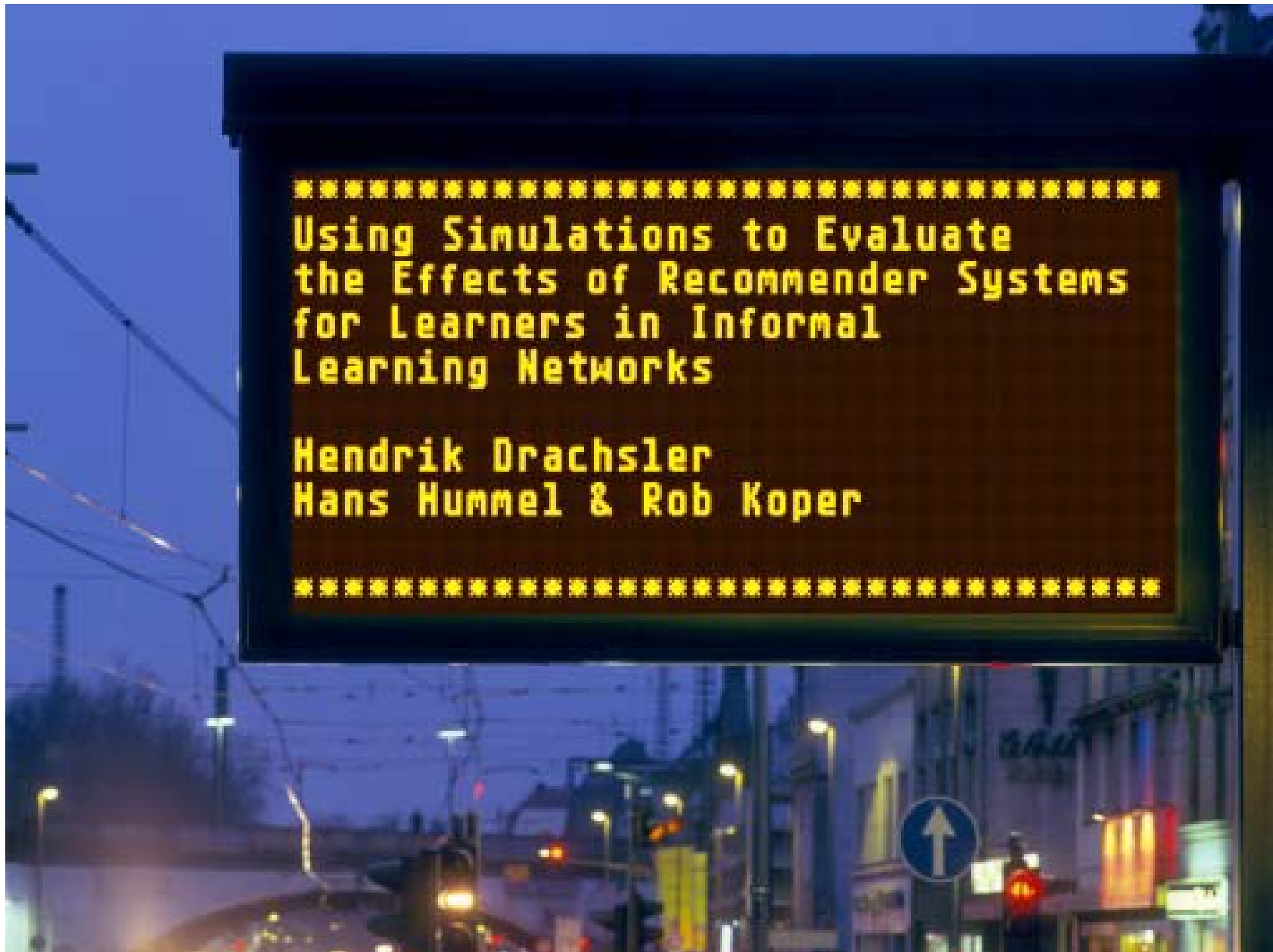


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Using Simulations to Evaluate  
the Effects of Recommender Systems  
for Learners in Informal  
Learning Networks

