
- Very high inventory-holding costs (capital tied up, space, obsolescence, handling)
- Result: low efficiency & limited leverage for service/routing optimization

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What must change

- **Optimize the footprint** – fewer, more focused warehouses; segment markets; refurbish priority sites; remove redundant stock
- **Centralize transport** – one planning/dispatch unit with a wider service radius and end-to-end accountability
- **Right-size & rebalance the fleet** – fewer trucks, correct vehicle classes per demand, higher utilization
- **Protect service promises** – keep same-day/next-day in metros; define clear SLAs by segment

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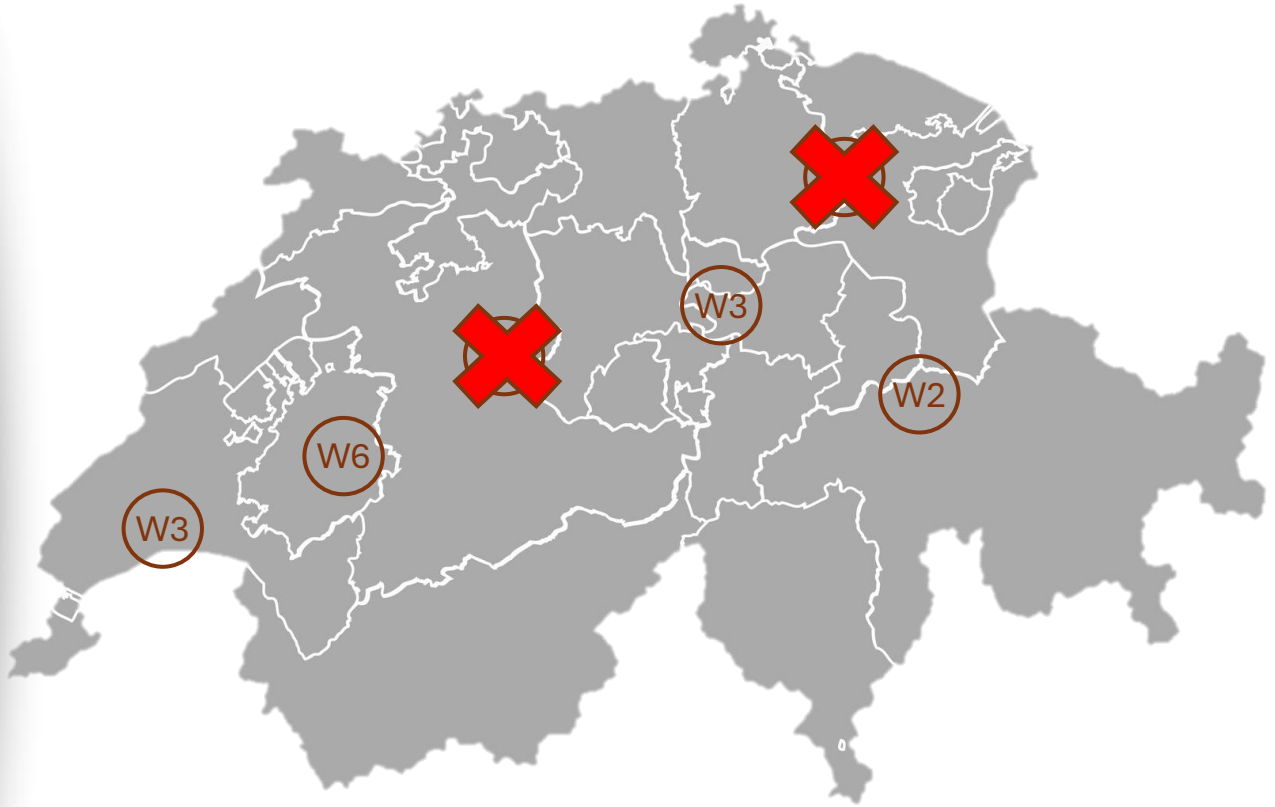
What must change

- **Consolidate the network from 6 to 4 warehouses** with a clearer, more specialized focus per site



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Why simulate?

