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Browns

Right Sizing ASRS for Streamlined Order Fulfillment

Fashion from the Warehouse to your Feet

AnyLogic Conference 2023

André Jacques & Alexandre Hubert

Agenda

- Intro to SimWell & Browns Shoes
- Simulation Project - Business Context, Objectives & Scenarios
- Model Demo
- Technical Modeling Overview
- Conclusion

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André Jacques

CTO

- SimWell is a global consulting firm focused on **simulation**, optimization and digital twins.
- Started up in **2015**
- Team of **70** people worldwide

- AnyLogic partner since **2018**
- SimWell delivers the official **AnyLogic public** training sessions for North America

SimWell Team

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Browns Shoes

Alexandre Hubert

VP technology and logistics

- **70 stores** across Canada
- North America's leading independent footwear chain
- **83-year-old** family business

- **Logistics** excellence
- State-of-the-art **automation** system

- Best-in-class shopping **experience**
- World-class customer **service**
- **Innovative** store design
- Exceptional **quality**

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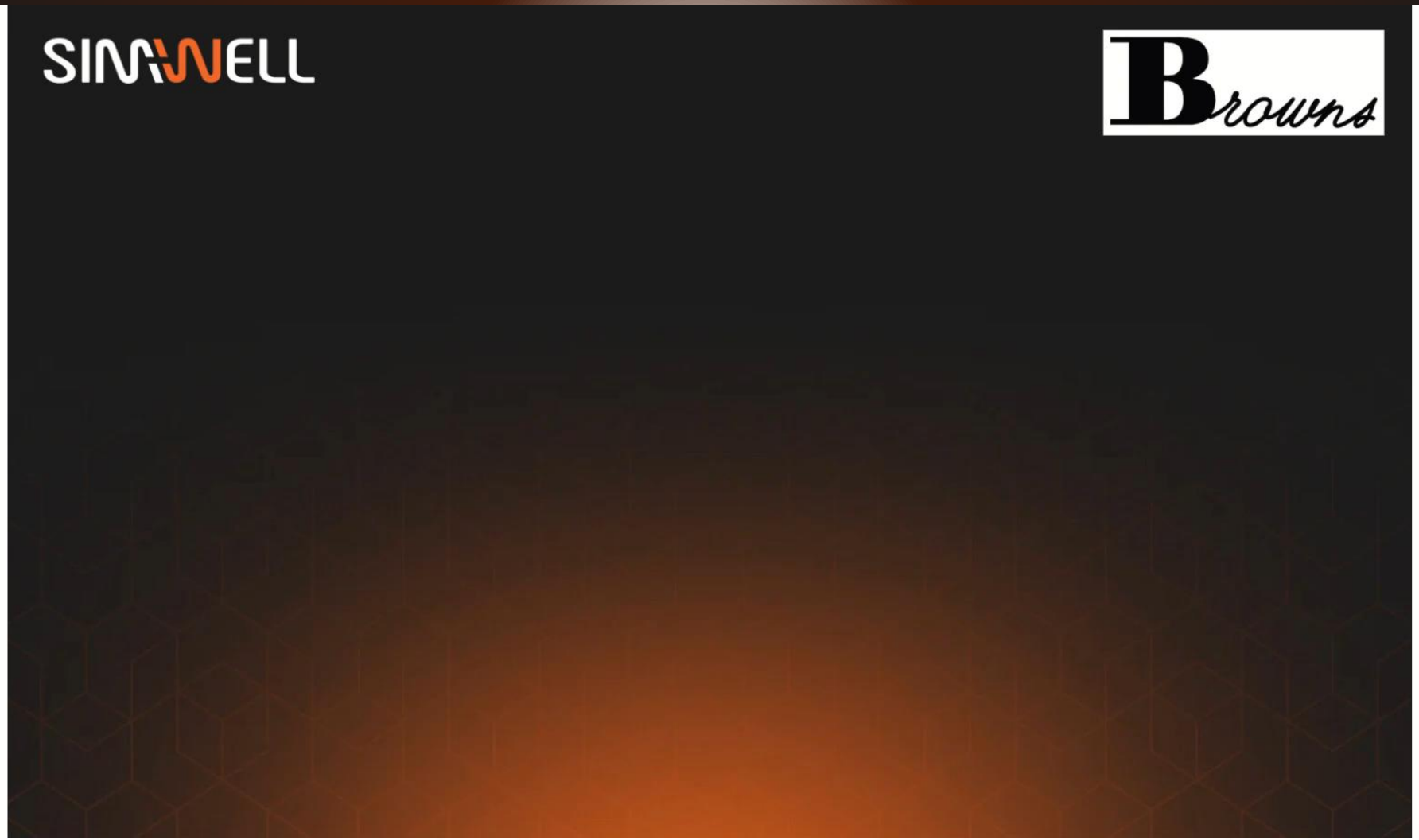
Video: Browns Shoes intro
Alexandre Hubert

