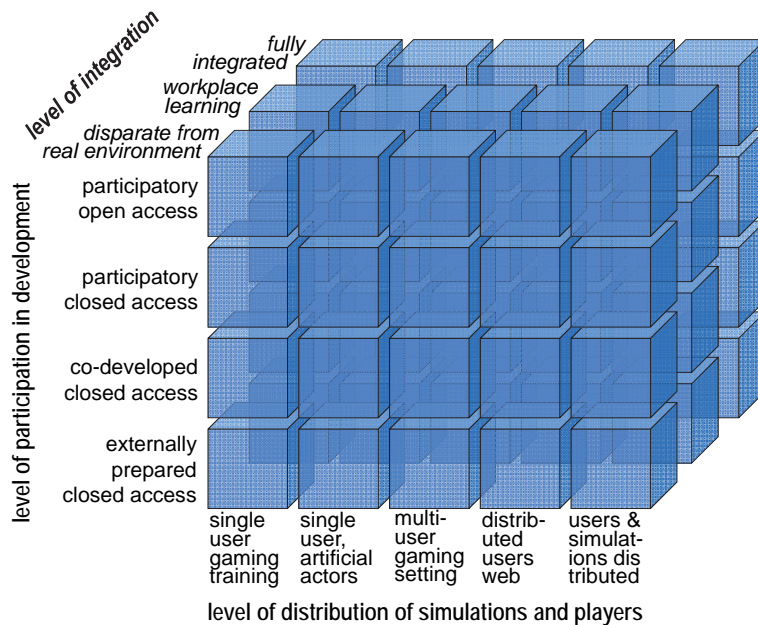
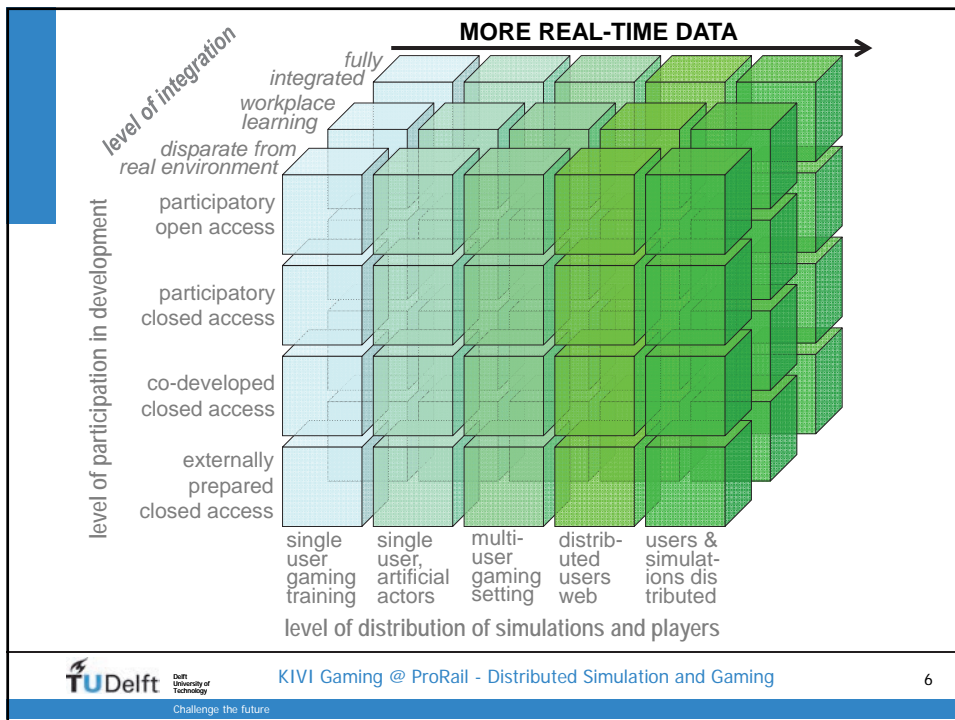
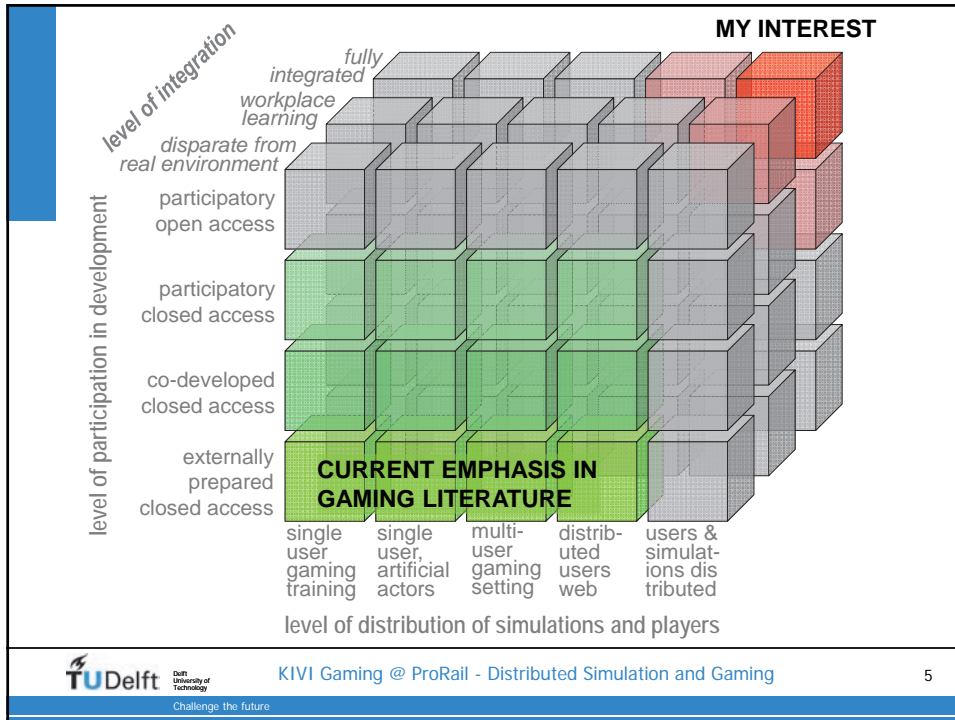


