

# From Conceptual Models to Simulation Models

Model Driven Development of Agent-Based Simulations

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<http://www.boxed-economy.org/>

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## From Conceptual Models to Simulation Models: Model Driven Development of Agent-Based Simulations

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Motivation and Background

2

Proposed Process and Tools

3

Demonstration

# From Conceptual Models to Simulation Models: Model Driven Development of Agent-Based Simulations

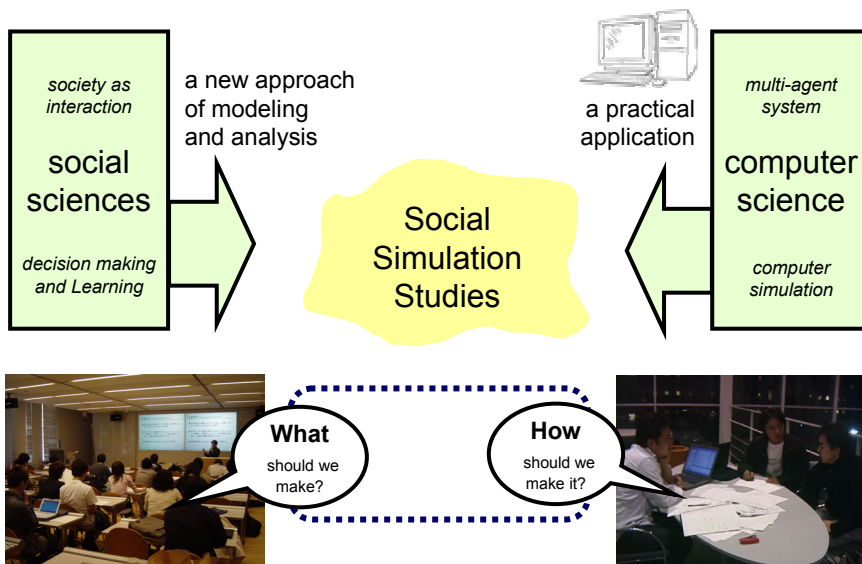
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## Position of Social Simulation Studies

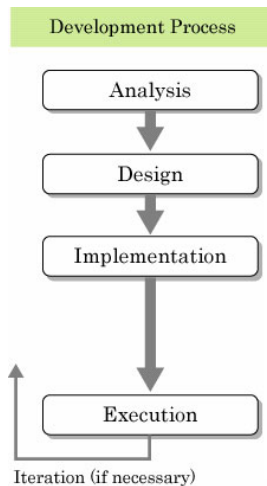


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What we should improve is  
the Process !

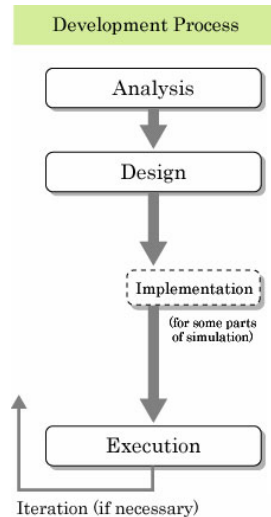
## Traditional Development Process of Software

The traditional development process of software is driven by implementation (program coding).



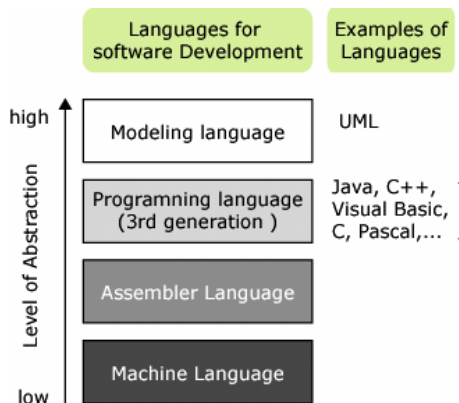
## A New Development Process of Software: Model Driven Development

A new development process is driven by modeling.



