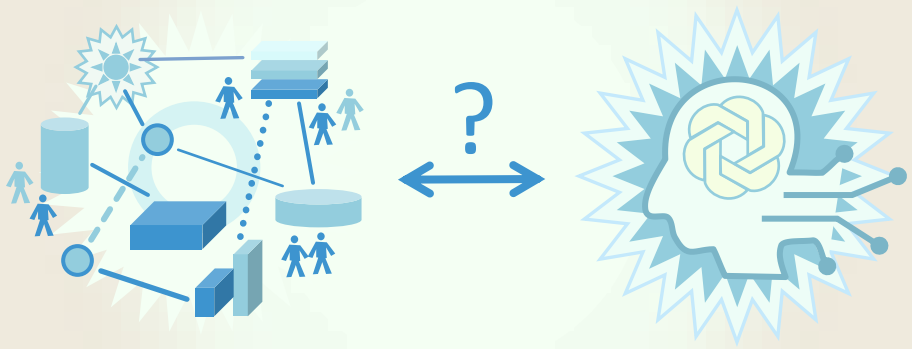


AI with the Model and Modeler: Exploring Integration for Simulation Co-Design

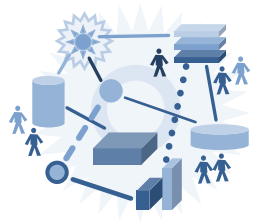
Nikolay Churkov and Dmitrii Alikov
The AnyLogic Company

The AnyLogic Conference 2025
September 9, 2025
Online

THE AnyLogic COMPANY

© The AnyLogic Company | www.anylogic.com

Simulation and AI

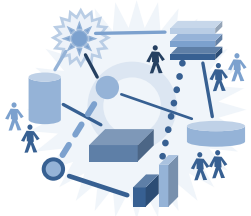


Simulation for AI (pre-LLM stuff)

- > Model as a Data Source for AI
- > Model used as a “living” environment for AI to learn and be assessed

---

AI for Simulation (working together)



- > LLMs as a helper for Modeler to create and work with the Model

© The AnyLogic Company | www.anylogic.com

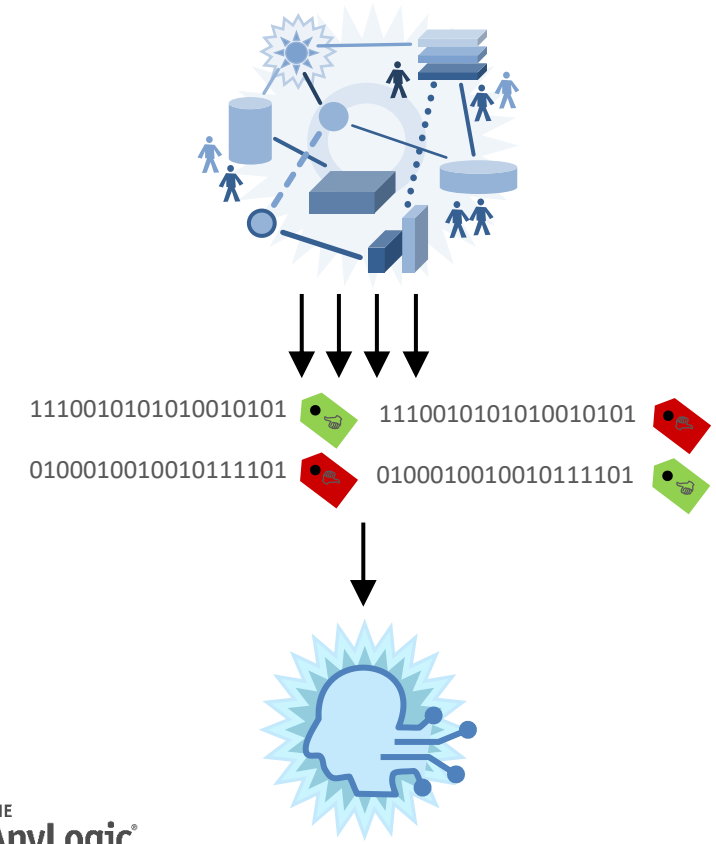
This was before the LLM era: ML + Simulation “false start”

Simulation models naturally provide powerful and realistic virtual environments that enable risk-free training and testing of learning agents.