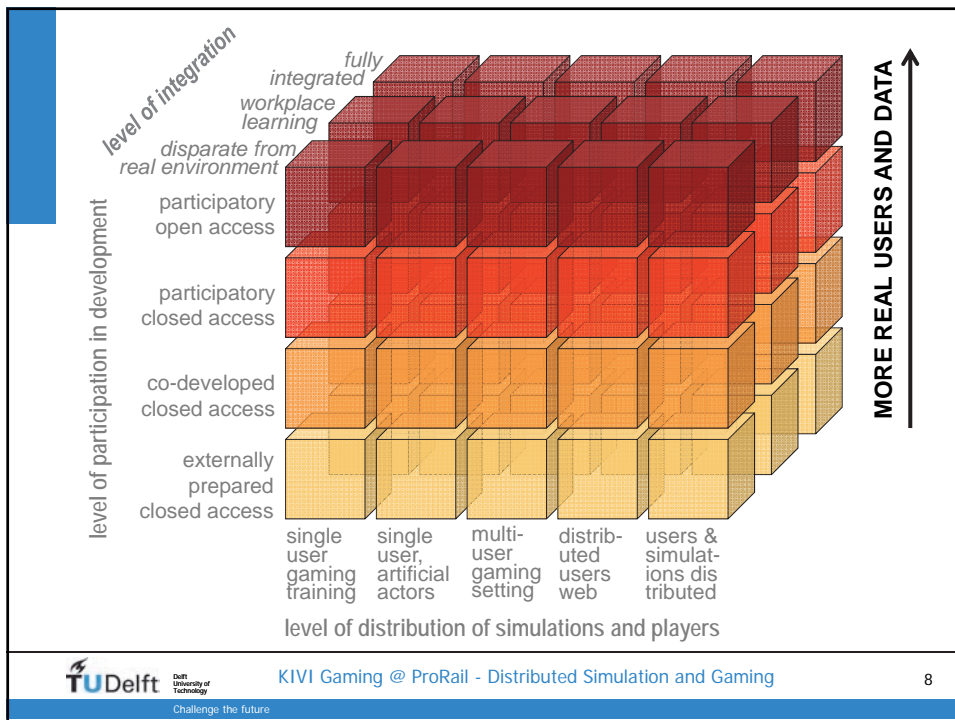
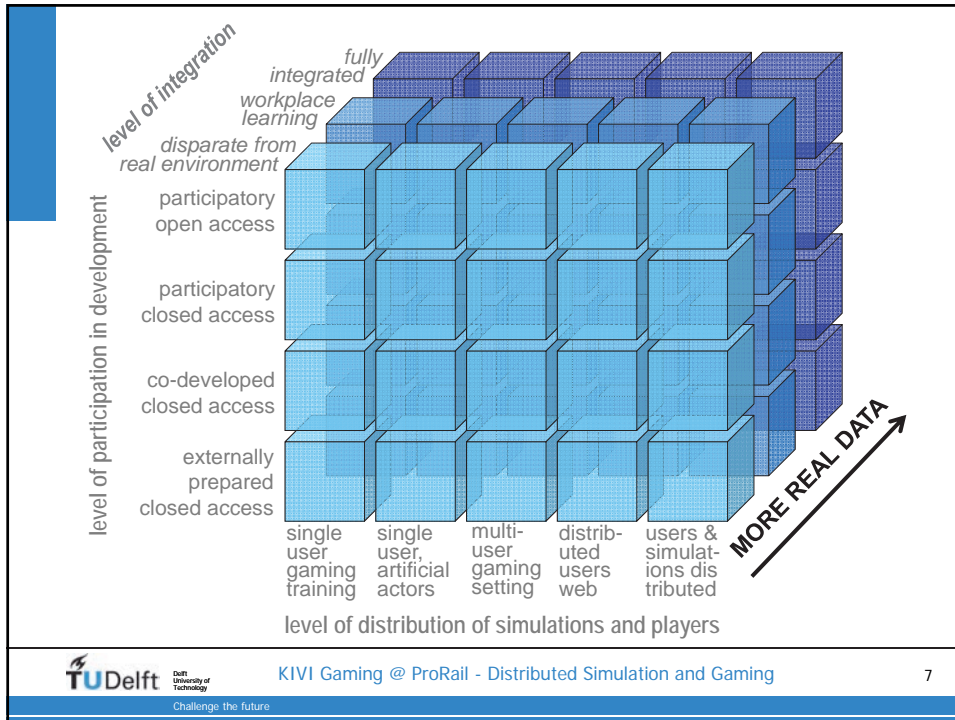