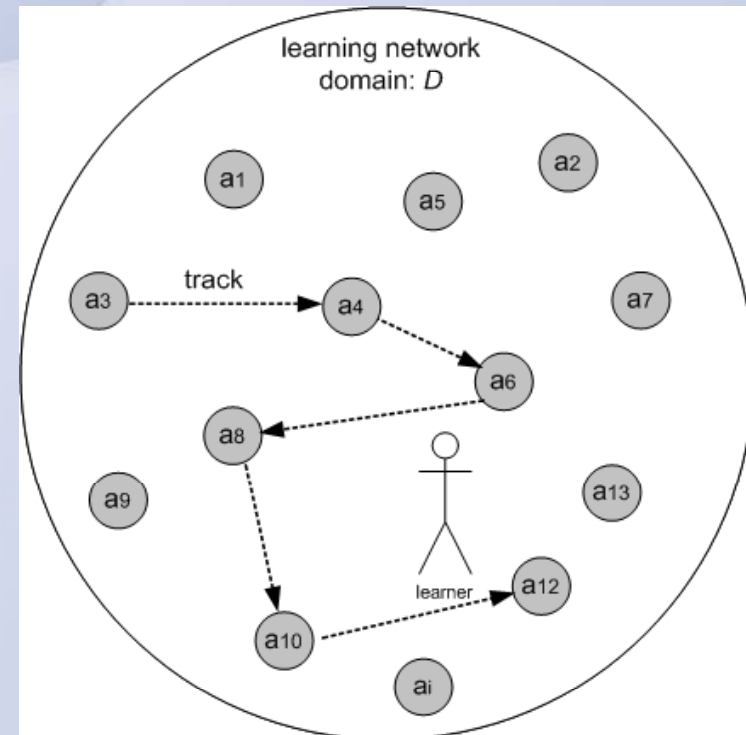
Hendrik Drachsler  
Hans Hummel & Rob Koper

\*\*\*\*\*



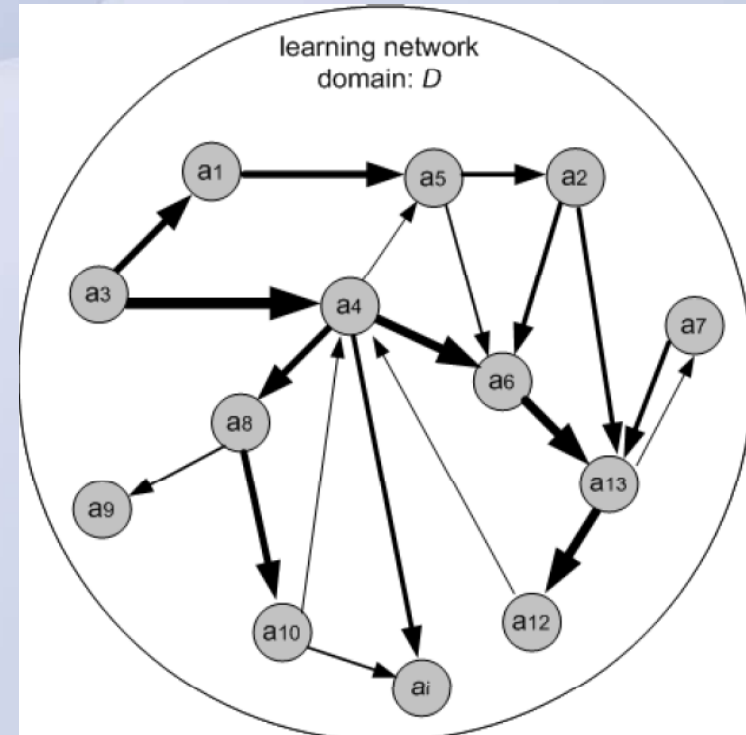
# Learning Networks?

- Learners can publish their own Learning Activities (LAs)
- Learners can share, rate, tag and adjust LAs from others
- Explicitly address informal learning



# Learning Networks?

- A Learning Network *emerge* from the bottom upwards
- Open Corpus with unlimited set of documents
- Learners create LAs and behavioural data over time