However, this hasn't taken off at scale — and complexity is the main reason. Each project still requires too much human brainpower to become a commodity solution.

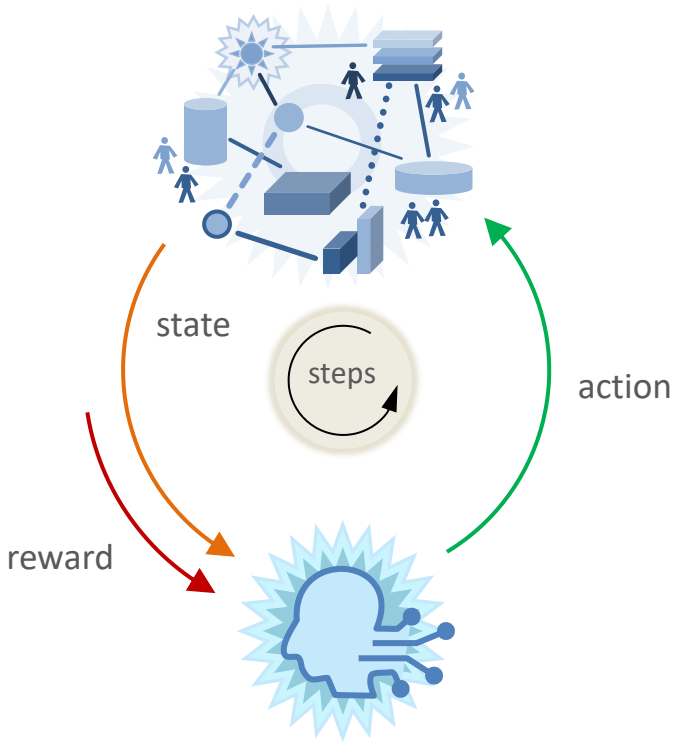
Generate synthetic data

Clean, detailed, naturally labeled, covering all possible scenarios



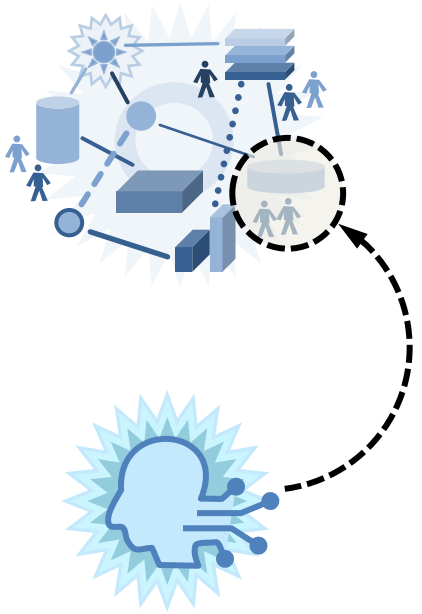
Learning environment

Cheap, risk-free, efficient virtual environment for Deep Reinforcement Learning



Testbed for trained AI

Again, cheap risk-free environment to test the effectiveness of a trained AI by integrating it into the model. Allows for comparing AI against other solutions