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## Raising the level of Abstraction



**Cf. “MDA” (Model Driven Architecture) and “Executable UML”**  
The point is “using modeling languages as programming languages rather than merely as design languages.” (Frankel 2003)

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**1 Motivation and Background**

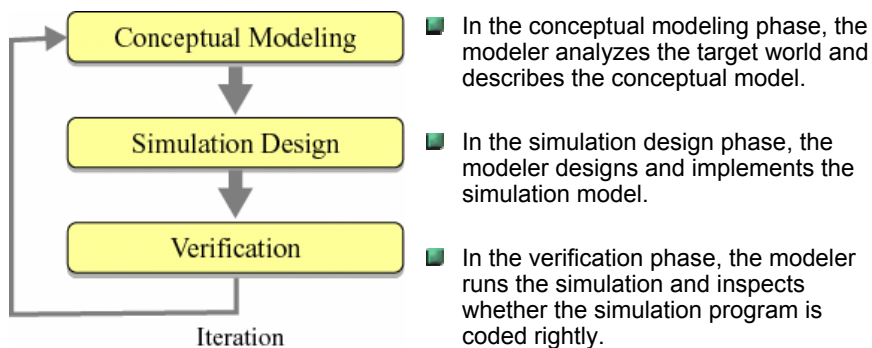
**2 Proposed Process and Tools**

**3 Demonstration**

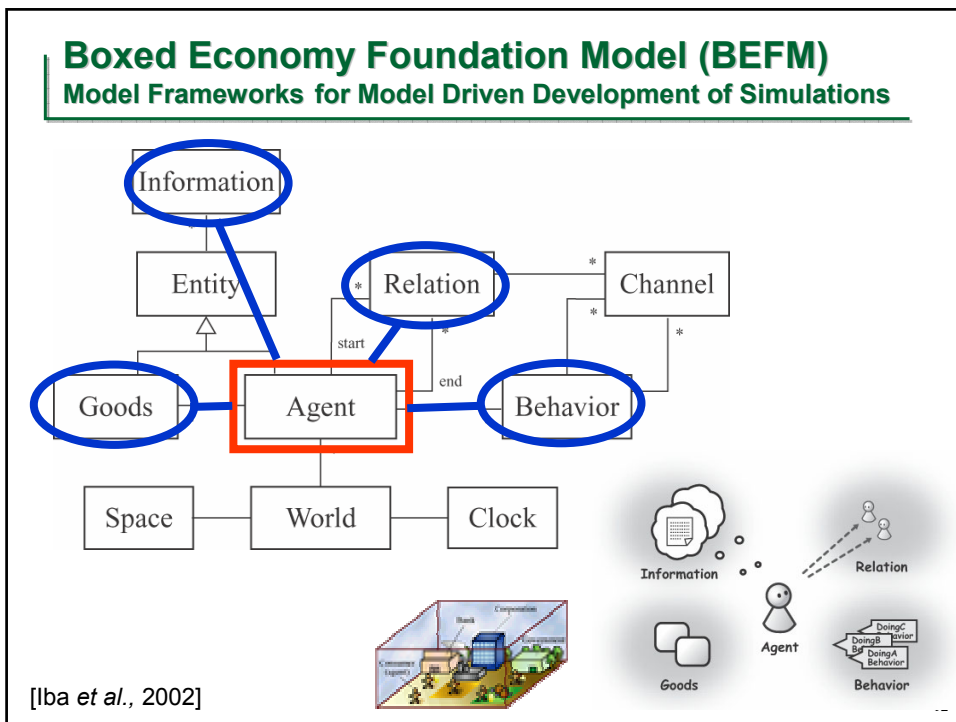
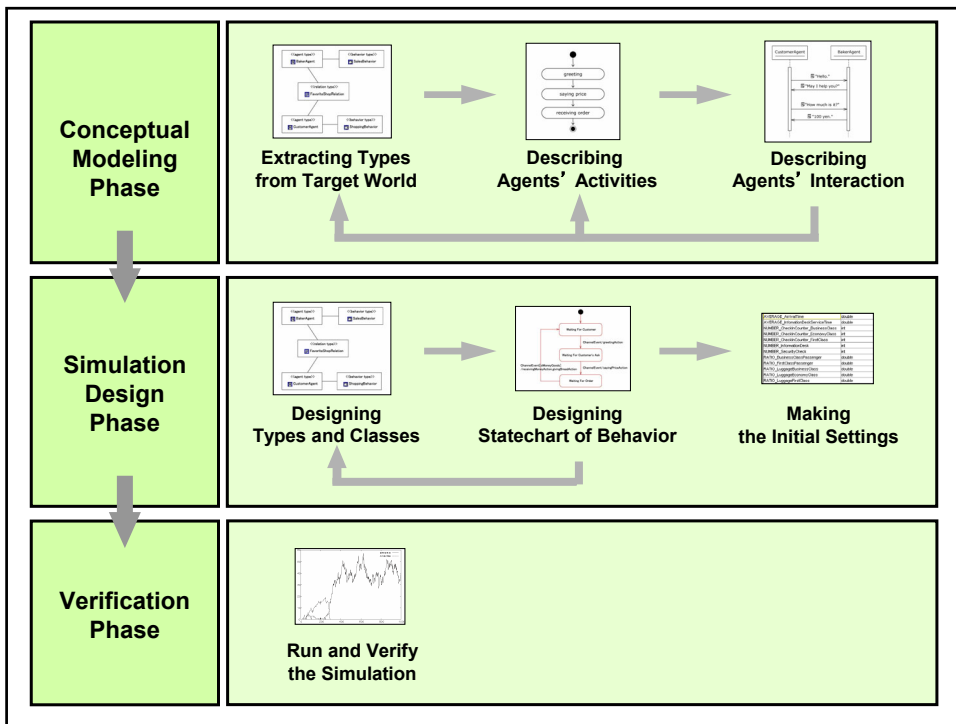
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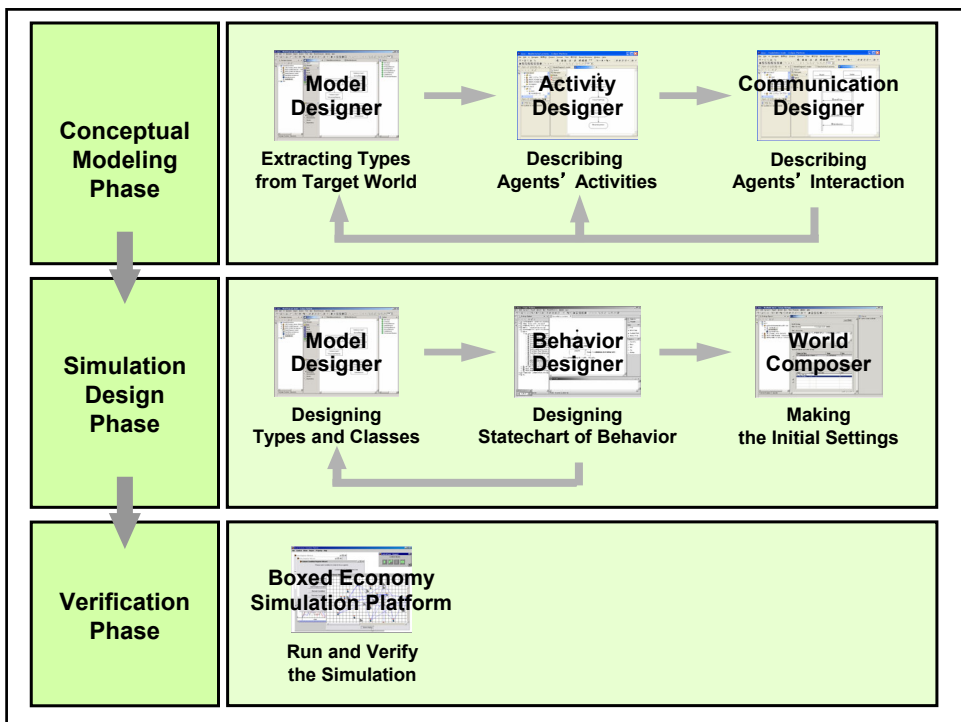
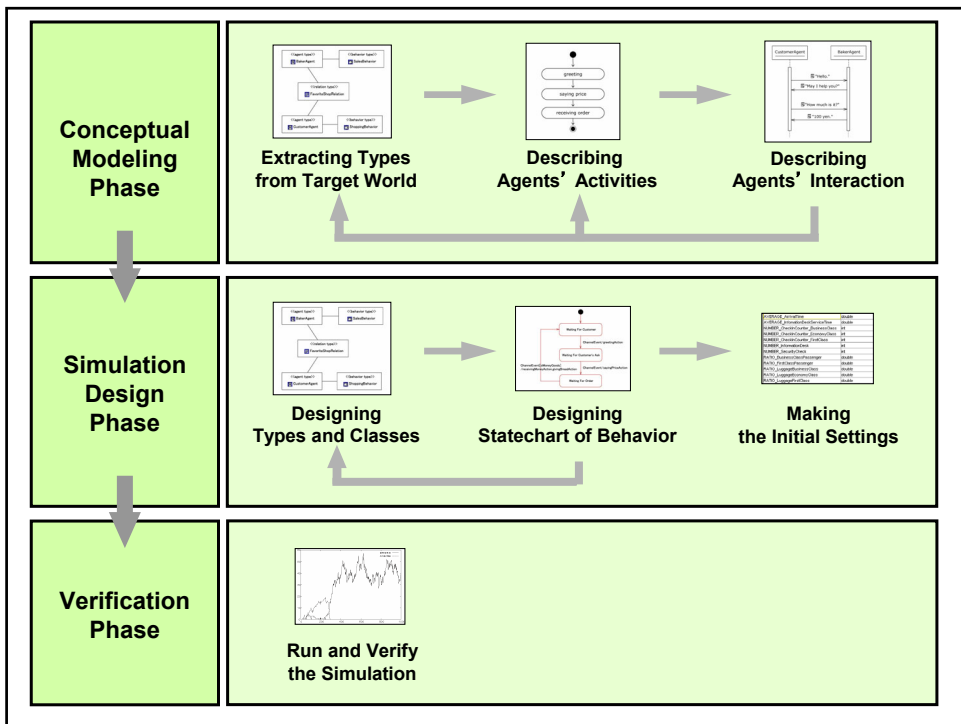
## Overview of Proposed Process