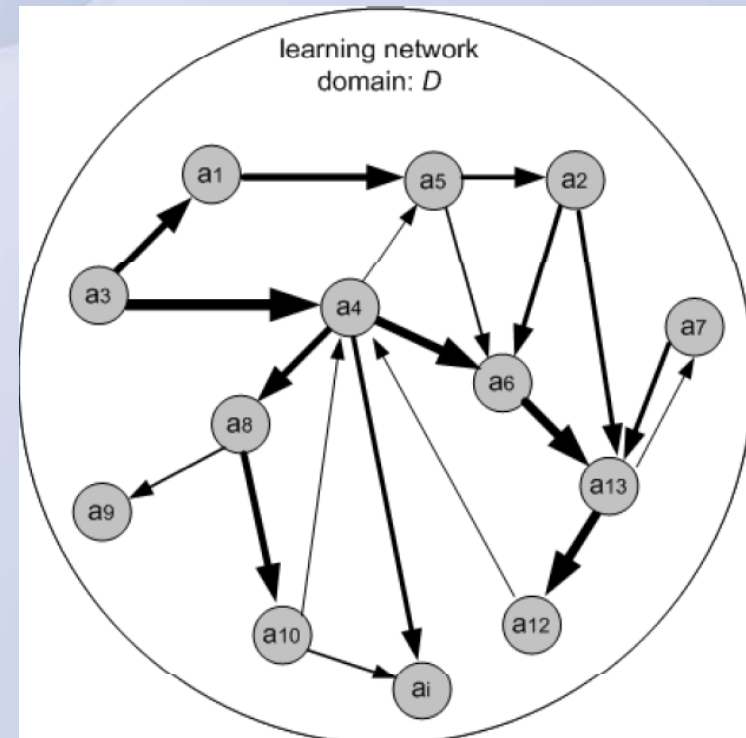


# Nowadays, Recommender Systems Supporting our Decisions

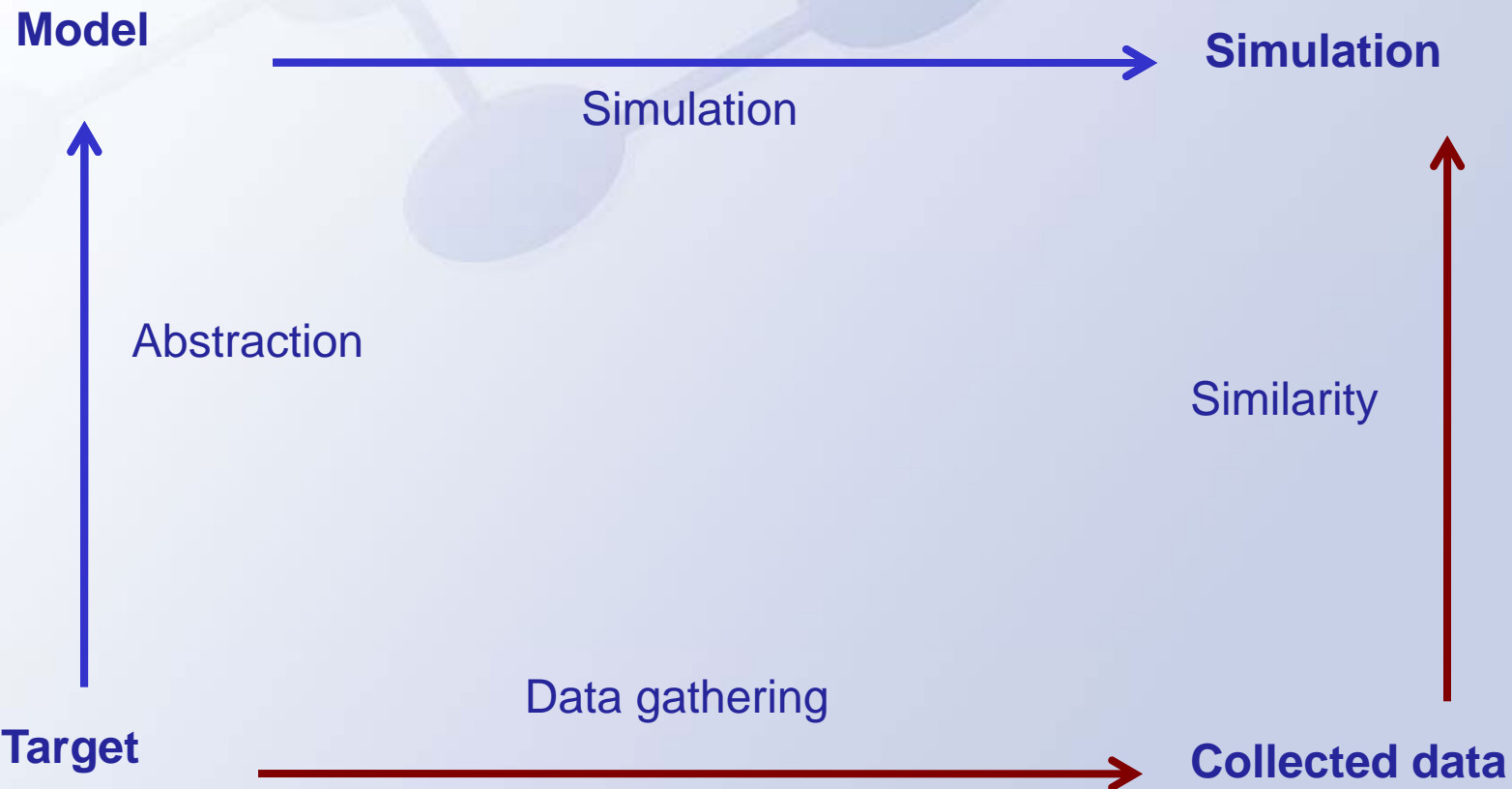


# Why using Simulations for Research in LNs?

- Observe emerging behavior of learners in LNs. This requires long term perspectives and huge amount of learners.