© The AnyLogic Company | www.anylogic.com

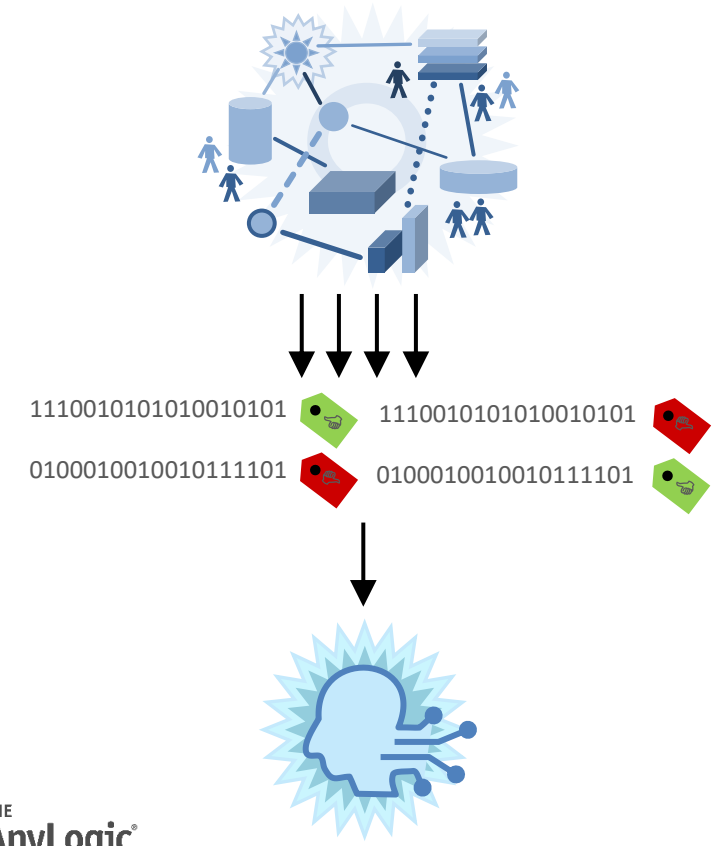
This was before the LLM era: ML + Simulation “false start”

Simulation models naturally provide powerful and realistic virtual environments that enable risk-free training and testing of learning agents.

However, this hasn't taken off at scale — and complexity is the main reason. Each project still requires too much human brainpower to become a commodity solution.