## Three axes in serious gaming development

- **Level of distribution of simulations and players**
  - single user, one simulation, no physical distribution
  - single user, computer simulates other users, no physical distribution
  - multiple users, one simulation, all users in one room
  - multiple users, one simulation, users access through web or client
  - multiple users, multiple simulations, all distributed physically
- **Level of participation in the game development**
  - game externally prepared, no real user influence, closed access
  - some users participated in the development, closed access
  - fully participatory development for a closed group
  - fully participatory development with open access
- **Level of integration in the workplace**
  - disparate from the real workplace, training center
  - game contains workplace learning elements
  - game fully integrated in day-to-day work



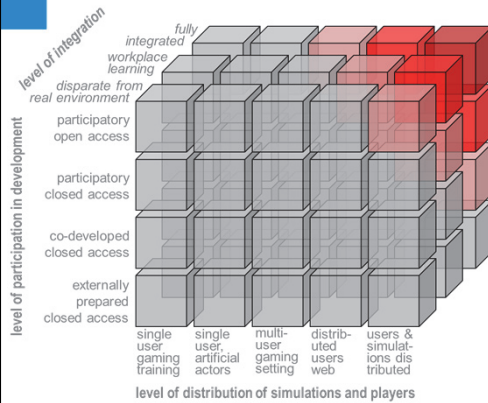






# Consequences for research and development

**Big leap** from current practice and current paradigms, although several of the necessary elements have been used before:



- heavily distributed simulations
- multiple simulations
- multiple views of reality
- participatory game design
- open access
- communities of practice
- integrated into day-to-day work
- anyone, anywhere, anytime
- real data
- real users
- real-time data

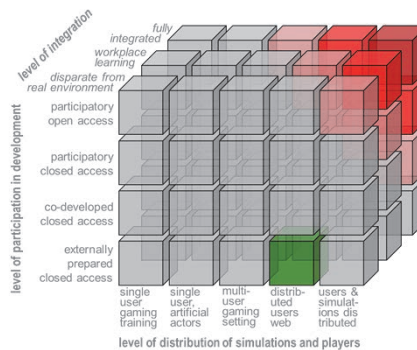
# Slowly working towards the goal

## 1) Global Supply Chain Game Competition



### Goal of the game:

Training students for operational and tactical decision making in complex, global supply chains using a web-based client/server simulation (multi-user).

