

Multi-Agent Model of Trust in a Human Game

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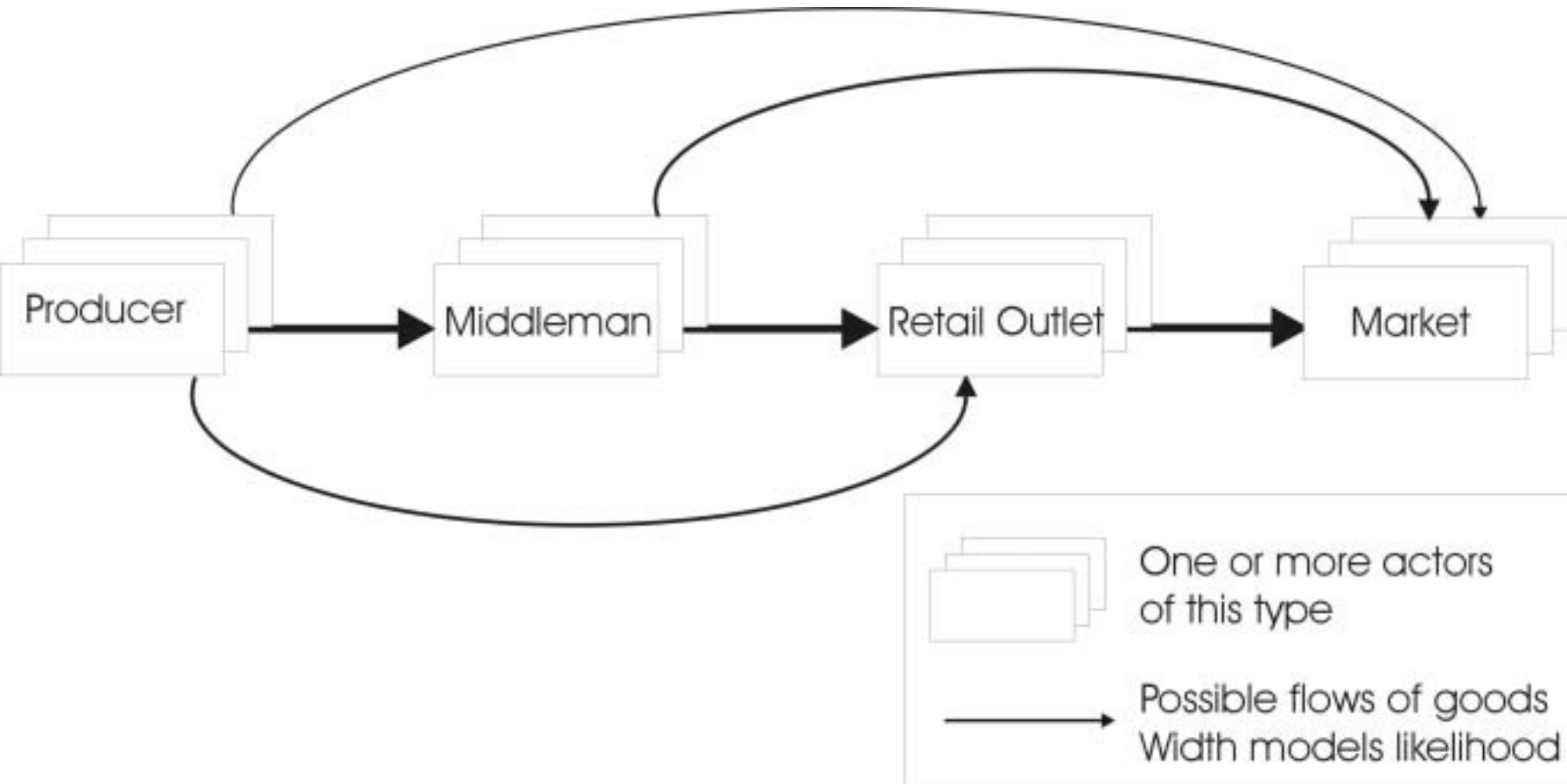
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Background

- Trust is recognized to be important in Transaction Cost Economics, but little is known about the mechanisms
- We apply human simulation games to gain insight in the mechanisms and role of trust
- Multi agent systems can operationalize qualitative models of individual behaviour from social science point of view
- Comparison of results from MAS and human simulation games vice versa can lead to better models