- Experiments are cost intensive and limited in time, amount of learners and LAs and they need carefully preparation as they can not easily repeated.



# Methodology Approach for Simulations in Social Science



Gilbert & Troitzsch (2005)

# Following the Methodology

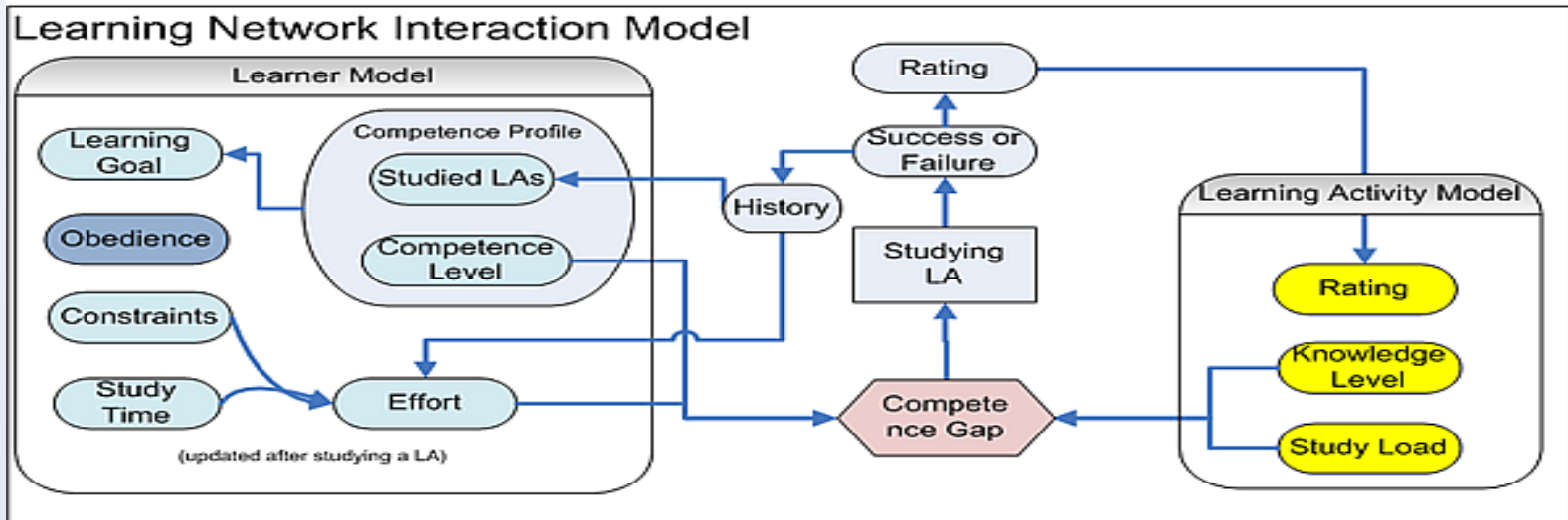
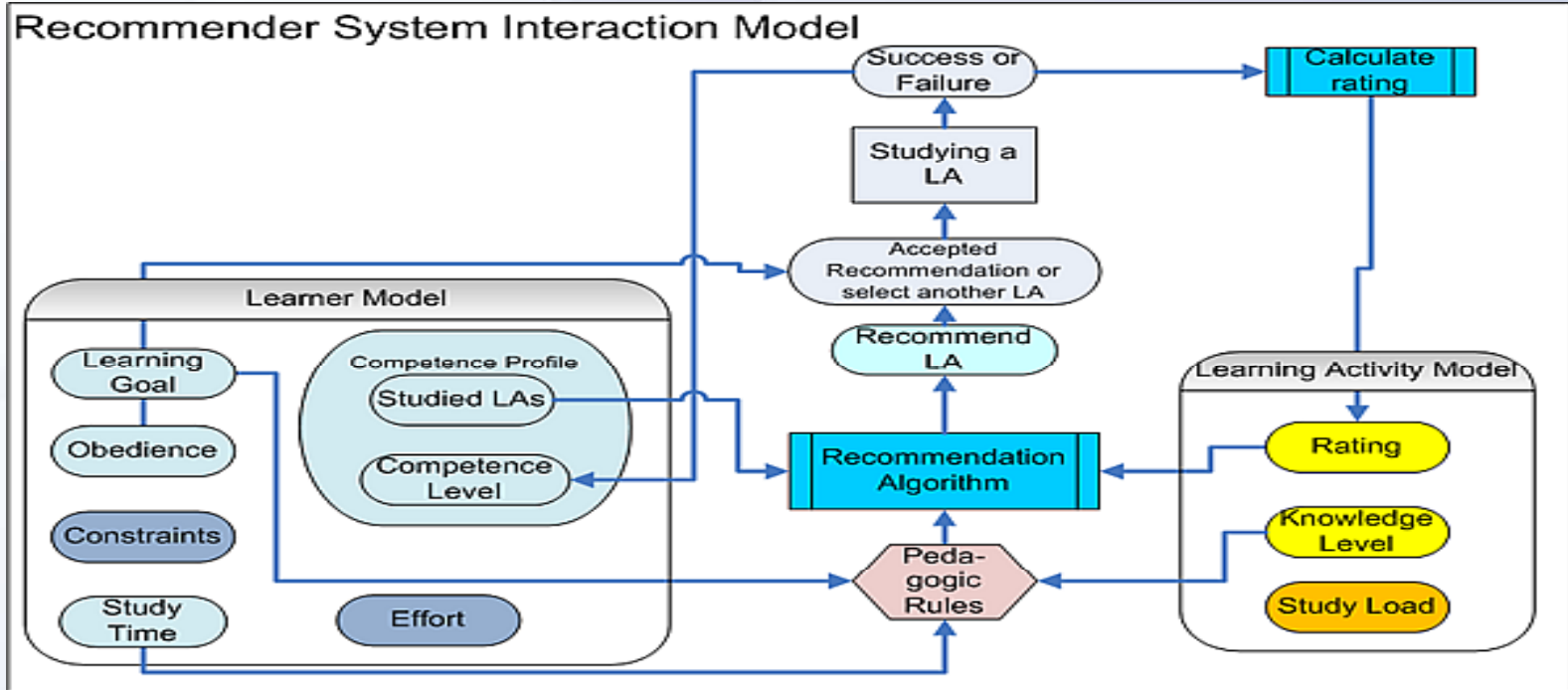
Simulation  
by Koper  
2005