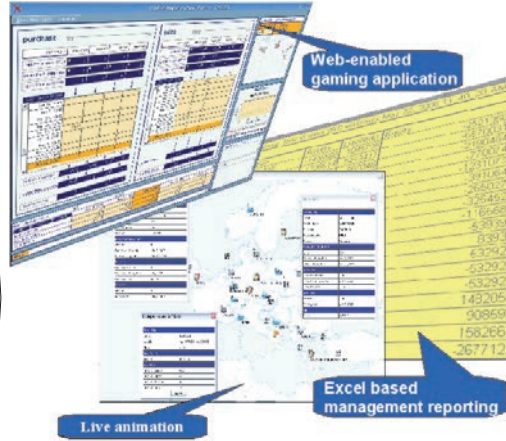


# A Live Supply Chain Game

## Situation

- Time pressure in today's supply chains
- Global dependencies and relations
- Variability in demand and supply
- Uncertainty in impact of choices made
- How to introduce these challenges to (future) managers? How to prepare them?

## What did we build?



- First on-line live supply chain game; combination between computer simulated market and real life players
- Work of 4 years academic research between TU Delft (NL) and Maryland business school (USA)
- 320 MBA students and 100 graduate students have been enrolled
- 10-50 students on average play concurrently and competitively

## Survey results

Scale=1-5, N=420

- 1) Effective for strategy forming
- 2) Comparable to real-life
- 3) Application is easy to use
- 4) The scenario supports learning

4.3

"I love the pace"

*Executive MBA student*

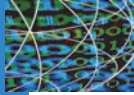
"This game will be part of all my courses"

*Professor in Logistics*



KPMG Gaming @ ProRail - Distributed Simulation and Gaming

## Added value due to realism



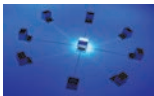
Players will have to make choices given a huge amount of information, part of which is distributed



There are time constraints



Players will have to form a strategy as a team and continuously monitor this strategy against their performances in the game

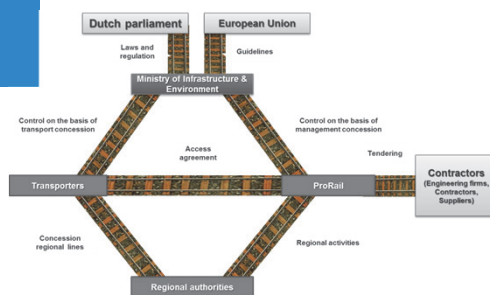


Dynamics in terms of competition



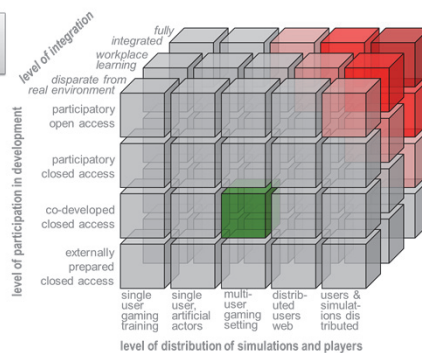
Simulation of a world wide global corporate environment

## Slowly working towards the goal 2) Complex Handovers at ProRail



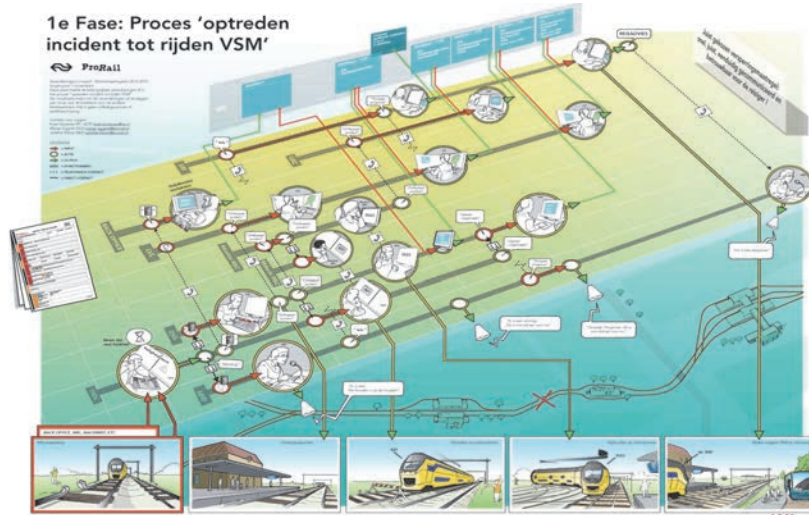
### Goal of the game:

Researching handovers during disturbances in a new operational concept for ProRail: High Frequency Train Operations.