Browns Shoes - Business Context

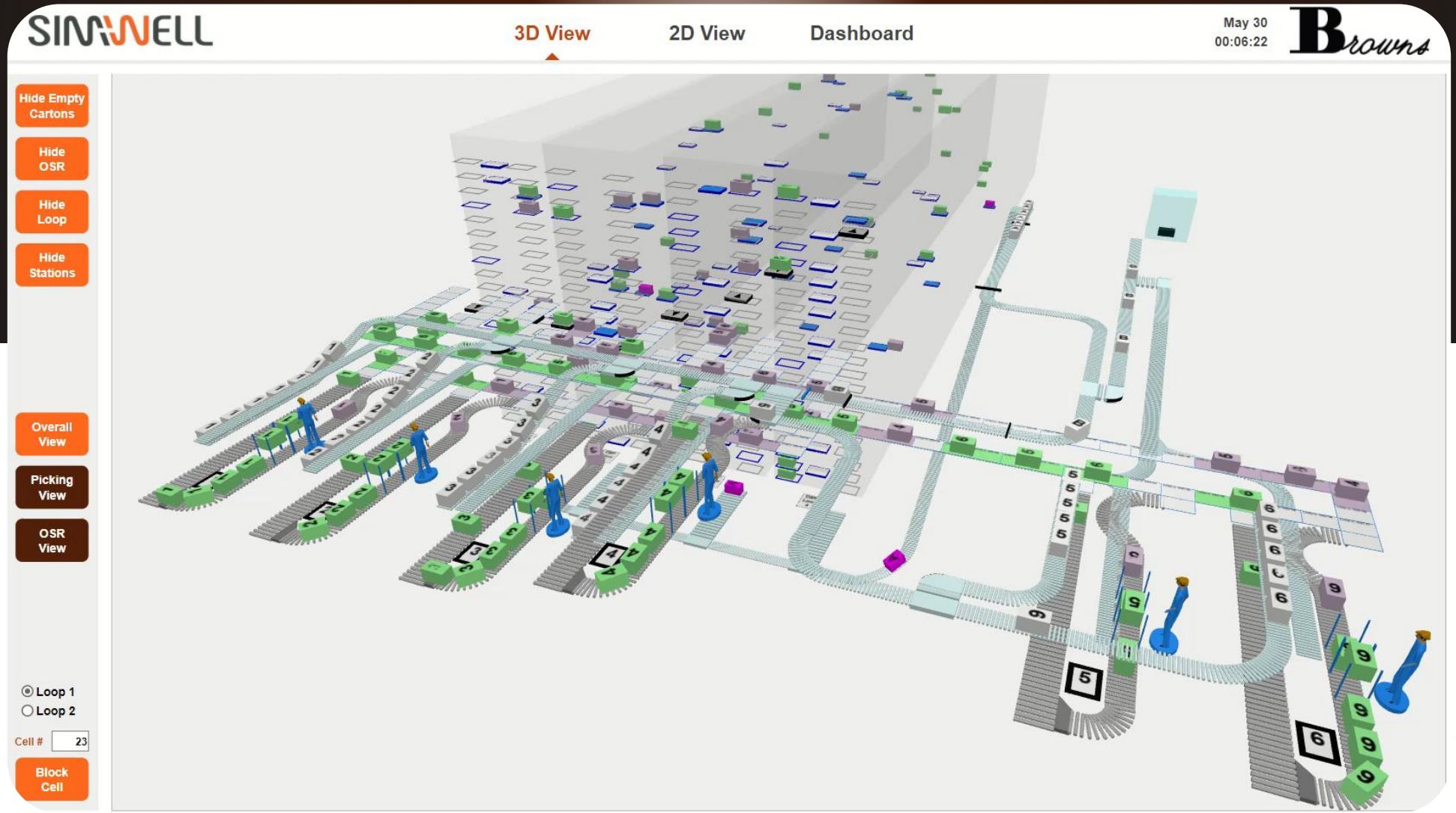
- 2015:
  - New facility built in Montreal
  - Distribution center & Headquarters
- ASRS
  - Automated storage and retrieval system
  - NOTE: word used in project is OSR
- Picking stations for order fulfilment
  - Store and web orders
  - “Goods-to-person”
- 2018: SimWell and Browns: first DES simulation model of picking
- 2023: system expansion options being considered
- Simulation completely rebuilt in AnyLogic:
  - Accurate 3d movement & animation
  - Scalable model components/systems
  - Cloud / Model Manager for experimentation