Experiment  
by Janssen  
et al. 2005

Experiment by  
Drachsler et al.  
2008

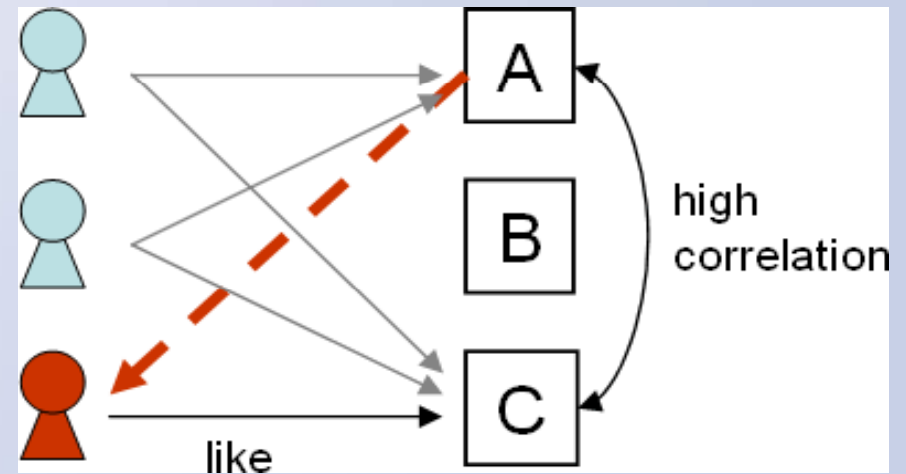
Simulation by  
Nadolski et al.  
(accepted)

New  
recommendation  
techniques in  
Simulation  
(pending)