■ The proposed process, which is based on Model Driven Development, consists of three major phases.



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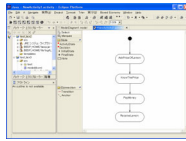




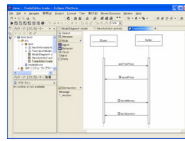
# Component Builder (CB)

## Tools for Model Driven Development of Simulations

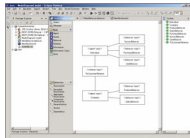
- Component Builder is developed as the plug-in for the currently standard development environment “Eclipse.”
- Component Builder consists of four designers and one composer.



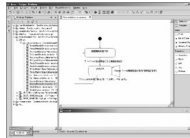
Activity Designer



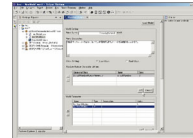
Communication Designer



Model Designer



Behavior Designer



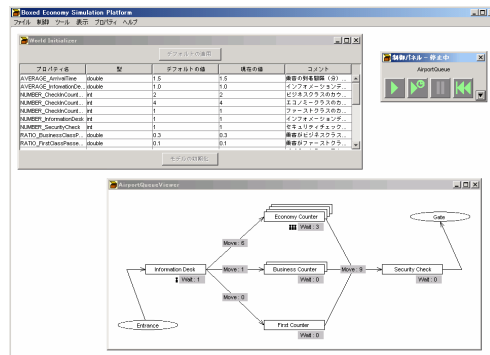
World Composer

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# Boxed Economy Simulation Platform (BESP)

## Tools for Model Driven Development of Simulations

- An integrated environment to execute and analyze the agent-based social simulations.
- Implemented in Java language.
- The source code and detail specification are opened to the public.