Food supply chain



Trust - invisible quality



MEZEDES
G. DIUNTE
148

NEKTARIN
548-
ŐSZI BAKKOCK
498-

SZENTESI
POMIDISZÓ
128

SZENTESI
SALATA
48

Paradicsom
148

SZENTESI
UTORKA
78

HÁZAI
UMACSKA
138

FRESKÓ
ZALACSKA
170-
70

JÁRMENTES
ZALAI
98

HÁZAI
ÉTER
268

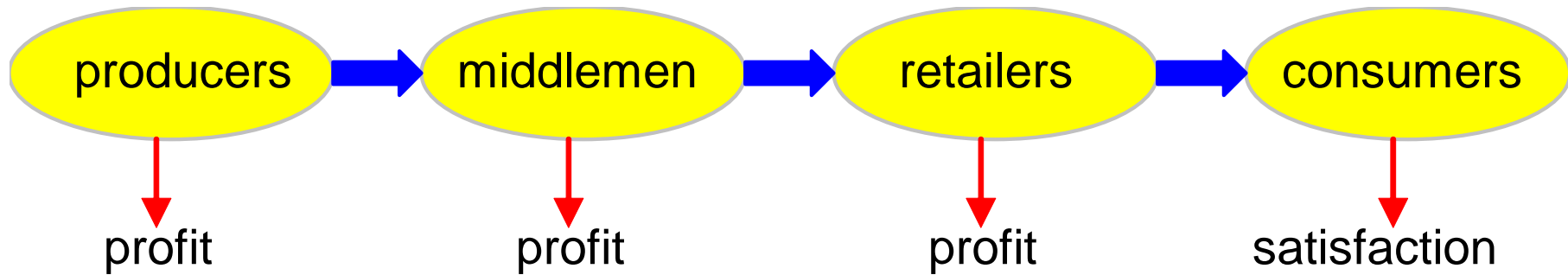
In this presentation

1. Explain the human game
2. Explain the role of human game and multi-agent simulation in supply chain research project
3. Present models of trading strategies
4. Conclusions

The Trust And Tracing Game

- Human simulation game
- Research tool for study of the importance and the effect of deceit and trust
- In supply chains and trade networks
- In different cultural / institutional settings