- **Remove uncertainty:** Quantify the different scenarios
- **Service level assurance:** Test if same-day / next-day delivery is still possible
- **Compare network options:** Evaluate what-ifs
- **Right-size the fleet:** Determine the required fleet size
- Optimize tours & assignment
- **Decision support:** Provide evidence for scenario selection

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Our Solution Approach (Overview)

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1. **Standardize inputs & prepare data:** Define schemas, build keys, validate and cleanse
2. **Develop & calibrate the simulation:** Implement logic, unit-test, and tune against reality
3. **Build the Power BI model:** Star schema, scenario slicer, KPI visuals for side-by-side comparison
4. **Optimize with genetic algorithms:** Evolve tour plans, feed best candidates back into the sim

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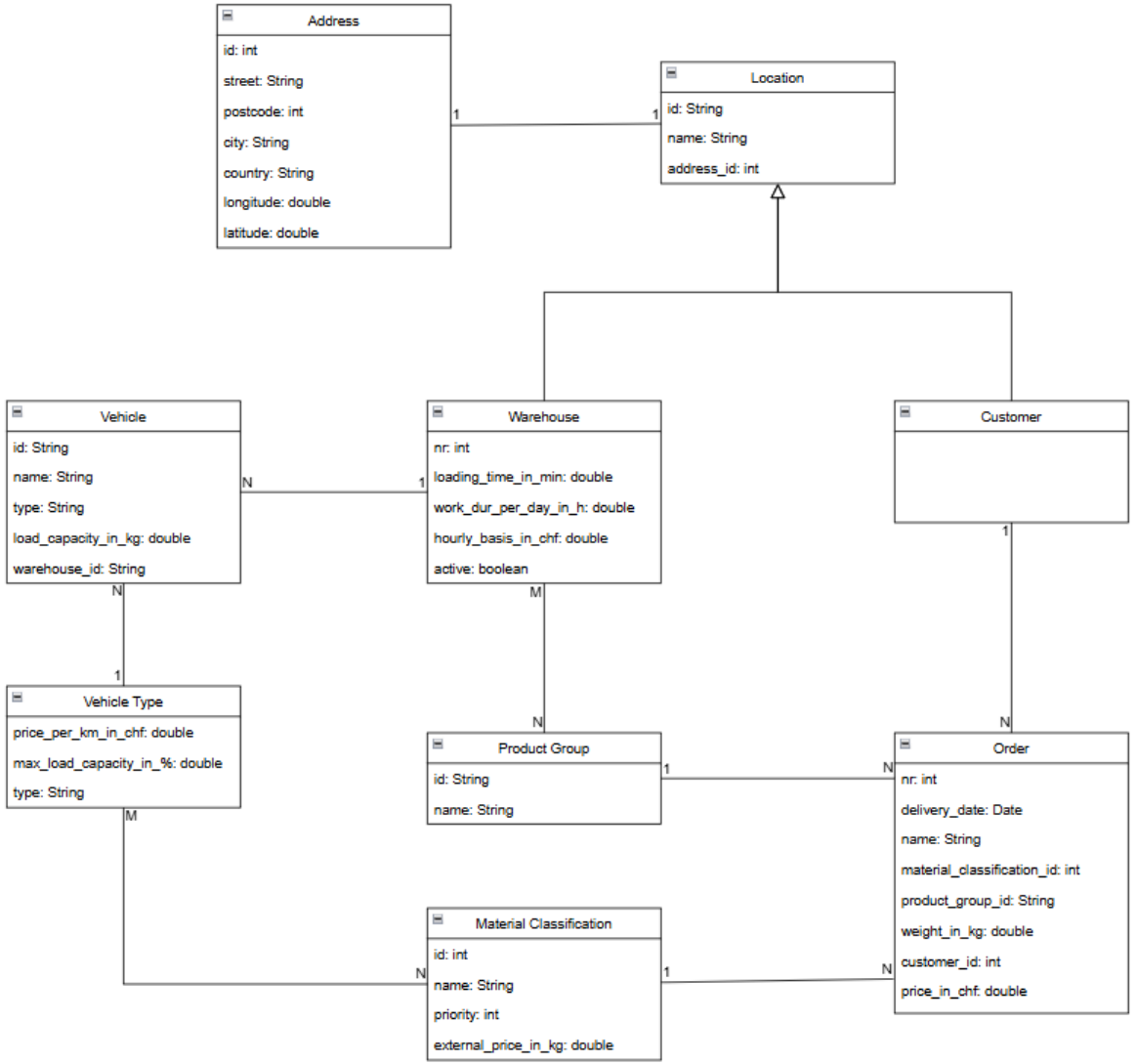
1. Standardize inputs & prepare data