# ProRail – complex handovers

1e Fase: Proces 'optreden incident tot rijden VSM'



# ProRail – Game play

## Challenge

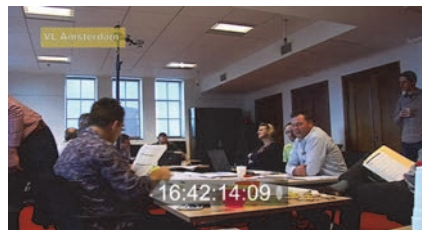
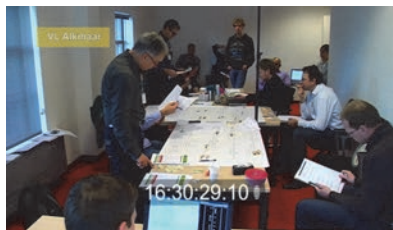
- 100% extra trains 2020

## Analog game

- Multi-actor
- Operators in real role
- Multiple offices connected through communication lines & shared video

## Two ways of handling a major disturbance

- Compare quantitative results
- Yield qualitative results from observers & debriefing
- Result: 'New' way will not work in practice
- Long list of expert items on how to improve the 'old' way





## ProRail – Game play

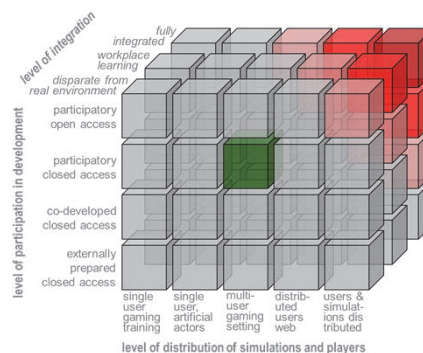
Elke 10 minuten een trein  
Every ten minutes a train



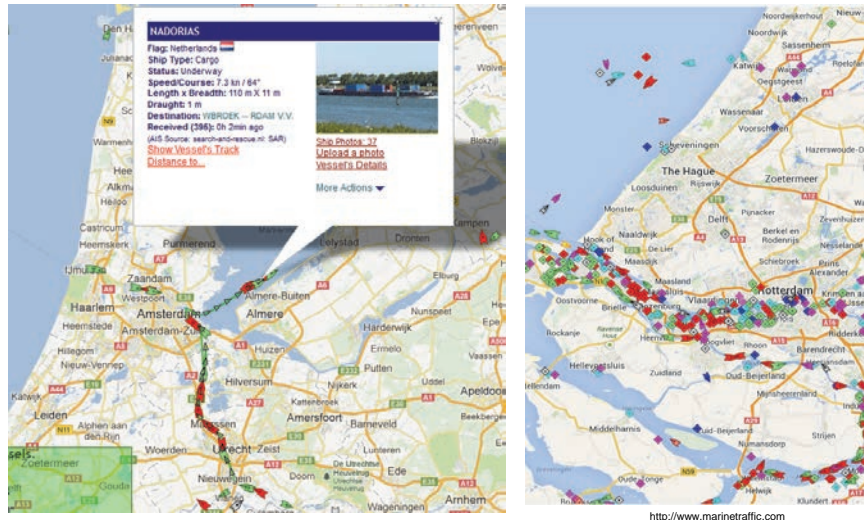
## Slowly working towards the goal 3) Barge Planning and Negotiation Game



**Goal of the game:**  
Negotiating new sailing services for inland barge transportation when there is a growth in demand and limited resources.

