Multi-Method Simulation Modeling using AnyLogic

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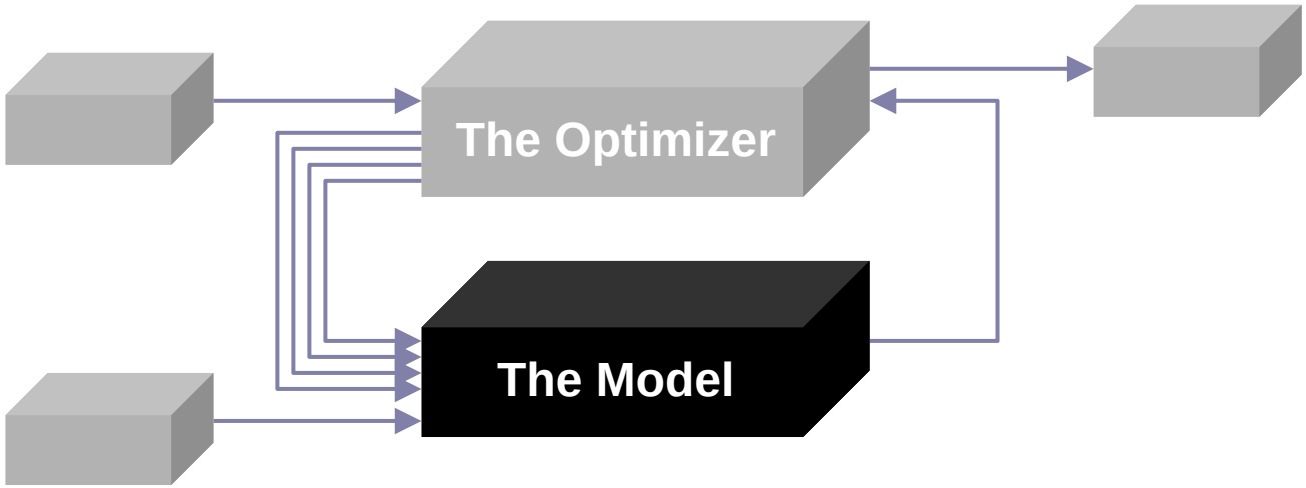
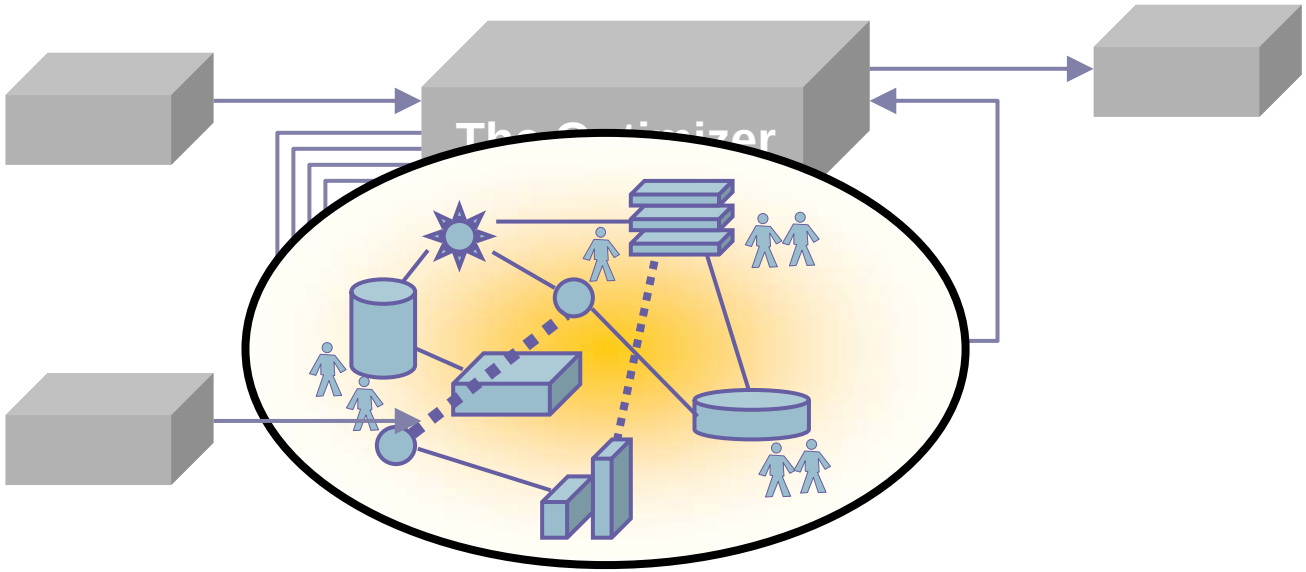
This presentation…

- …is **NOT** about what you do with the model after it is completed and can be treated as a black box

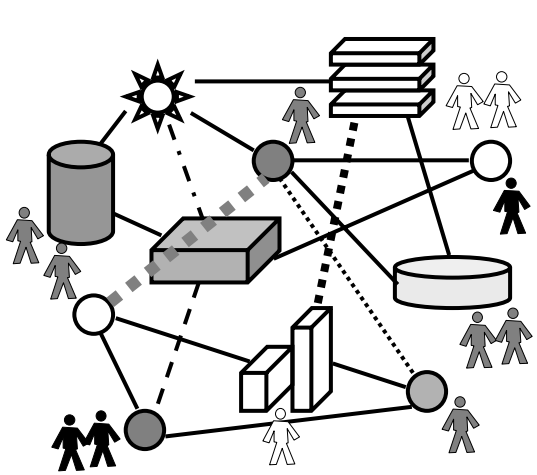


This presentation…



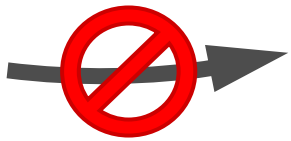
- …is about **HOW** you develop simulation models, choose abstraction level and methodology