- **Generic, scenario-ready model** that captures complex relationships with simple tables
- **Warehouses:** easy onboarding, availability via active flag
- **Vehicles:** default fleets per warehouse with key specs (type, capacity, cost)
- **Orders:** ingested and linked to Customer/Location
- **Material classification:** Warehouse assignment (roules drive routing)
- **Result:** fast scenario changes (toggle active, tweak fleets/rules) and **simulate market-segment impact** with minimal maintenance



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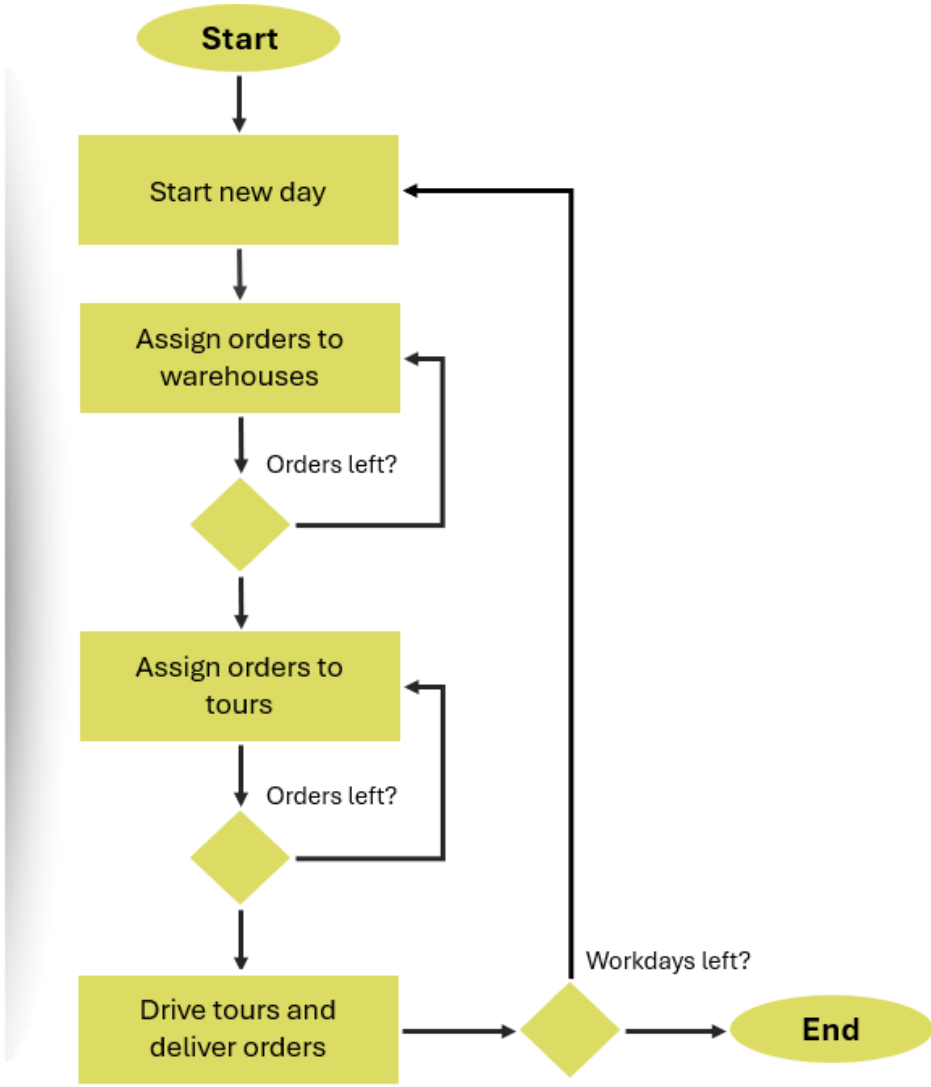
2. Develop & calibrate the simulation