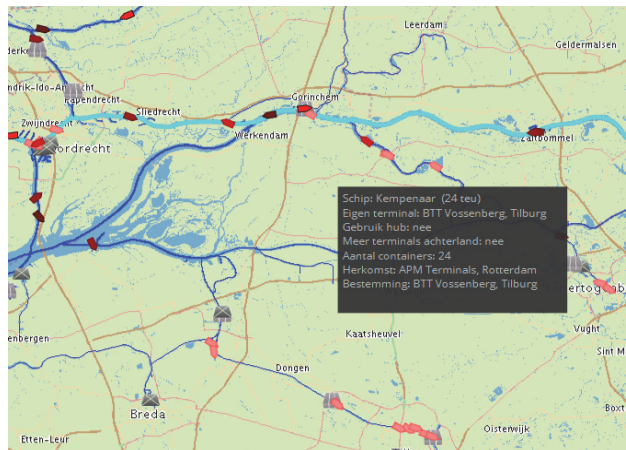


## Abundant data availability...



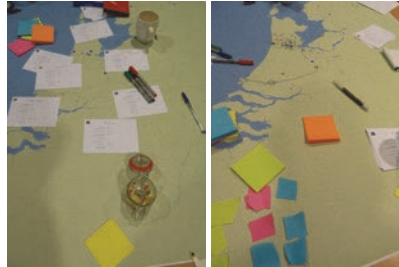
## Developed game

- Game developed with the market, based on lots of detailed data



- Business
- Growth
- Resources
- Negotiation
- Competition
- Roles
- Interdependency
- Performance

## Game impressions

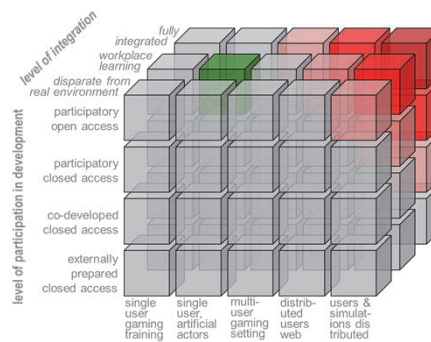


## Slowly working towards the goal 4) High Fidelity Graphics and Realism



### Goal of the games:

All kinds of training for professionals that need a realistic environment for training. Get what is 'outside' to the 'inside' to be used in (workplace) learning and gaming.





# Training in reconstructed environments

Use of laserscanning data to construct the world



# Stereo-photogrammetry for Railway Gaming

Gaming: lots of data to be processed...



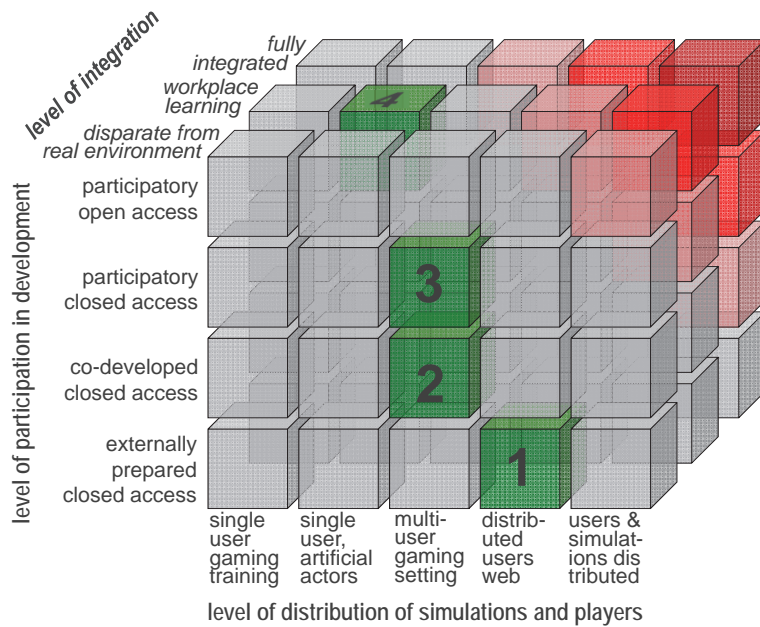
Real-time visualization of point clouds for train simulation purposes

01. Station Zevenaar 130 kmph





# Realistic human-computer interaction and virtual / real footage to drive in



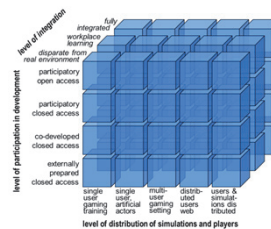
## Conclusions

Helping to address today's problems in networked organizations:

- **Relevance** models, data, realism
- **Richness** multiple worlds, scenarios
- **Realism** data-based, agents
- **Engagement** games, involvement
- **Participation** user-driven development
- **Networked** distributed, agent-based

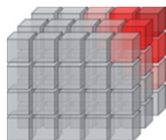
Progress needed and achieved for:

- **distributed and open access**
- **participatory development**
- **integration into day-to-day world**



## Contact data

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 URL: <http://tudelft.nl/averbraeck>



QUESTIONS?