Video: Overview of the System Simulation Demo

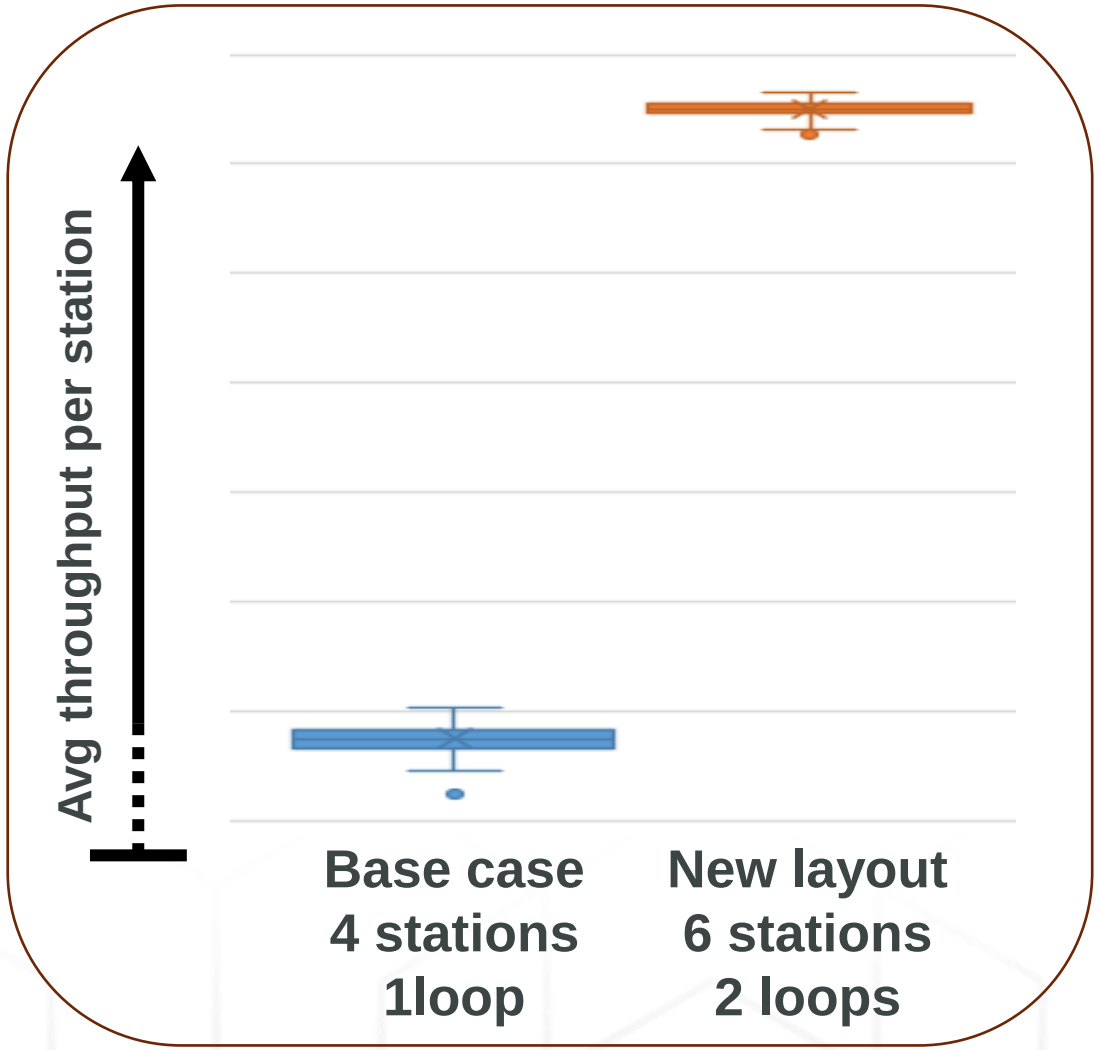
Scenarios & Experimentation

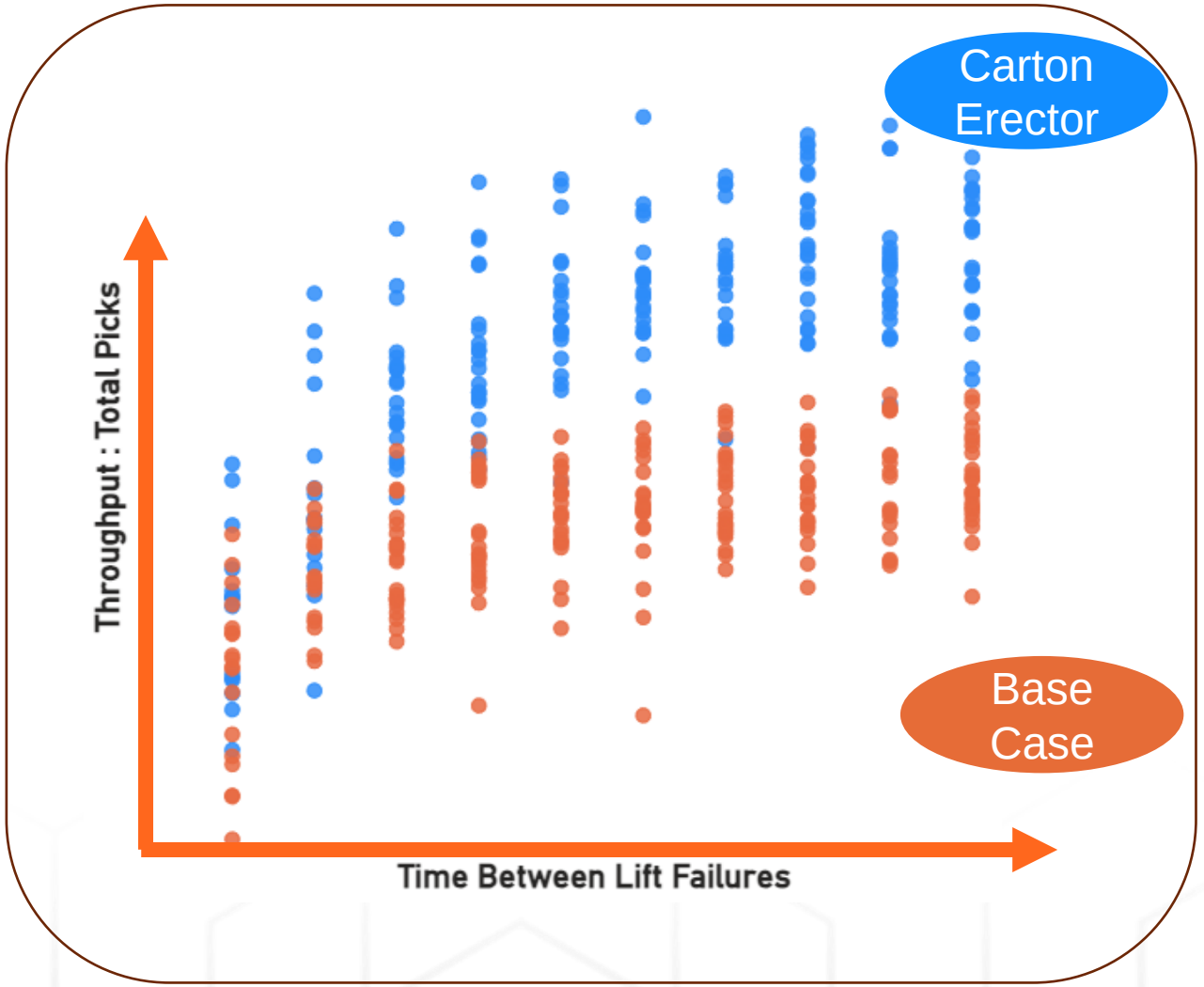
- Extra **picking stations & Loop**
  - Different scenarios to fine tune conveyor utilization/congestion
  - Different configurations: connectivity to conveyor loops
- A new **decant** station
  - Increased processing rate
- One additional **ASRS lane**
  - More storage and automated handling capacity
- New **carton erector** and empty carton feeding system
  - Cartons are shared between orders and ASRS system (source->destination identical boxes)
- **Sensitivity analysis** on resources
  - ASRS lift and shuttle downtime, carton scanning errors, etc.
  - Will allow training DC operators and managers: impact on productivity