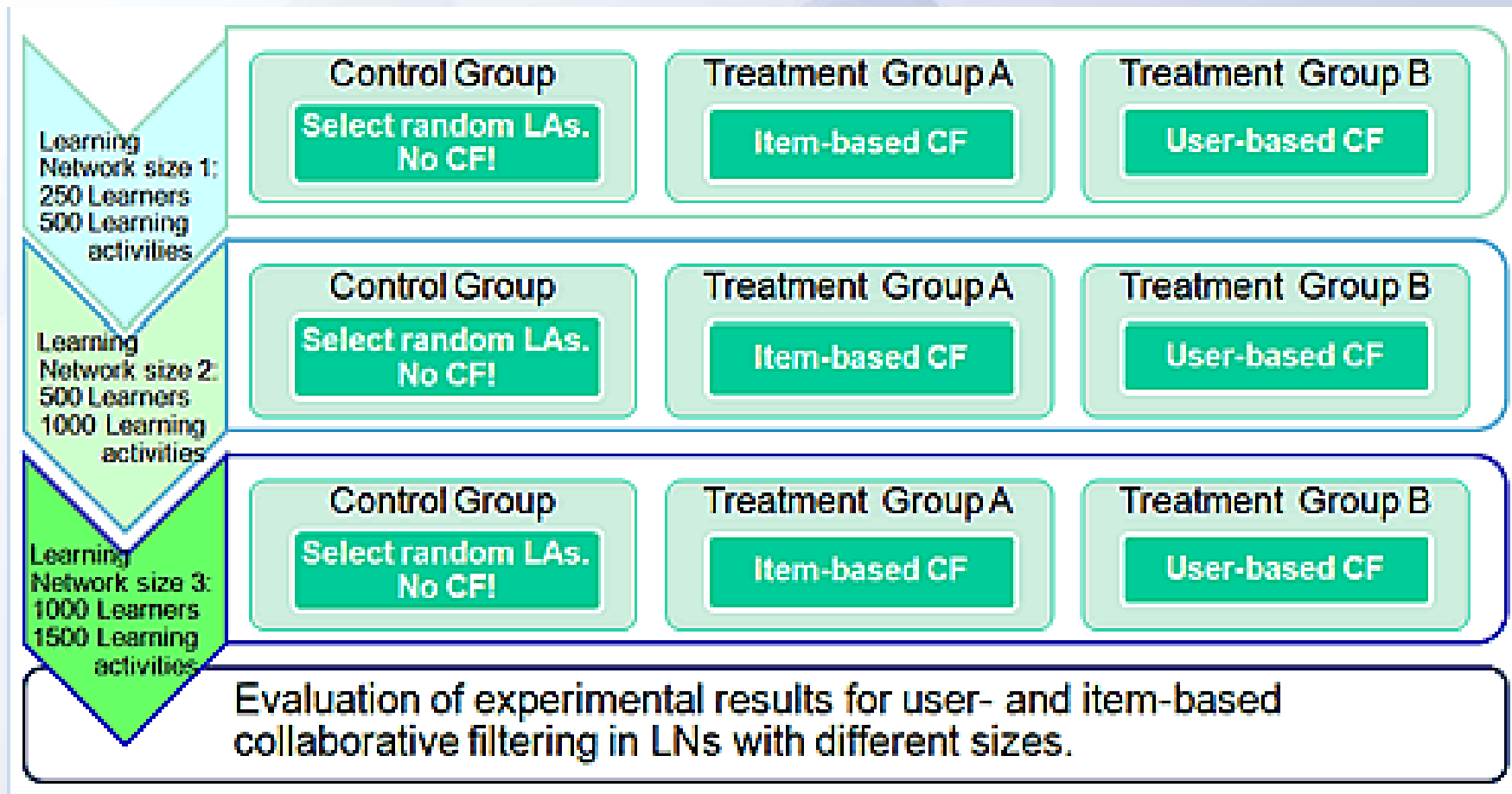


# Recommender System Algorithms

1. User-based filtering (Slope-One Algorithm)
2. Item-based filtering (Pearson Correlation)



# Experimental Design



# Evaluation Measures

## Learning Theory Measures

- Completed LAs (Effectiveness)
- Time to reach Learning Goal (Efficiency)
- Drop out rate