Modeling



The Real World

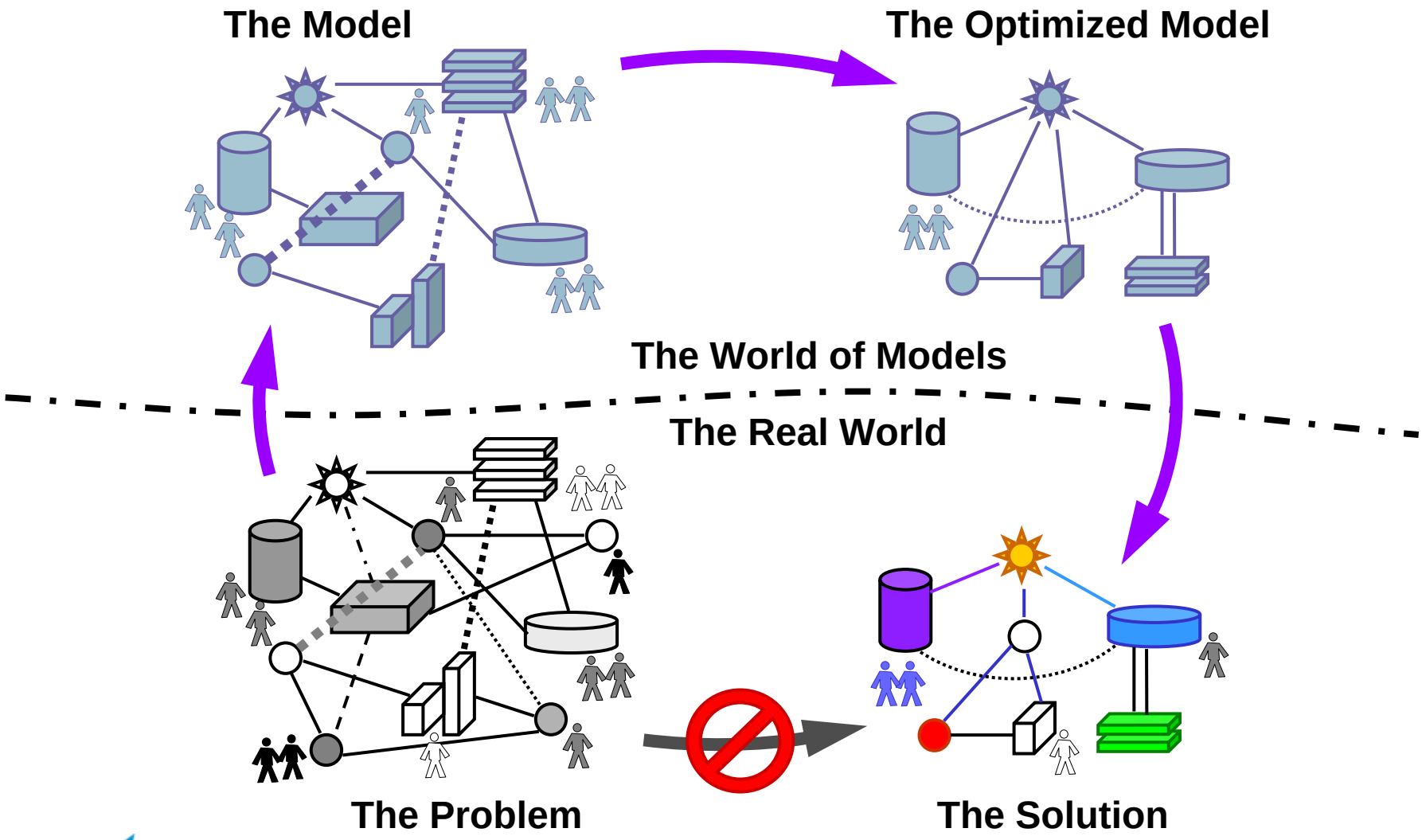
The Problem



?