Video: Potential new layout: Extra ASRS aisle and 2 loops with 3 picking stations on each

Scenario Results - Samples





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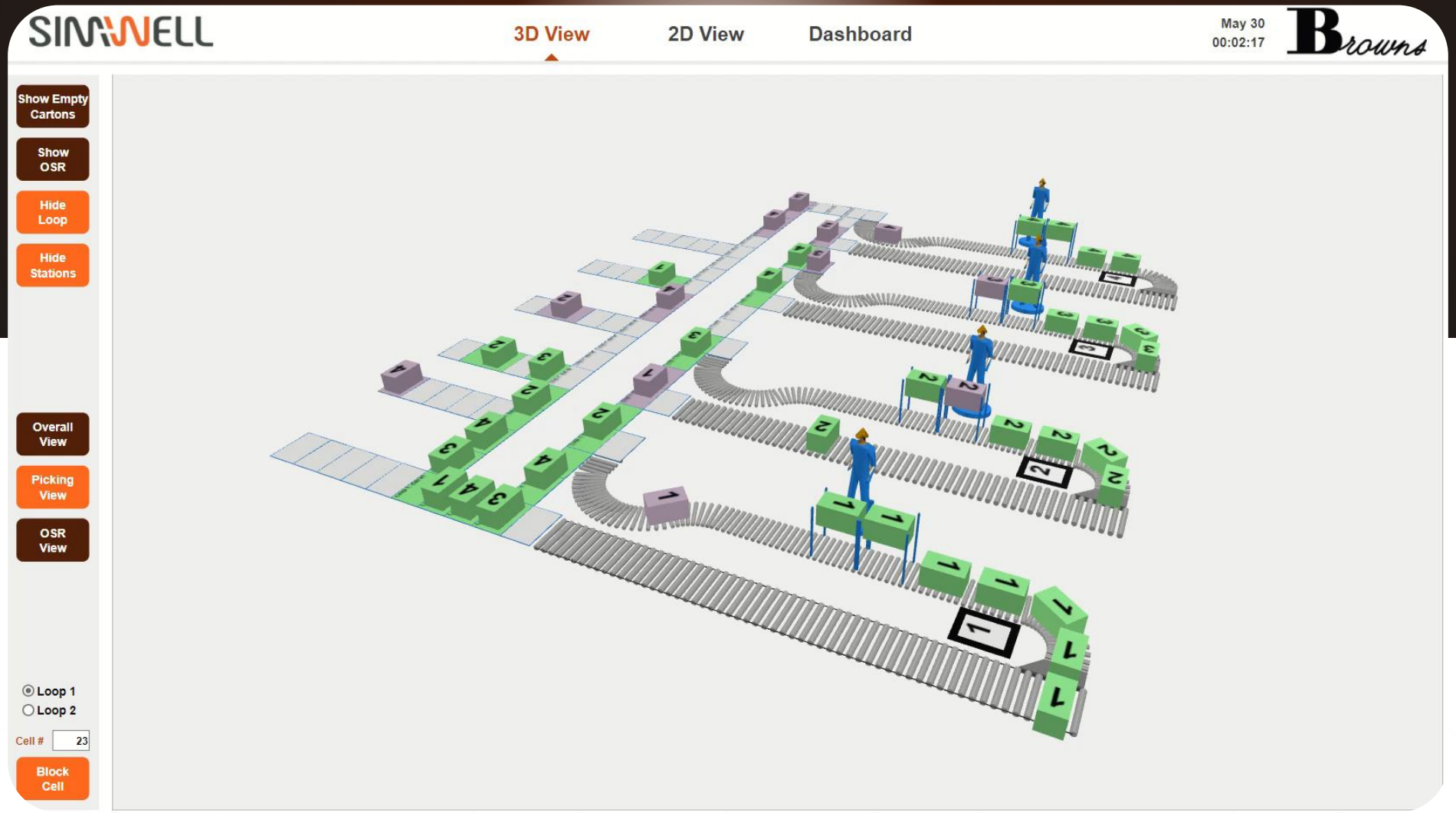