## Recommender System Measures

- Accuracy
- Precision
- Recall



**TEN** Competence

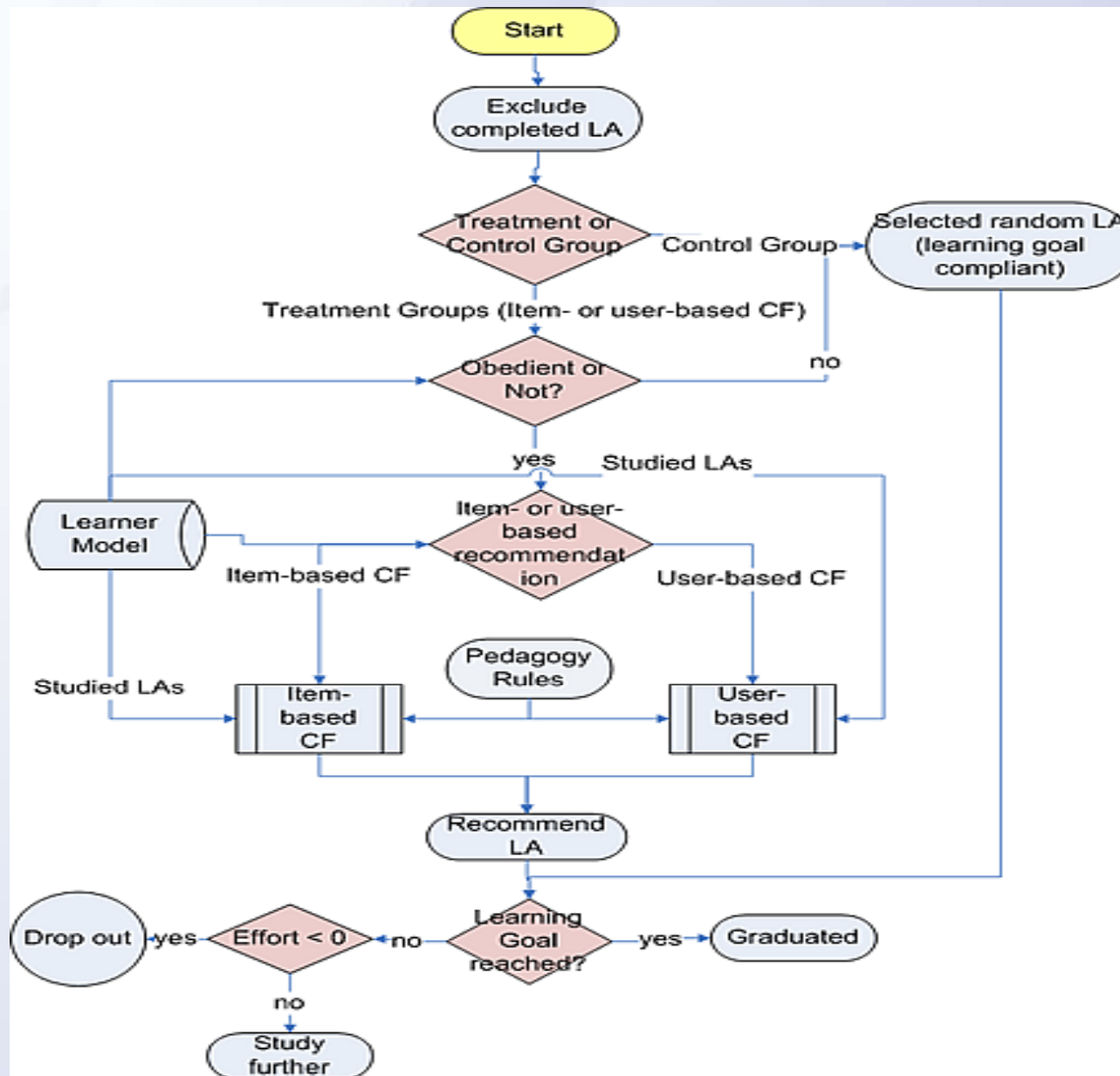
Building The European Network for Lifelong Competence Development



# Hypotheses

1. The treatment groups will be able to complete more learning activities than the control group (Effectiveness).
2. The treatment groups will complete learning activities in less time, because alignment of learners and learning activities increase the efficiency of the learning process (Efficiency).
3. The treatment groups have smaller drop out rates because the learners are more satisfied with the recommended learning activities. (Drop out)
4. There will be no significant difference between treatment group A and B regarding Effectiveness, Efficiency, Drop out rate.





# Multi-agent Modeling Environment “Netlogo”

## Description

A programmable multi-agent modeling environment for simulating natural and social phenomena.