1. **Start new workday** and **bundle all orders** with the same delivery date
2. Assign orders to warehouses
   Option A: Nearest eligible warehouse
   Option B: Optimization using Genetic Algorithm
3. **Assign orders to tours** using NN and 3-opt algorithm
4. **Drive tours** and deliver orders



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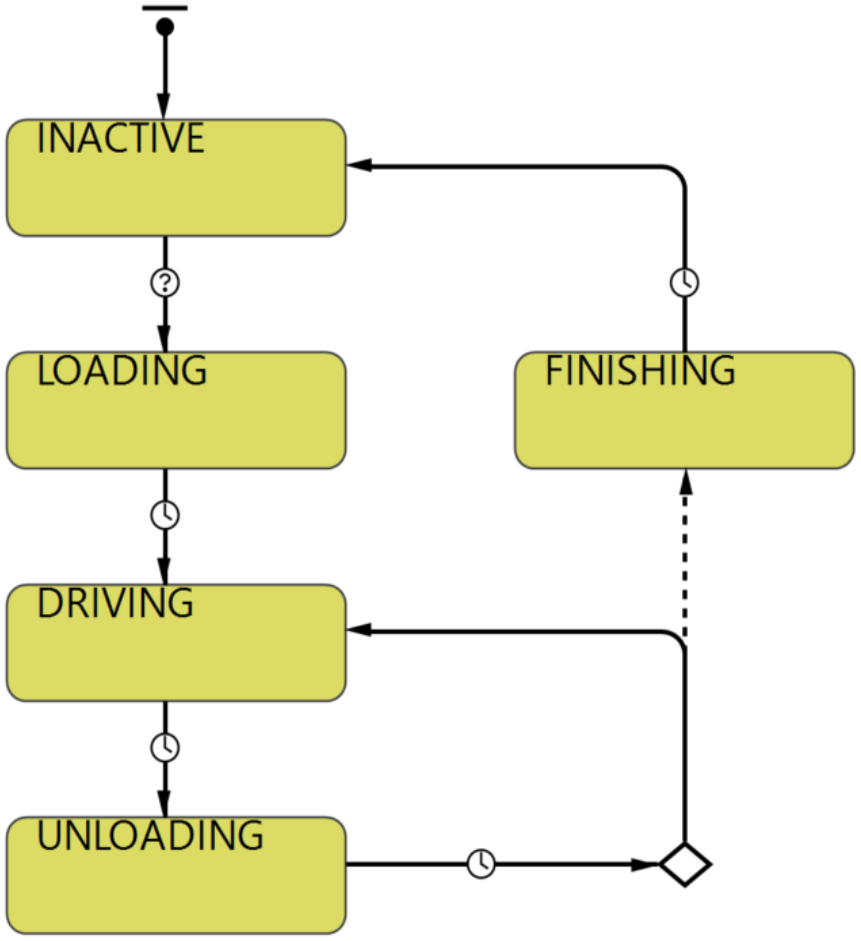
2. Develop & calibrate the simulation

1. Start loading orders if tour is defined
2. Drive to the next defined order
3. Unload order
4. If tour has next order: Go to 2., else finish tour by driving back to the warehouse



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3. Build the Power BI model

- **Why Power BI:** Easy scenario comparison and simulation evaluation easibly storable
- **Source → SQL**: Import simulation logs written by the engine
- **Scenario filter**: Use scenario_id to slice the entire model and compare scenarios side-by-side
- **Visuals**: Scenario slicer + KPI cards, comparison matrix (by warehouse/vehicle), maps for depot & stops, trend charts over time