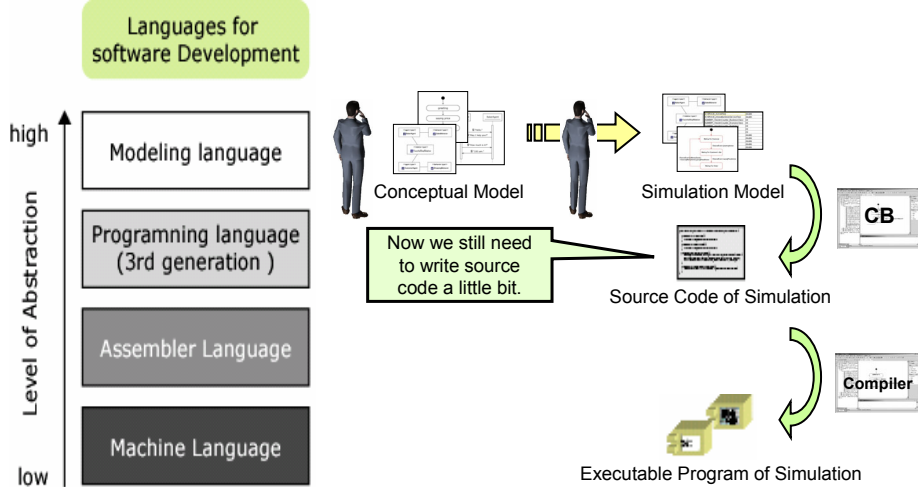


[Iba et al., 2002]

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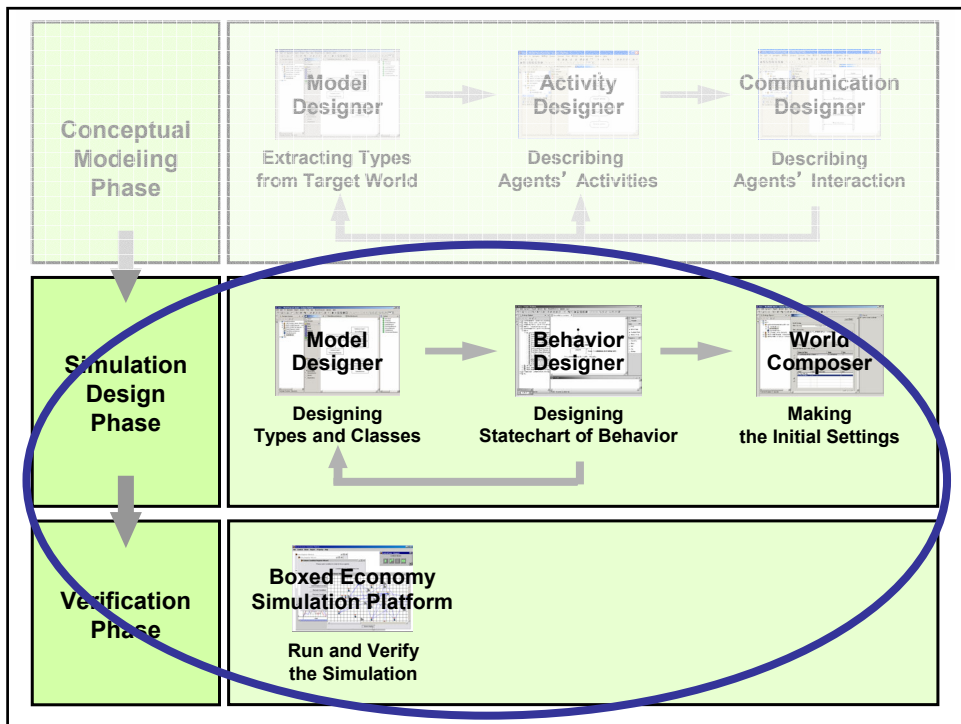
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## We have already applied to ...

- Format Competition (VHS vs. Beta)
- Evolving Network (Scale-Free Network)
- Evolutionary Market Competition
- Emergence and Collapse of Money
- Artificial Financial Market
- Strategic Evolution in Iterated Prisoners Dilemma
- Airport Queuing Model
- Influence Analysis of Social Interaction to Voting
- Electric Power Market

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Contact us by sending E-mail to  
[iba@sfc.keio.ac.jp](mailto:iba@sfc.keio.ac.jp)  
or talk to me later,  
if you are interested in our tools.

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