## Author

Uri Wilensky in 1999, Continuous developed at the CCL, Northwestern's University, USA

## Purpose

- Modeling complex systems which are developing over time.
- Explore emerged effects through the connection between the micro-level behavior of individuals and the macro-level patterns from the interaction of many individuals.
- Core elements “*turtles*” moving over a grid of “*patches*” (both are programmable agents)

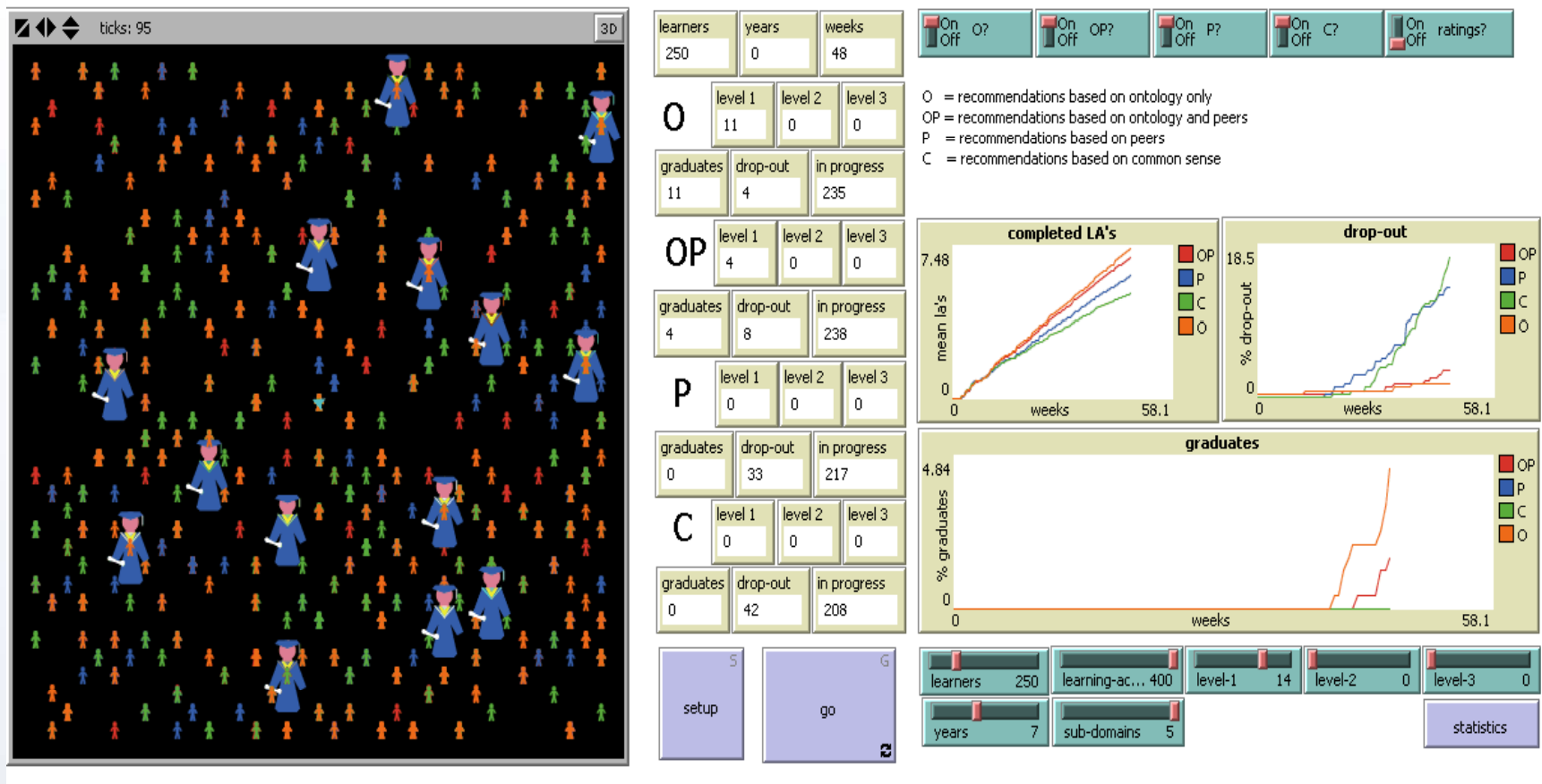


**Competence**

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# Screenshot of the Simulation



# Conclusions

- Simulation studies can offer insights into the supportive effects of collaborative filtering techniques for informal LNs.
- If the results are satisfying we can test additional algorithms in simulations before setting up real life experiments.

Many thanks for your interest!



**TEN Competence**

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