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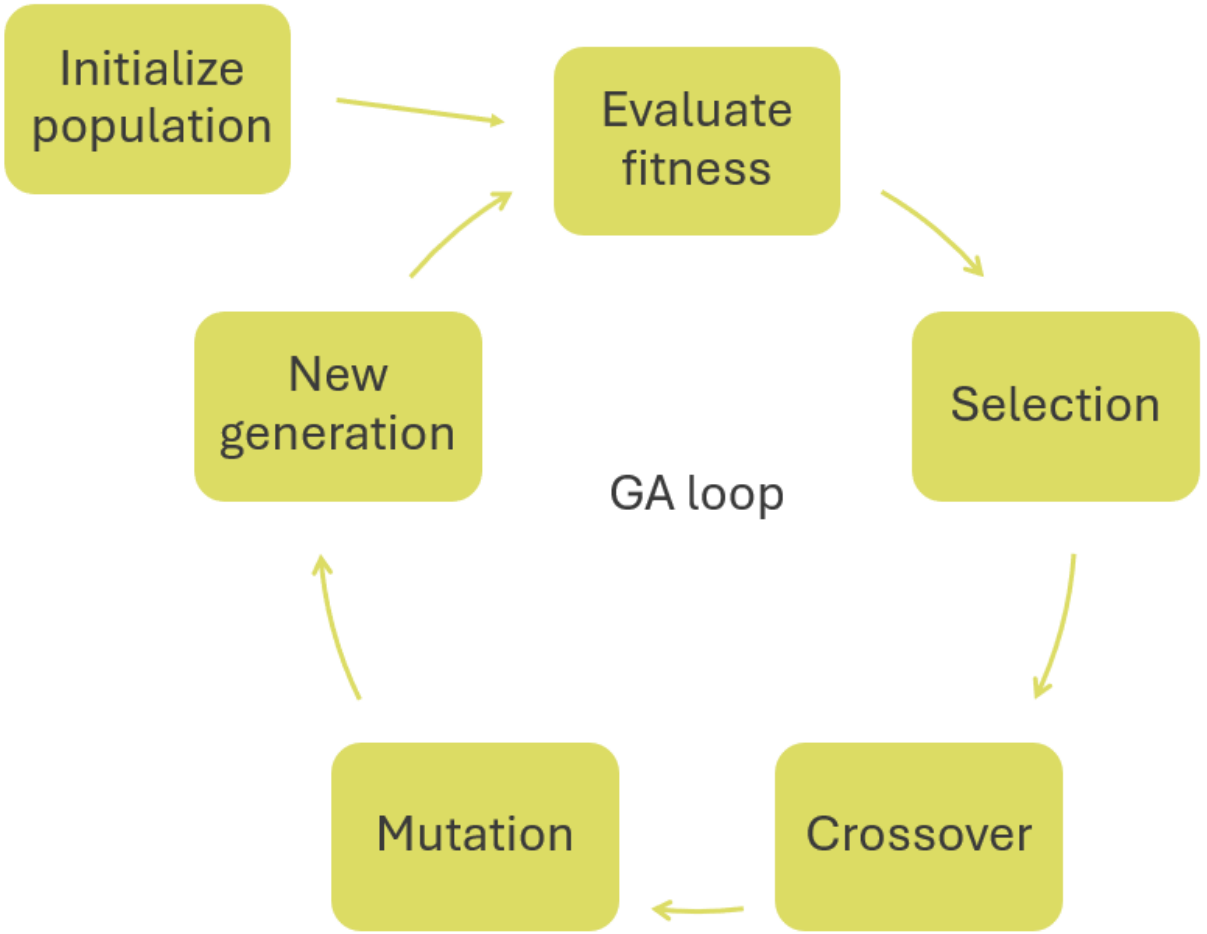
4. Optimize with genetic algorithms

- **Initialize population:** Create a population and simulate them
- **Evaluate fitness:** Calculate the fitness value for each individuum
- **Select, crossover and mutate** the new generation based on the fitness values
- Optimize **orders to warehouse mapping** and **vehicle to warehouse mapping**