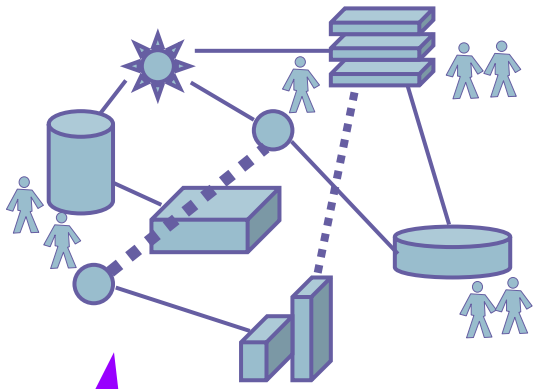
The Solution

Modeling

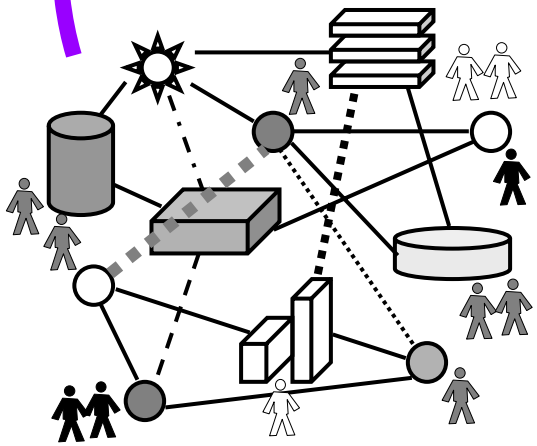


[Dynamic] Simulation Modeling

The Simulation Model



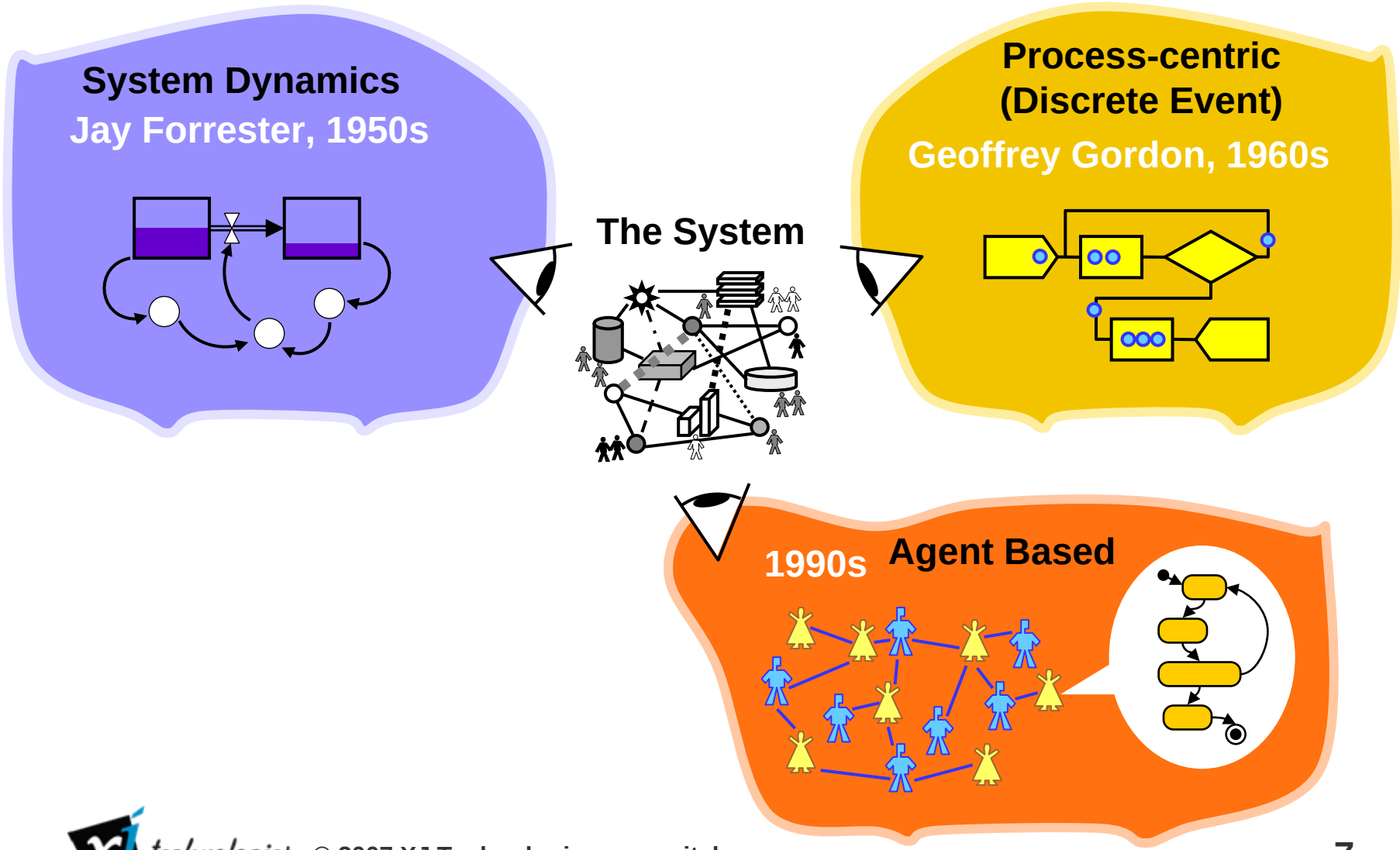
- Executable
  - A set of rules telling how to obtain the next state of the system from the current state
- Gives the trajectory of the system in time



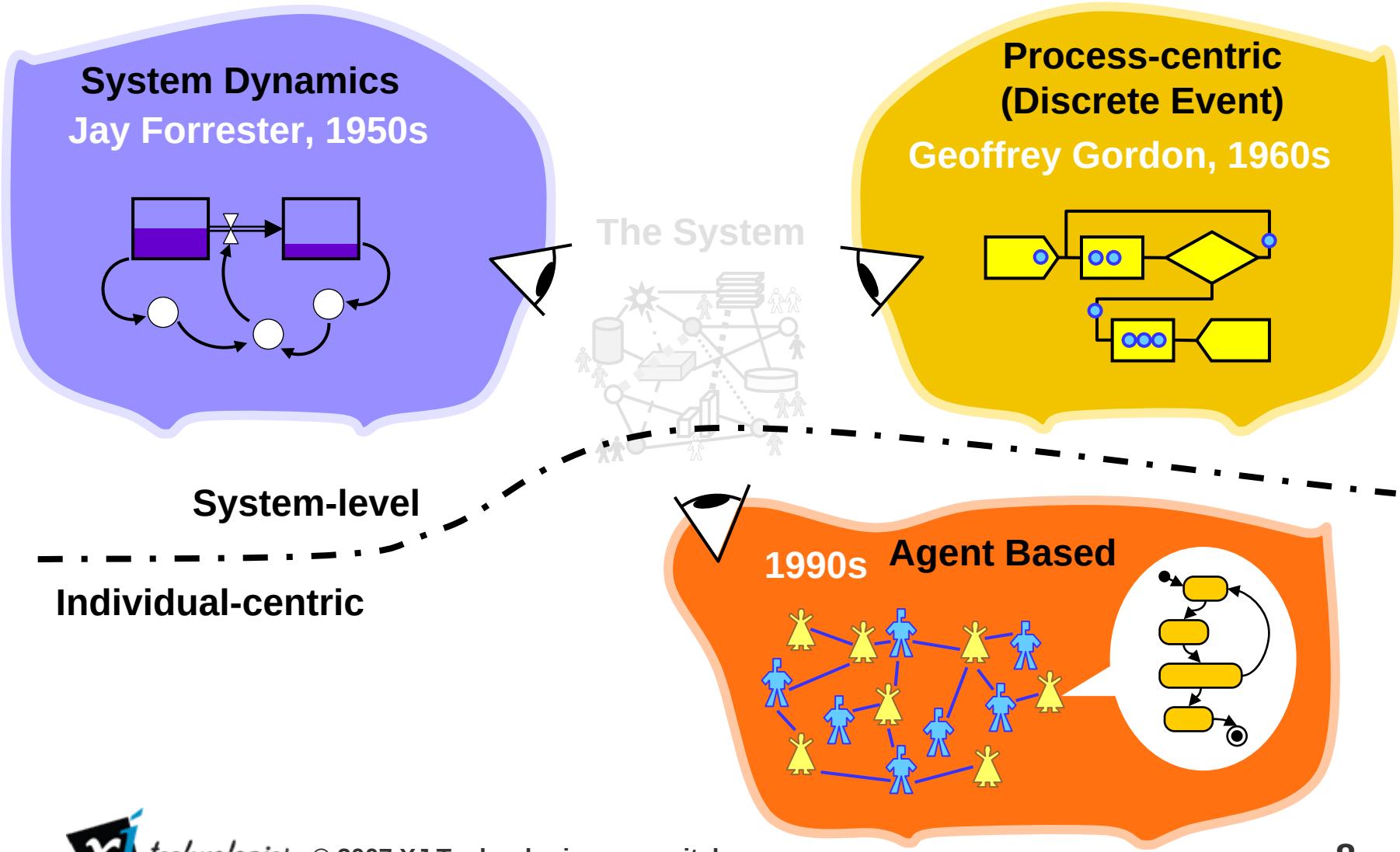
The System

- Dynamic
  - Causal and time dependencies
  - Time-related constraints
- Complex
  - No analytical solution