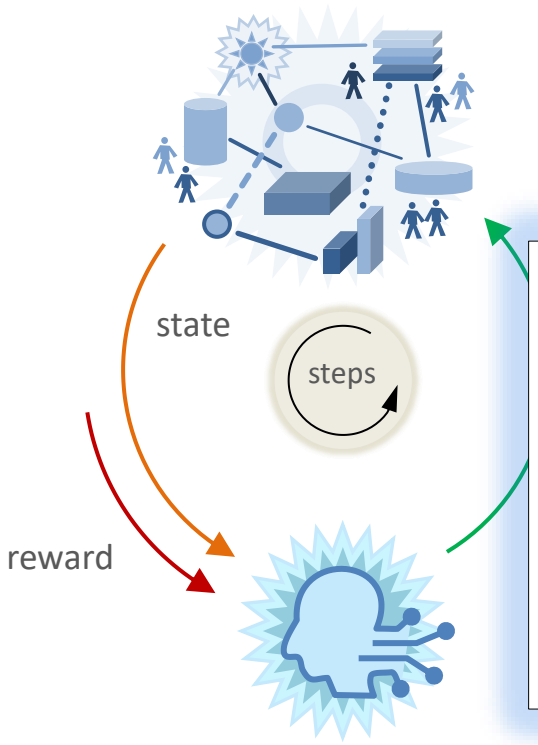
Generate synthetic data

Clean, detailed, naturally labeled, covering all possible scenarios



Learning environment

Cheap, risk-free, efficient virtual environment for Deep Reinforcement Learning

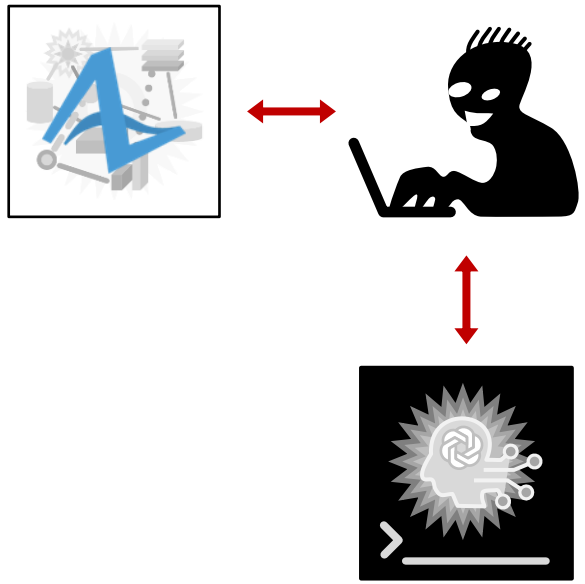


Testbed for trained AI

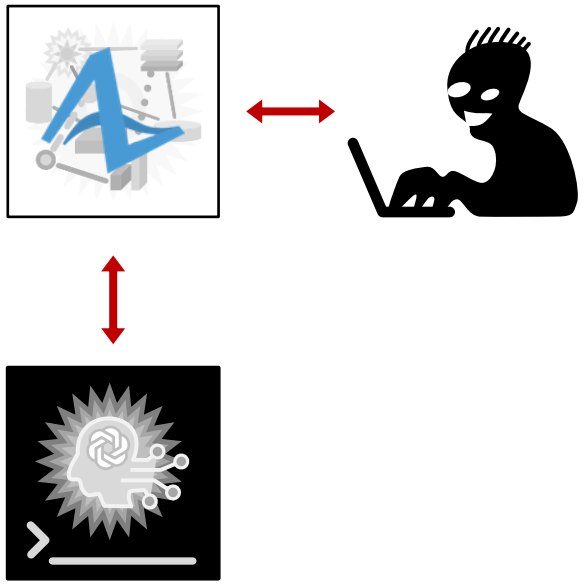
Again, cheap risk-free environment to test the effectiveness of a trained AI by integrating it into the model. Allows for comparing AI against other solutions

LLM + Simulation journey

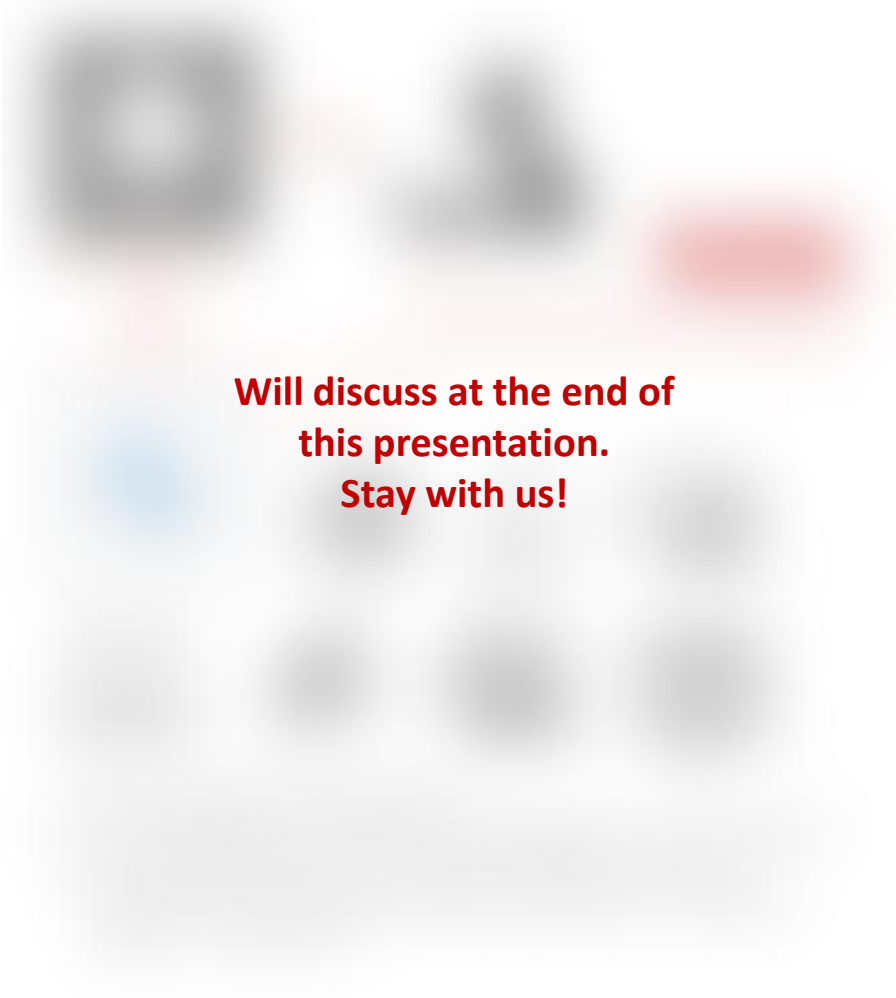
Now: The modeler occasionally uses AI as a separate, auxiliary tool



Near Future: The modeler uses AI built into AnyLogic to perform specific tasks



Possible Future:



Will discuss at the end of this presentation. Stay with us!