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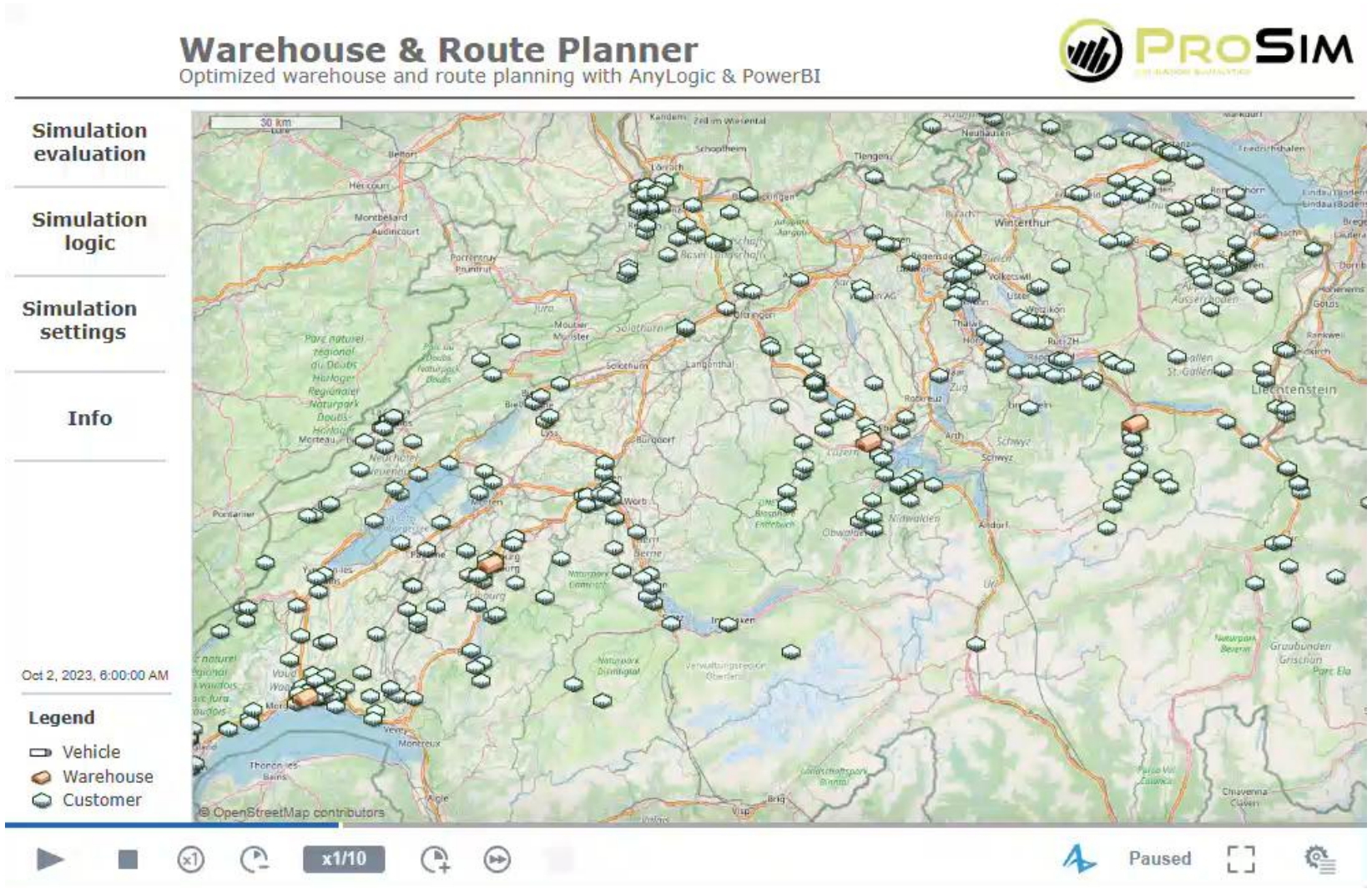
AnyLogic Demo