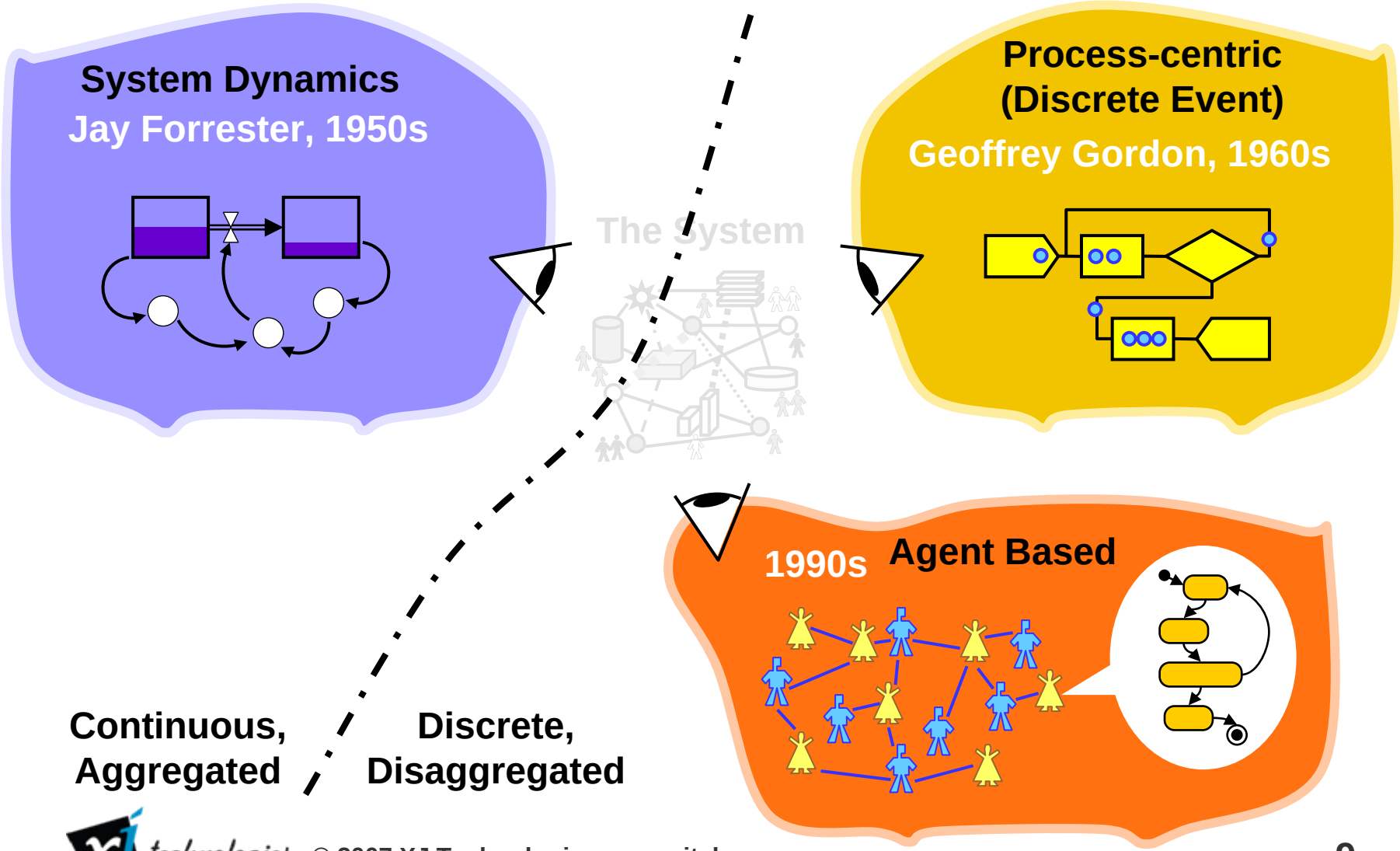
Methods



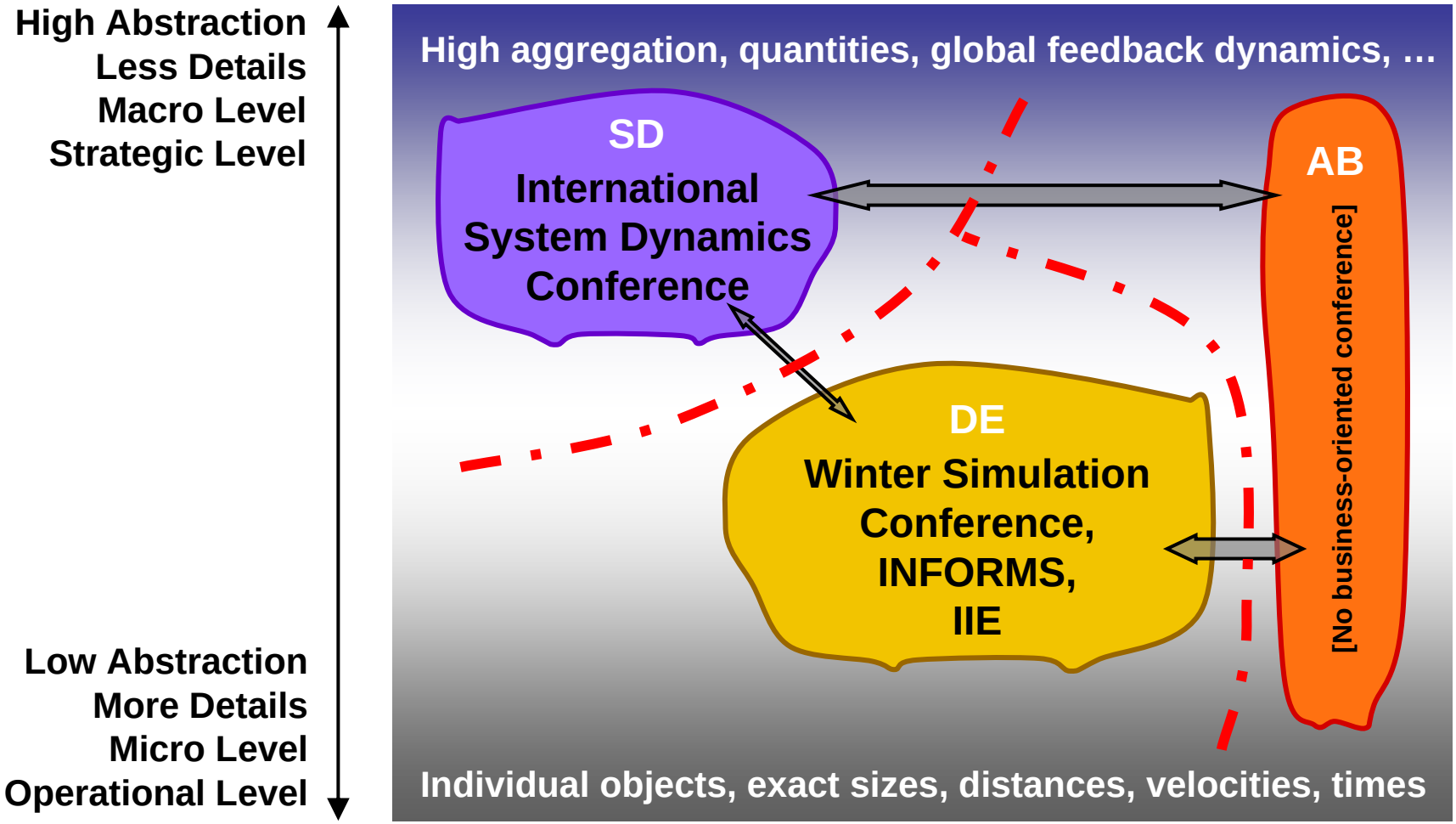
Methods


System Dynamics
Jay Forrester, 1950s
Process-centric
(Discrete Event)
Geoffrey Gordon, 1960s
The System
System-level
Individual-centric
1990s
Agent Based