Optional Helper ⇢ Integrated Productivity Tool

- Logic coding: suggest code snippets
- Debugging: provide hints to understand compilation and runtime errors
- Experiment planning
- Output analysis and interpretation
- Conceptualization suggestions

This is our current R&D ->
And we will demo some of it today

- Conceptualization: create initial version
- Logic coding: write code snippets
- Creating markup from images and CAD
- Creating a 3D scene from photo or video
- Debugging: explain compilation and runtime errors and suggest fixes
- Experiment planning and dashboard design
- Output analysis and interpretation
- Model improvement: change the model
- Explaining a model: what's inside and how it works?

© The AnyLogic Company | www.anylogic.com

AI with the Modeler

"I want to model an airport"

Role instruction prompt

You are Professional AnyLogic Modeler. Your goal is
simulation model based on the text provided by us
You should consider the following steps when think

1. Based on user text description, you should conce
problem to make it abstract enough to be

YAML Libraries info

API files ?

GPT-5

Script to create a model ?

```
# Passenger arrivals by schedule
passengerSrc = PedSource.create(agent)
passengerSrc.setName("passengerSrc")
passengerSrc.setX(100); passengerSrc.setY(100)
passengerSrc.setLocationType(pedestrian_PedConstants_LocationTy
passengerSrc.setLocationNode("nodeEntrance")
passengerSrc.setArrivalType(pedestrian_PedConstants_ArrivalType
passengerSrc.setRate(("1", RateUnits.PER_SECOND))  # unused wit
passengerSrc.setArrivalSchedule("passengerSchedule")

# Split passengers to Terminal A / Terminal B (50/50)
chooseTerminalPed = PedSelectOutput.create(agent)
```

CURSOR

Python API

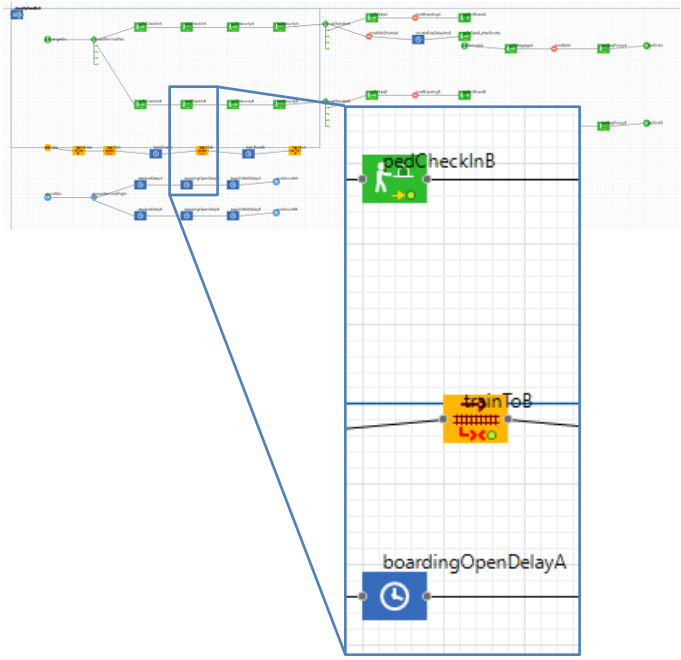
Model description

Conceptual model (high-level)

Three interlinked processes

1. **Passengers (Pedestrian Library)**
   - Arrive by schedule → terminal choice → walk to check-in →
     →
     a) go to gate (same terminal), or
     b) transfer: wait for shuttle signal → "ride" time → continue t
   - Wait at gate for **boarding signal** from the aircraft process →
   - Arrivals (from aircraft) appear at gate → walk to baggage →

The Model



LLM itself doesn't "know":
- exact block names, ports, parameters
- block parameters' relations

