Digital Twin of picking operations in the fulfilment centres of an online supermarket

AnyLogic Conference 2023

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With thanks to: Jacob Whyte, Alexandru Petrencu, and Vidina Rodriguez

DATE: 05/09/2023

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MIGROS Online

01

Overview

Executive Summary

- Migros Online, the leading Swiss online supermarket, founded in 1997
- Decision Lab – pioneering decision intelligence, founded in 2011
- Data-driven solution
- API allowing on execution from external code and interaction with optimisers

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Business Needs

Tool	Digital Twin to support strategic decisions of warehouse managers				
Objective	Improving warehouse efficiency Data driven approach				
Specific challenges	Evaluation of warehouse topology		Evaluation of optimization/decision algorithms		
	Warehouse structure	Slotting	Volumetric	Composition of picking trolleys	Workforce assignment

The Team

MIGROS
Online

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Warehouse Manager & Associate

Provide input information

Java Developers

Build APIs / interfaces for external running, inputs, and optimisers

Simulation Consultants

AnyLogic modelling and visualisation

MIGROS
Online
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02

AnyLogic Model

Choosing AnyLogic

Discrete Event and Agent-Based Modelling

Combine simulation paradigms to make a more realistic model.

Customisable Transporter Library

In-built behaviour to support transport of products by trolleys. Customisable, using Java, to meet bespoke requirements.

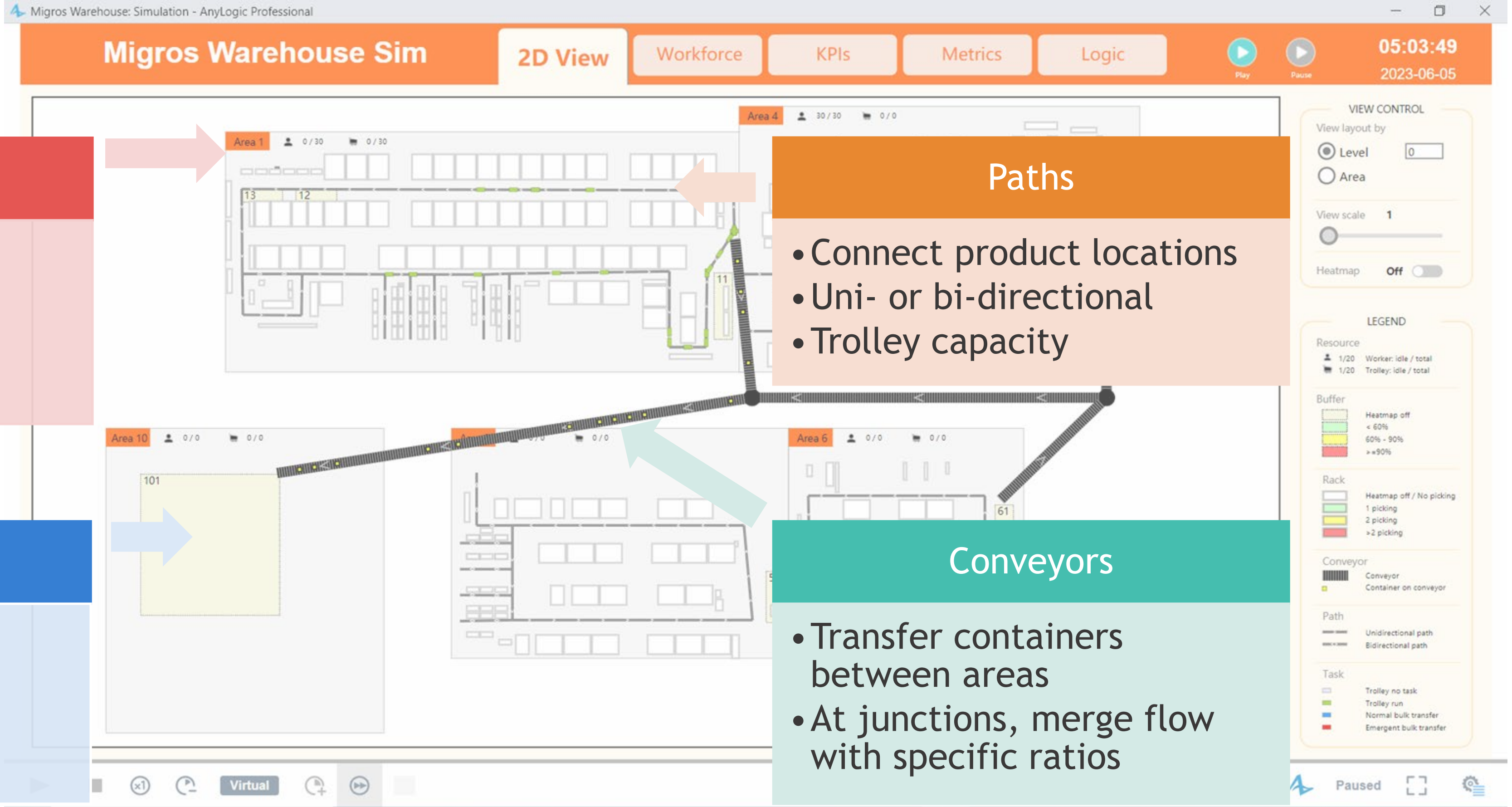
Java Connectivity

Integrate with external Java code as part of a more complex decision-making system. Execute model programmatically.

Data Driven

Simulate variations of centre layout and operational rules by changing CSV inputs (not underlying code).

Core Components (1)



Areas

- Contain products to be picked
- Fleet of trolleys
- Assigned workforce

Paths

- Connect product locations
- Uni- or bi-directional
- Trolley capacity

Buffers

- Storage place for containers
- When full, deposits are suspended

Conveyors

- Transfer containers between areas
- At junctions, merge flow with specific ratios

Core Components (2)

Containers
- Multiple types
- Hold products
- Some hold cold products; some must be sealed
- Internal & external dimensions

Trolleys
- Multiple types
- Speed limit
- Weight limit
- Capacity for each container type
- Setup and release time

Workforce
- Follow shifts
- Take breaks
- Can move between areas

Trolley Runs
- Pick containers
- Pick products from order to place in set of containers
- Products located at specific points along paths
- Seal and deposit containers

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External Java Optimisers

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Container optimiser

Trolley optimiser

Products in order
- Quantity
- Weight
- Dimensions

Container types
- Weight limit
- Dimensions

Products assigned to containers

Sequence of orders
- Container types
- Picking status of products

Trolley types
- Capacity
- Availability

Trolley runs

Video Demo


Migros Warehouse: Simulation - AnyLogic Professional
MIGROS
Online
Welcome To
Migros Warehouse Simulation
Scenario ID:
scenario3
Scenario CSV files folder name
Simulation ID:
simulation_s3_1
Simulation run name
RUN
Running Mode
Info logging
Debug logging
No logging
x1
Idle

03

Benefits

Benefits

- Supporting new change requests in the fulfilment centres.
- Testing and assessing of the changes.
- First findings: reduction of shipping costs by 4%.

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THANK YOU

Any questions?