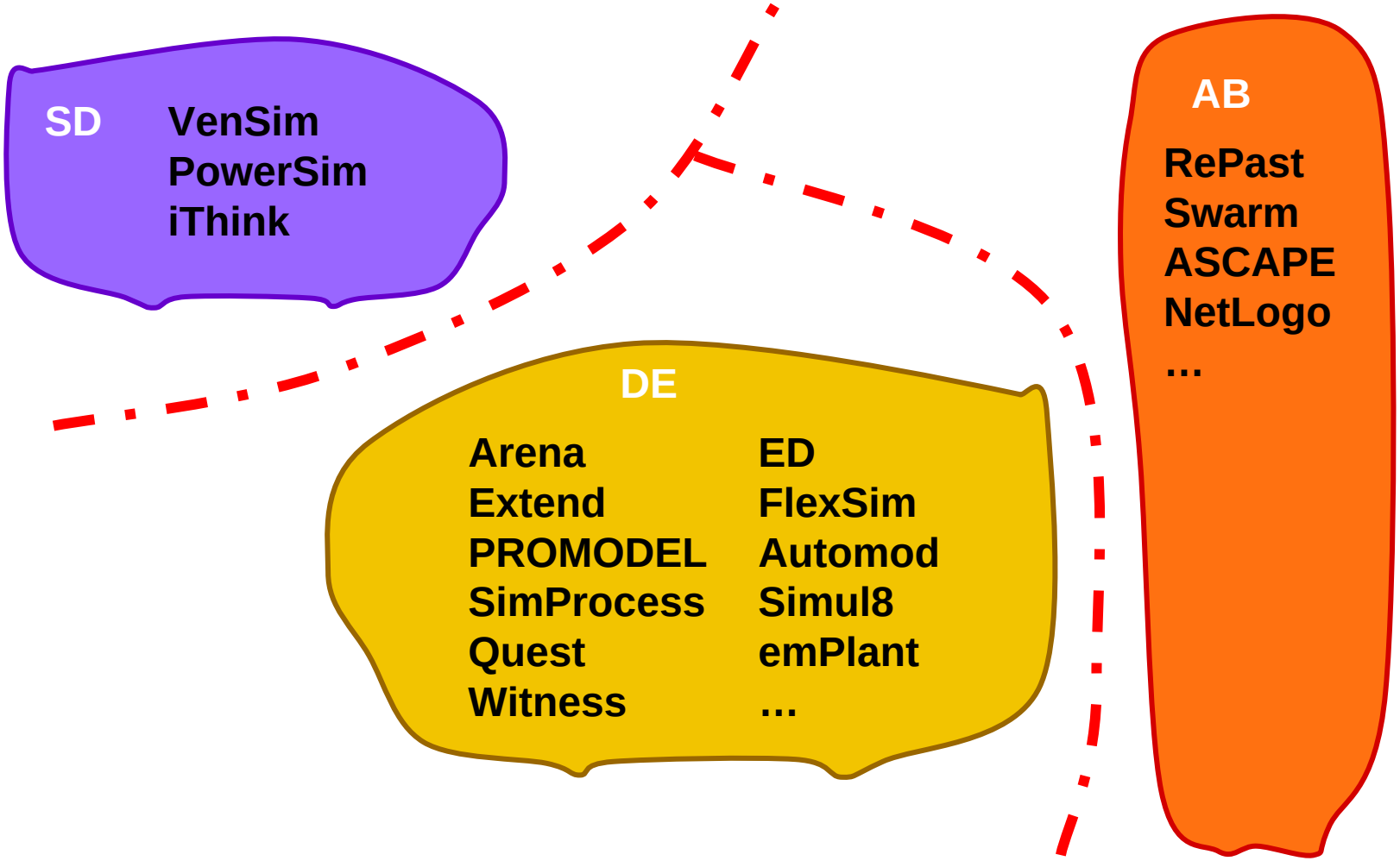
Methods



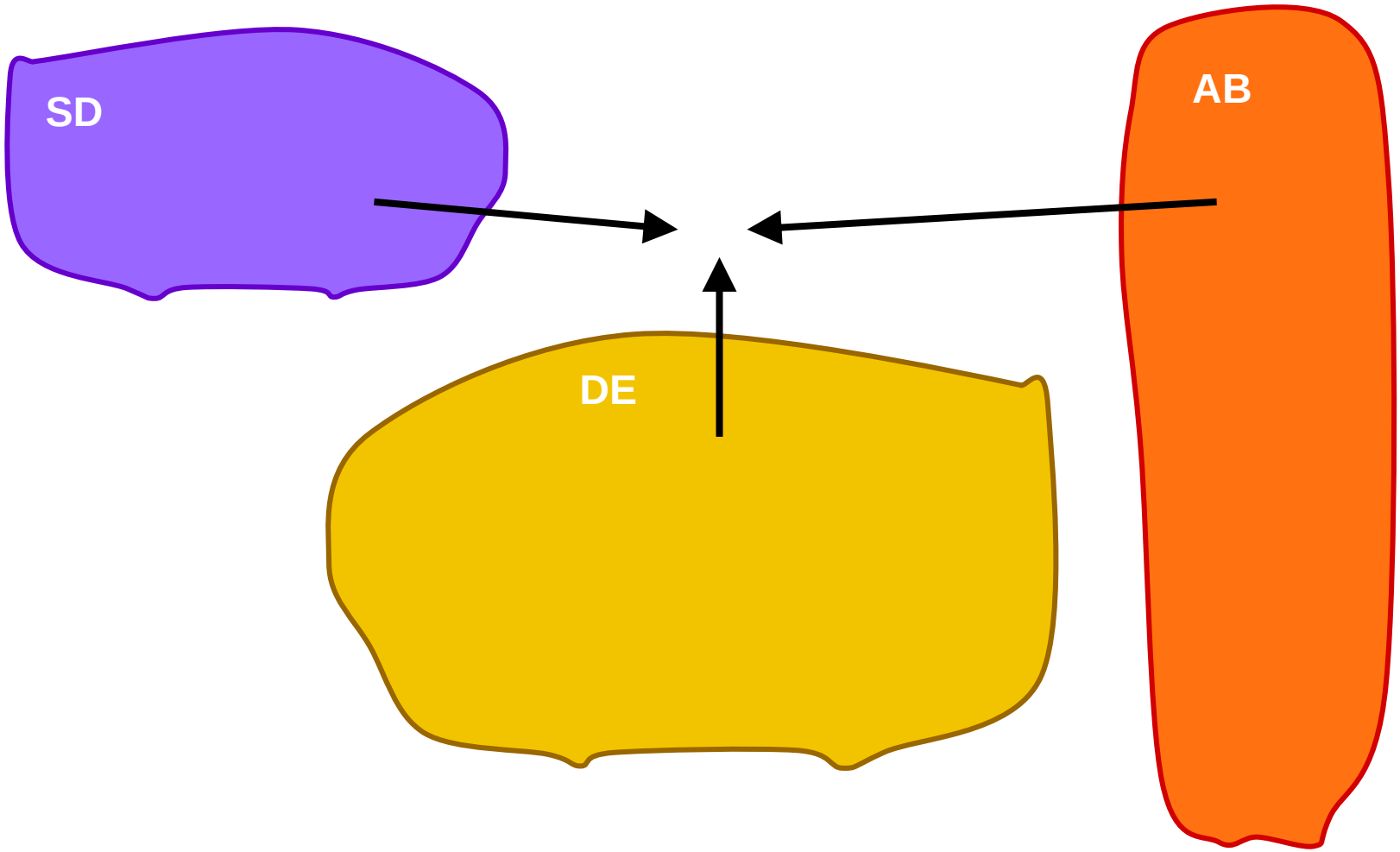
Abstraction levels. Modeler communities



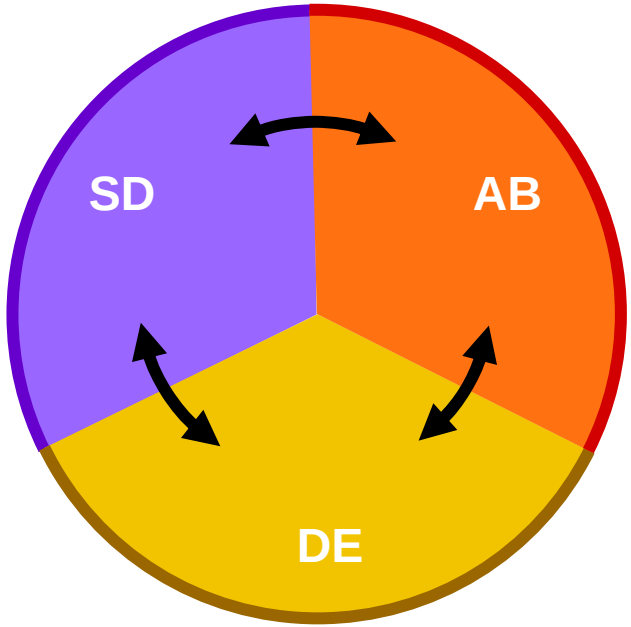
Tools



AnyLogic



AnyLogic



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