© The AnyLogic Company | www.anylogic.com

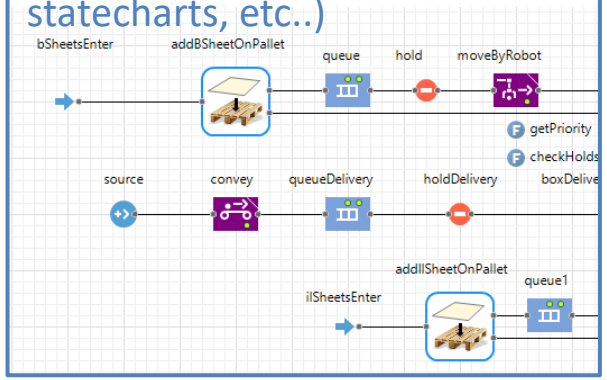
▷ DEMO

© The AnyLogic Company | www.anylogic.com

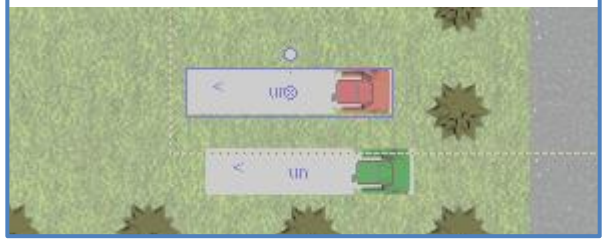
Current RnD coverage

AnyLogic Model

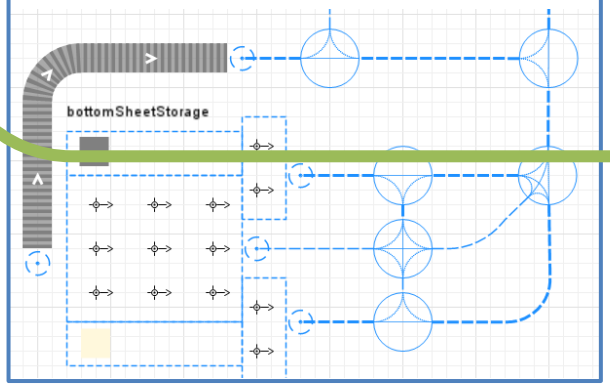
Conceptualization (flowcharts, statecharts, etc..)



Animation



Space markup



Custom logic code writing

Function body

```
for ( int i = 0; i < palletBatchSize; i++ ) {
    Pallet pallet = new Pallet( destination, goods, p
    addEmptyPallet.take pallet );
}
```