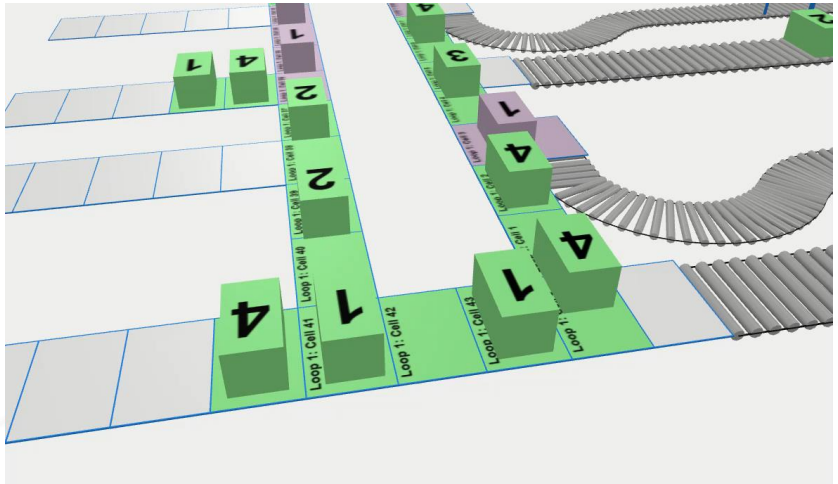
Video: Serious gaming:

Carton blocks conveyor cell

Modeling: Key Technical Challenge #1

- Loop conveyor is type roller
  - Fixed cells : one carton each
  - Sensors between all
  - Controlled individually
- Each carton must seize the next cell before moving into it
  - Previous cell is released when cleared
- Allows setting priorities
  - for different types of inbound branches:

- Custom built AnyLogic agents
  - ConveyorLoop
    - ConveyorCell
      - ConveyorCellResource



Modeling: Key Technical Challenge #2

- ASRS/OSR System
- Each lane has:
  - One “fetch” lift
  - One “putaway” lift
  - Several levels of storage
    - Each level has:
    - a shuttle
    - 2 buffer spaces to transfer to/from lifts
    - Many storage cell along the length