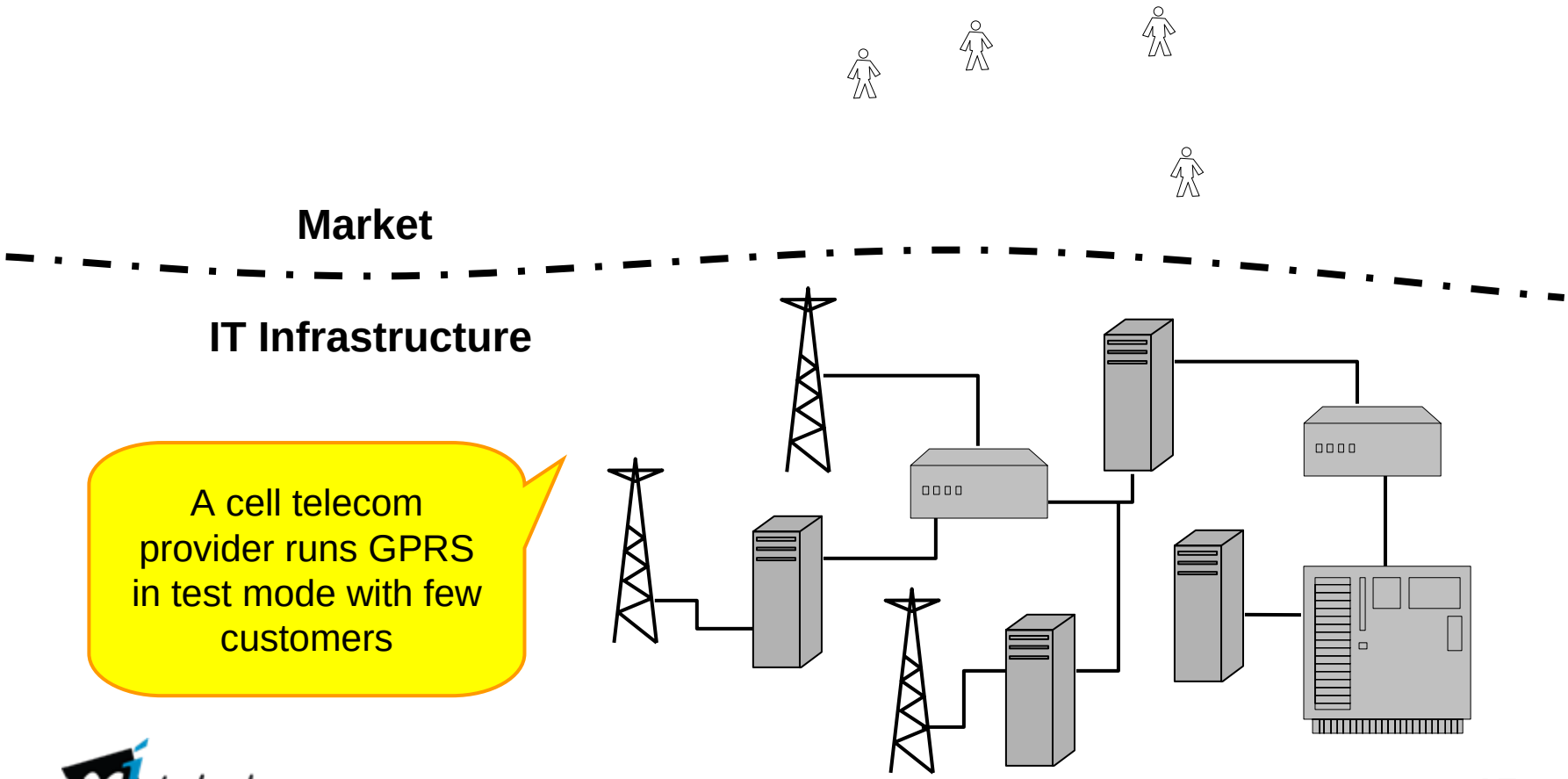
OO Language
Java/Eclipse platform
Windows, Mac OS, Linux
Interactive Animation
Statistics
Data presentation
OptQuest included
Teamwork support
GIS support
Open at Java level
Export models as applets
…