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PowerBI Demo

Warehouse & Route Planner

Optimized warehouse and route planning with AnyLogic & PowerBI

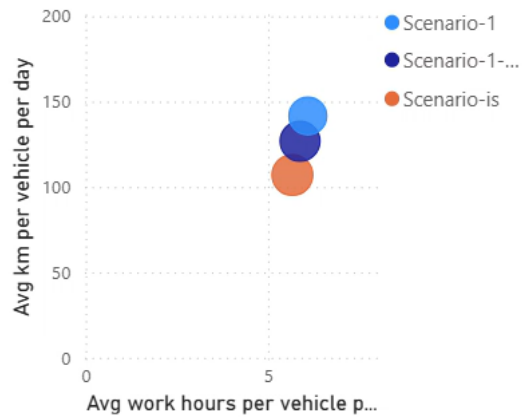
KPI	Scenario-1	Scenario-1-GA	Scenario-is
Avg chf/tour	949.33	814.30	782.21
Avg drive hour/day/vehicle	3.44	2.95	2.59
Avg dwell hour/day/vehicle	2.66	2.93	3.07
Avg kg/tour	917.33	1'028.83	1'081.36
Avg km/tour	141.53	126.76	107.04
Avg stops/day	381.00	349.00	418.00
Avg stops/tour	7.62	8.73	9.29
Avg time utilisation [%]	76.13	73.46	70.84
Avg tours/day	50.00	40.00	45.00
Avg weight utilisation [%]	23.69	21.25	25.13
Total cost [CHF]	50'710.57	39'136.60	36'851.94
Total drive cost [CHF]	28'287.58	17'767.19	19'138.35
Total external cost [CHF]	3'244.19	6'564.49	1'652.53
Total work cost [CHF]	19'178.80	14'804.92	16'061.06

Overview total cost per warehouse

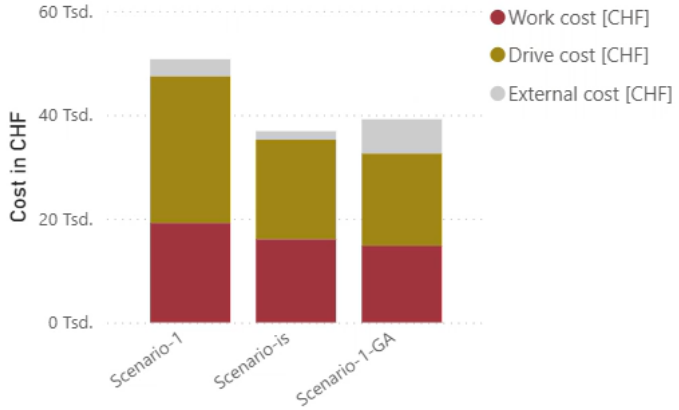
warehouse	Scenario-1	Scenario-1-GA	Scenario-is
Warehouse 1			5'946.27
Warehouse 2	15'238.71	13'159.50	6'678.60
Warehouse 3	15'292.69	10'417.34	8'341.72
Warehouse 5			4'673.58
Warehouse 6	10'154.45	7'890.64	4'897.05
Warehouse 7	10'024.73	7'669.12	6'314.73
Gesamt	**50'710.57**	**39'136.60**	**36'851.94**

Overview number of vehicles per warehouse

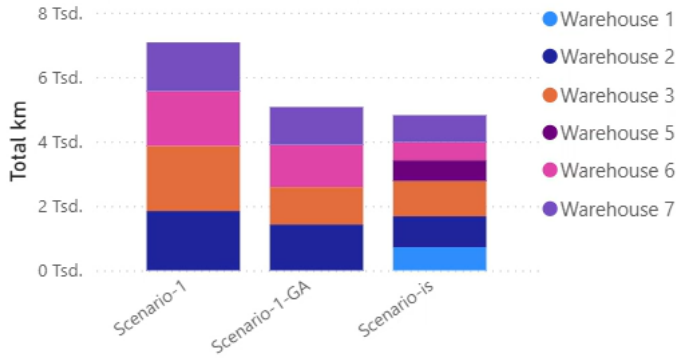
warehouse	Scenario-1	Scenario-1-GA	Scenario-is
Warehouse 1			8
Warehouse 2	13	11	9
Warehouse 3	16	8	12
Warehouse 5			6
Warehouse 6	9	17	6
Warehouse 7	17	19	14
Gesamt	**55**	**55**	**55**



Total cost [CHF] per scenario



Total distance [km] per scenario



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Thank you for your attention

Any questions?
Feel free to ask them

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