Data analysis

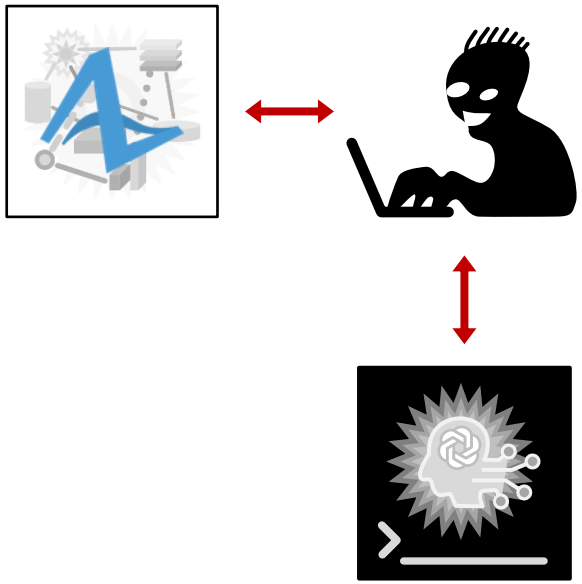
Debugging

Improving

© The AnyLogic Company | www.anylogic.com

LLM + Simulation journey

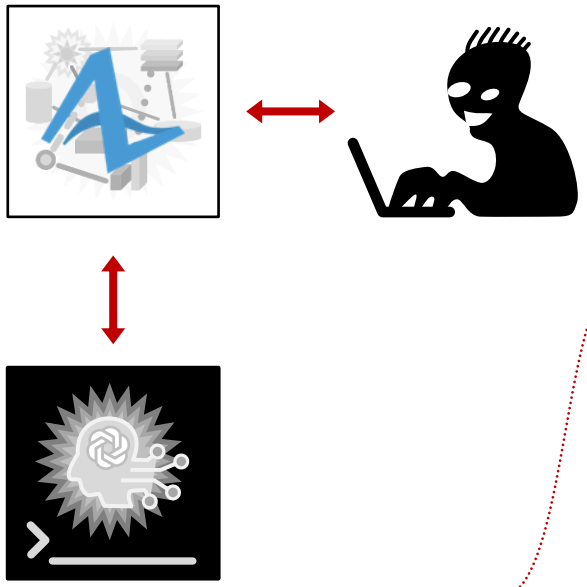
Now: The modeler occasionally uses AI as a separate, auxiliary tool



Optional Helper

- Logic coding: suggest code snippets
- Debugging: provide hints to understand compilation and runtime errors
- Experiment planning
- Output analysis and interpretation
- Conceptualization suggestions

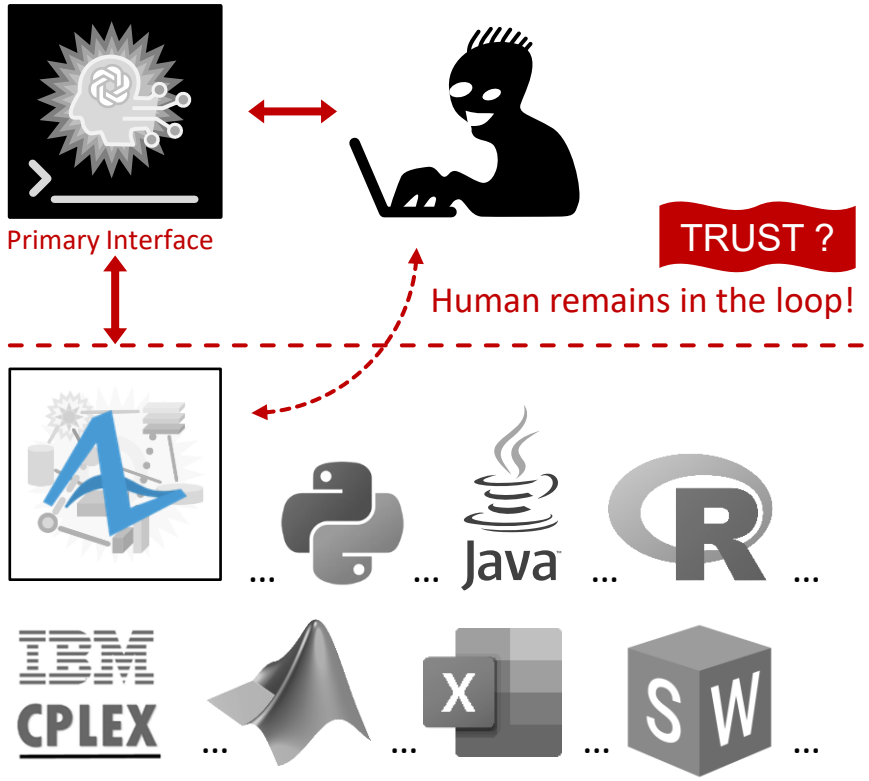
Near Future: The modeler uses AI built into AnyLogic to perform specific tasks



Integrated Productivity Tool

- Conceptualization: create initial version
- Logic coding: write code snippets
- Creating markup from images and CAD
- Creating a 3D scene from photo or video
- Debugging: explain compilation and runtime errors and suggest fixes
- Experiment planning and dashboard design
- Output analysis and interpretation
- Model improvement: change the model
- Explaining a model: what's inside and how it works?