1. You can easily vary the level of abstraction and viewpoint until it perfectly fits the problem
2. You can mix different methods in one model

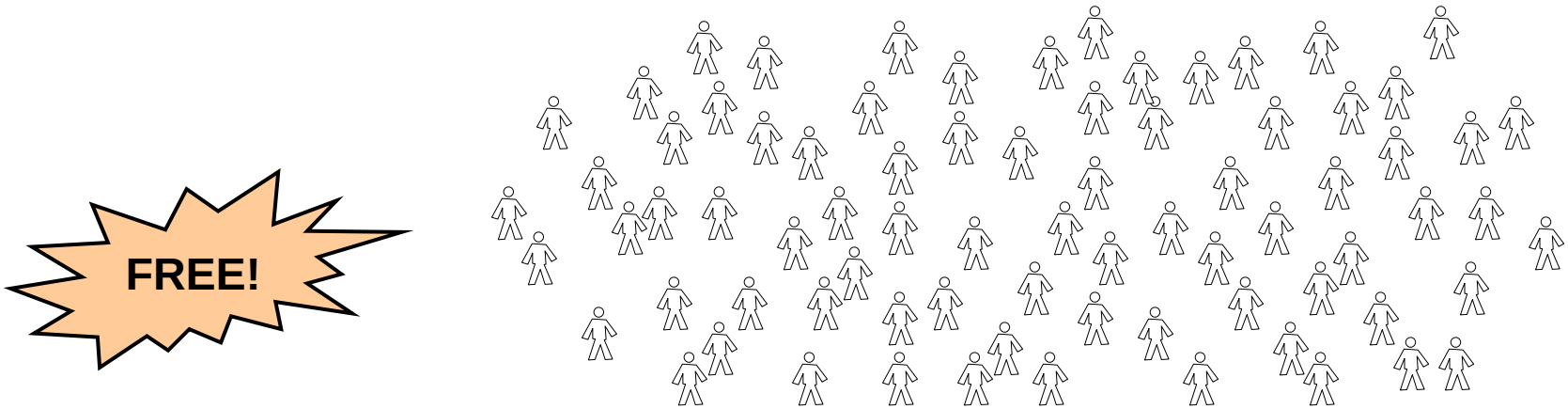
“No Workarounds!”

- Do not fight the modeling language and the tool!
- If you feel the SD abstraction level (stocks, flows, feedback dynamics) is enough for the problem, use aggregated view
- If the system can be naturally represented as a process (sequence of operations, entities, resources) – use DE
- If you are more comfortable with specifying individual behavior of objects (people, vehicles, companies, assets, projects, etc.) – use AB

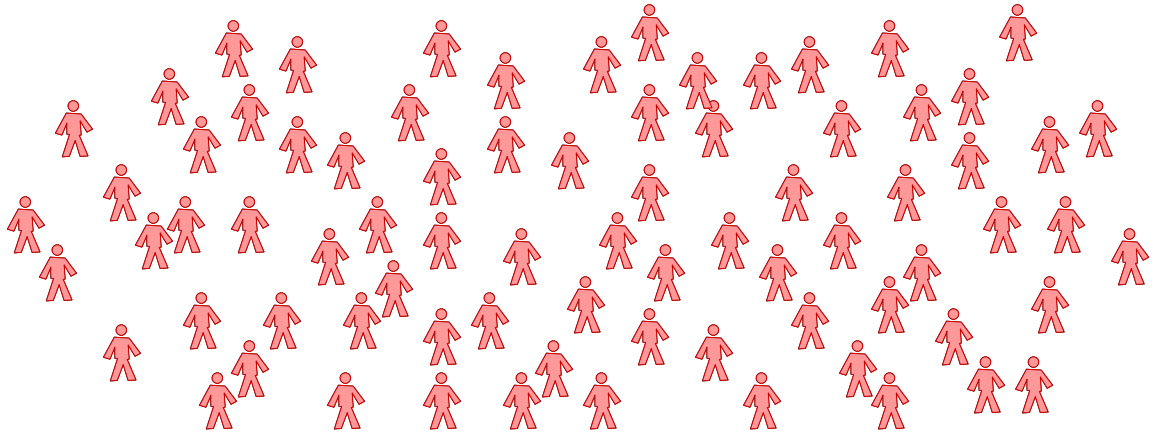
Why this is important: cell telecom example



Why this is important: cell telecom example



Why this is important: cell telecom example

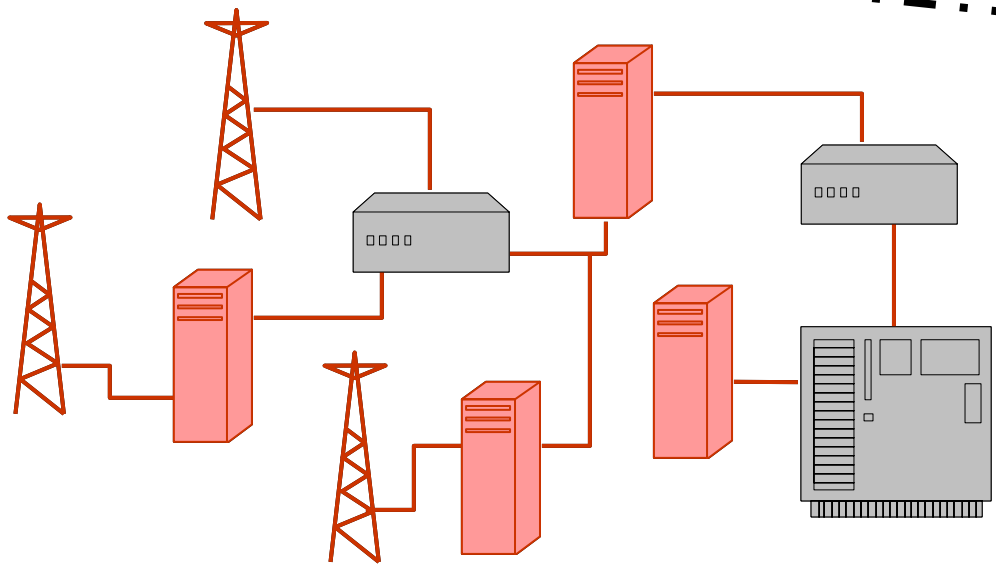


FREE!