- Custom built AnyLogic agents

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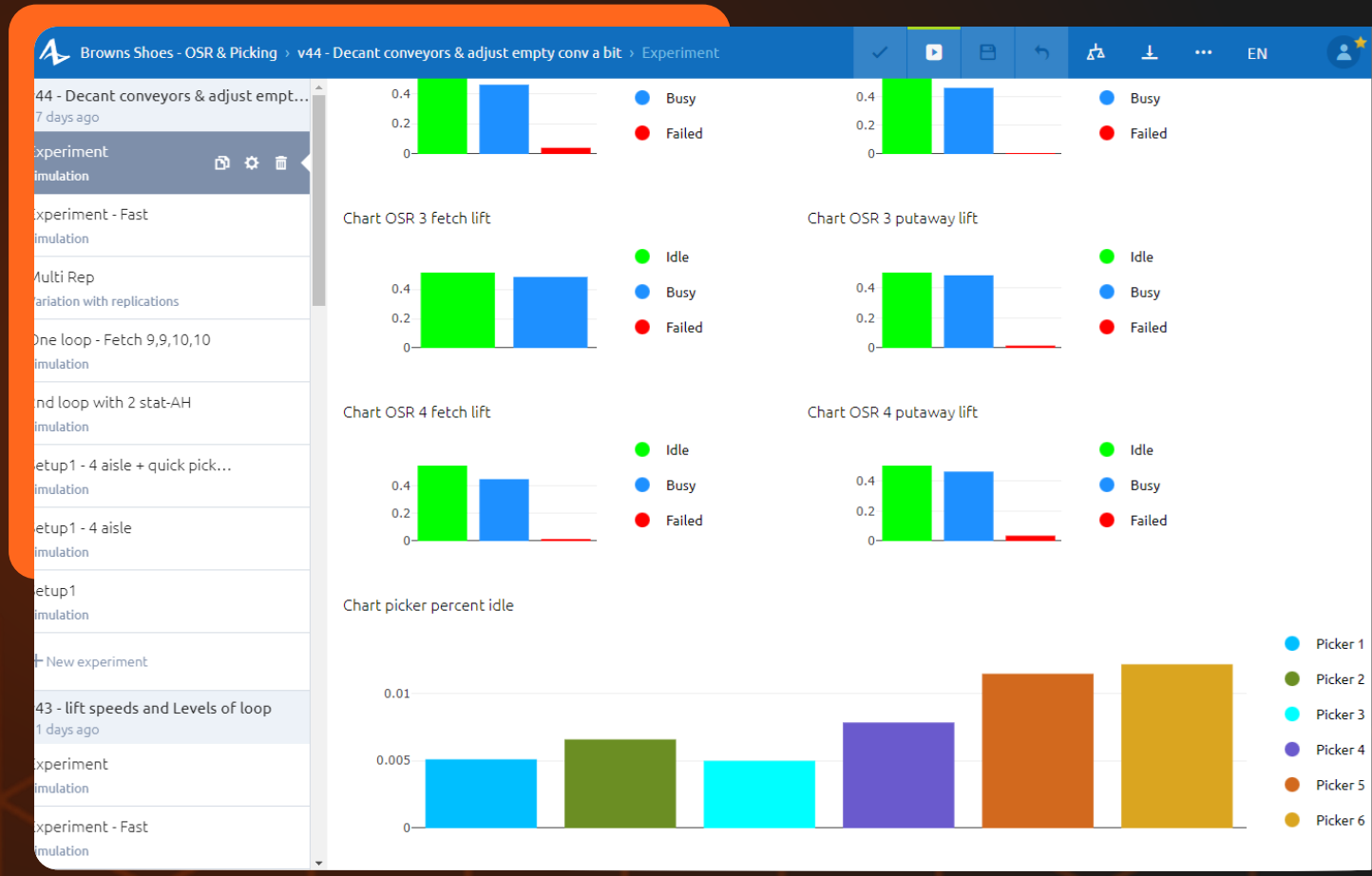
AnyLogic Cloud / Model Manager

Hosting the model and sharing with Browns:

- Simulation demo, testing & validation
- Scenario execution and results analysis



Simulation: Next Steps

- **Fine tune certain scenarios**
- Empty cartons feeding system
  - possible conveyor routes
  - sensor locations and triggers logic for erector and box dispatch
- Test operational parameters:
  - Different number of boxes fetched and circulating on loop, for each station
  - a digital twin of the distribution center
- Run more scenarios:
  - combinations of the different expansion options
  - Sensitivity analysis on certain parameters

Conclusion

- Browns Shoes is currently evaluating the **capex scenarios**
- Evaluating options, estimating implementation cost
- **Calculating potential benefits**: increased throughput, decreased operational costs
- The empty carton system is the **most likely project** to happen first.

- SimWell and Browns Shoes: can now **maintain and expand** this model over time
- Use the model for **different purposes**: future projects, internal training, testing operational ideas
- We’re getting close to a **digital twin** of the distribution center

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Thank you

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