Possible Future: The end user talks to AI equipped with AnyLogic +… to find a solution to the problem

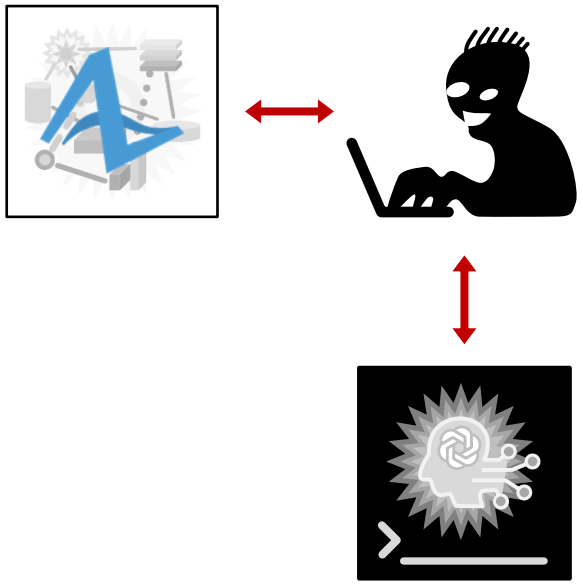


- AI is the primary user interface.
- AI has AnyLogic and other tools and engines "in the backyard"
- AI orchestrates the suite of tools behind the scenes to transform the problem description and data to a complete solution – end to end.

© The AnyLogic Company | www.anylogic.com

LLM + Simulation journey

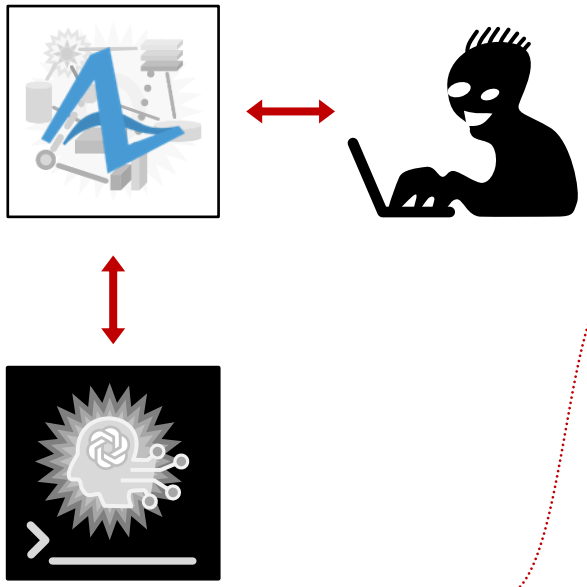
Now: The modeler occasionally uses AI as a separate, auxiliary tool



Optional Helper

- Logic coding: suggest code snippets
- Debugging: provide hints to understand compilation and runtime errors
- Experiment planning
- Output analysis and interpretation
- Conceptualization suggestions

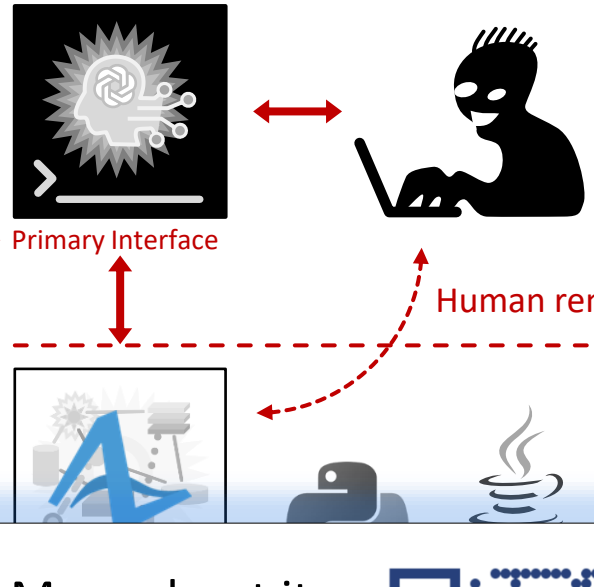
Near Future: The modeler uses AI built into AnyLogic to perform specific tasks



Integrated Productivity Tool

- Conceptualization: create initial version
- Logic coding: write code snippets
- Creating markup from images and CAD
- Creating a 3D scene from photo or video
- Debugging: explain compilation and runtime errors and suggest fixes
- Experiment planning and dashboard design
- Output analysis and interpretation
- Model improvement: change the model
- Explaining a model: what's inside and how it works?

Possible Future: The end user talks to AI equipped with AnyLogic +… to find a solution to the problem



Primary Interface

TRUST ?

Human remains in the loop!

More about it

(and about why AI cannot replace even a simple calculator:)

Thank you!

© The AnyLogic Company | www.anylogic.com