Market

IT Infrastructure

A lot of users start using GPRS because it is free – much more than IT infrastructure can handle

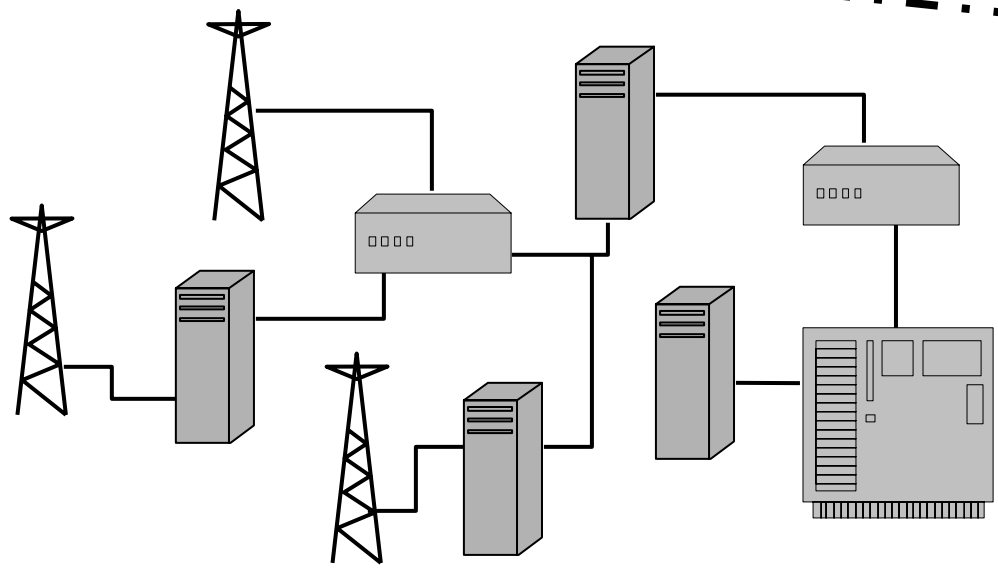


Why this is important: cell telecom example

Market

IT Infrastructure

Users frustrated with poor QoS leave the company forever



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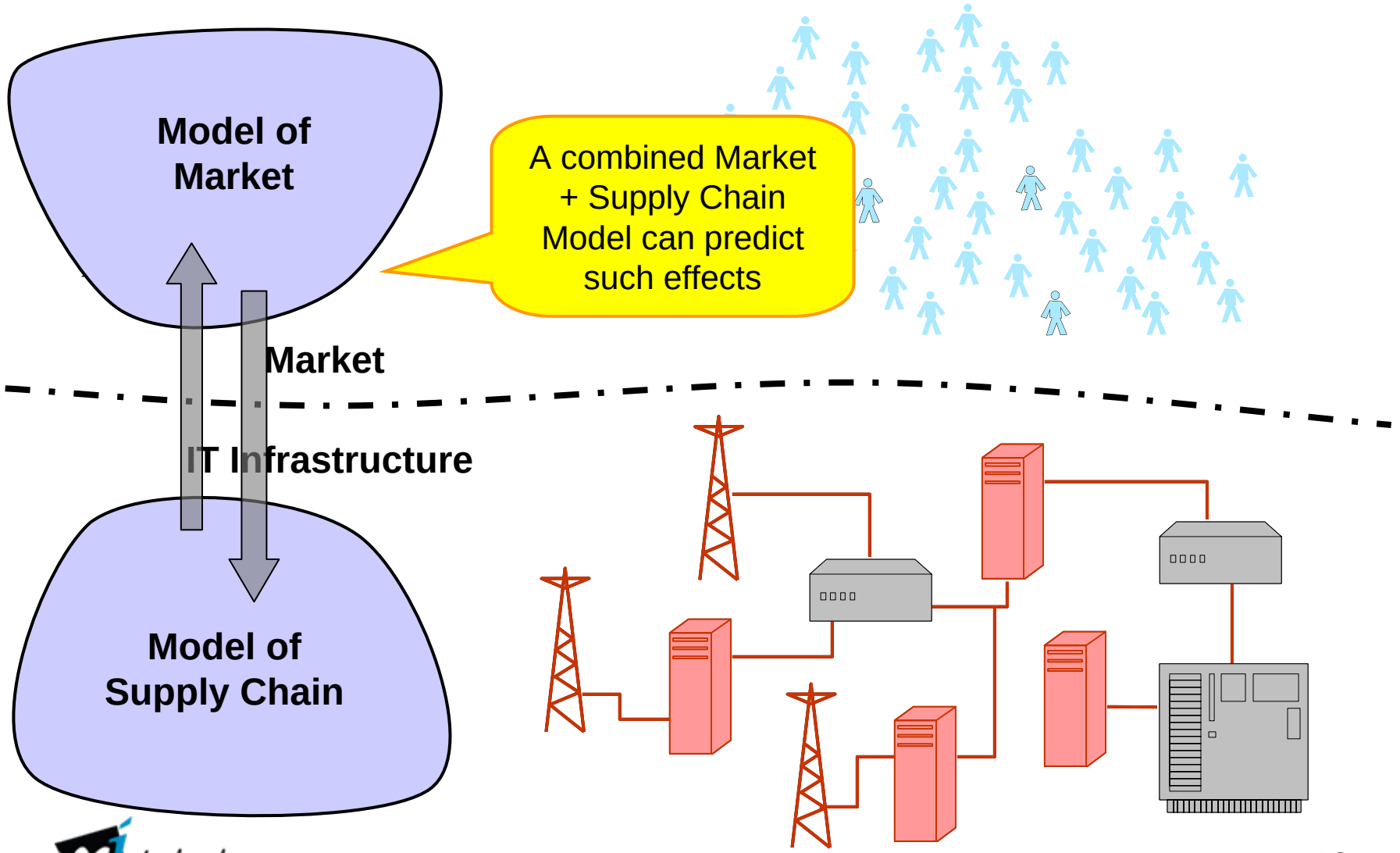

A quick tool demo =>