Typical game configuration



- 4 producers
- 4 middlemen
- 4 retailers
- 8 consumers

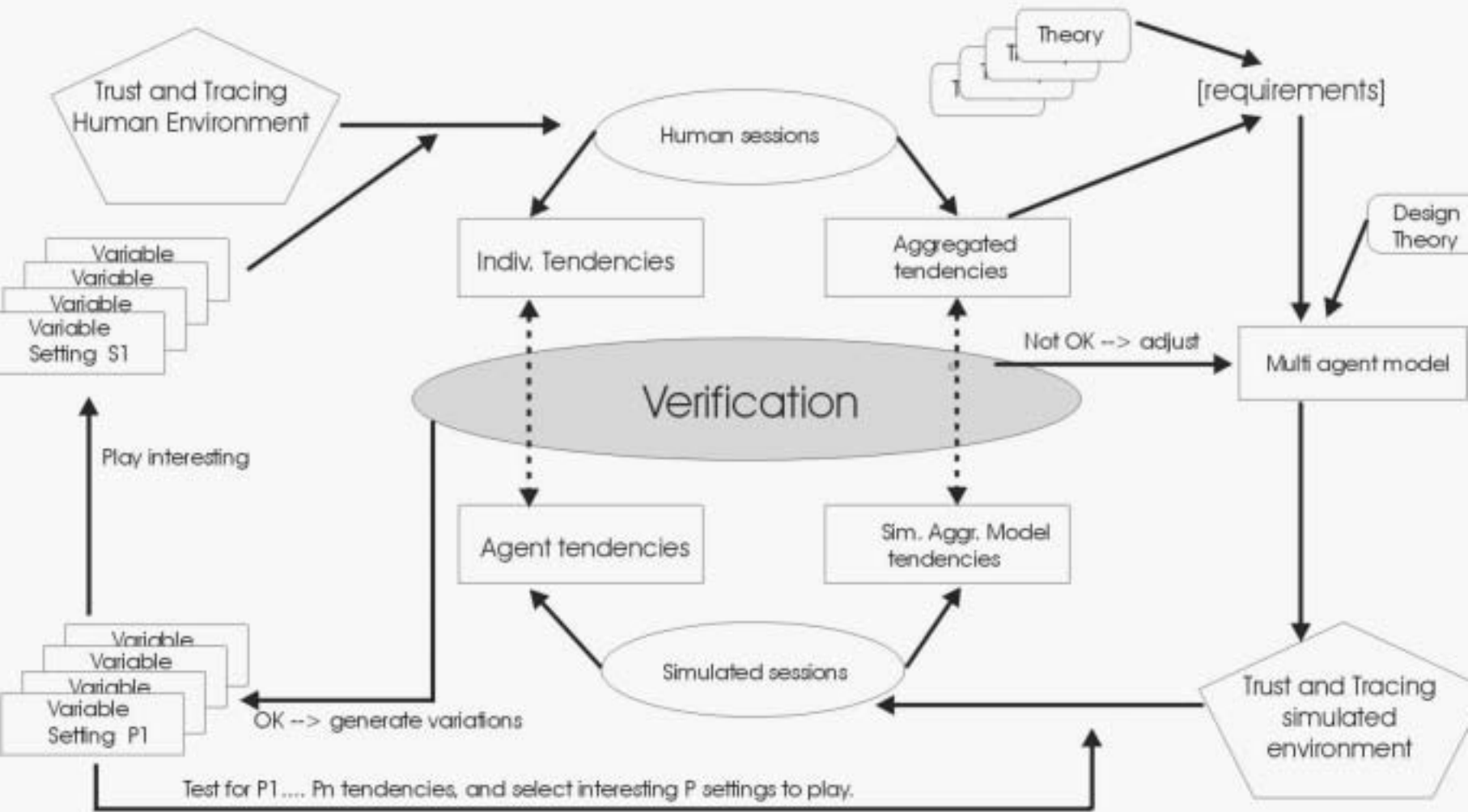
Invisible quality

- Commodities traded in the T&T game are of either high or low quality
- Quality is a hidden attribute
- Producers know the real quality
- Buyers either have to rely on seller's quality statement (**TRUST**)
- Or request that quality be assessed by the tracing agency (**TRACE**)





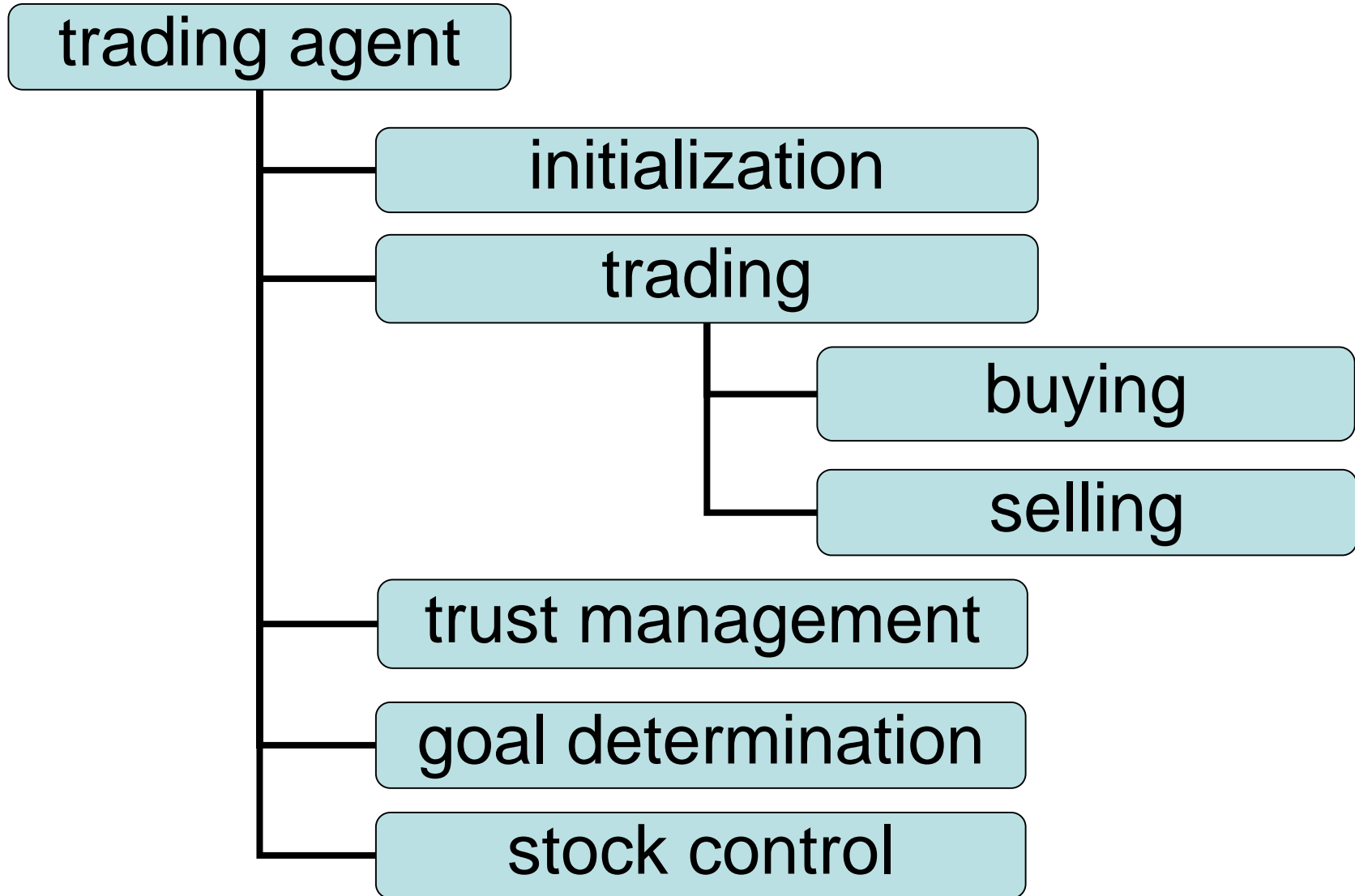
Research method



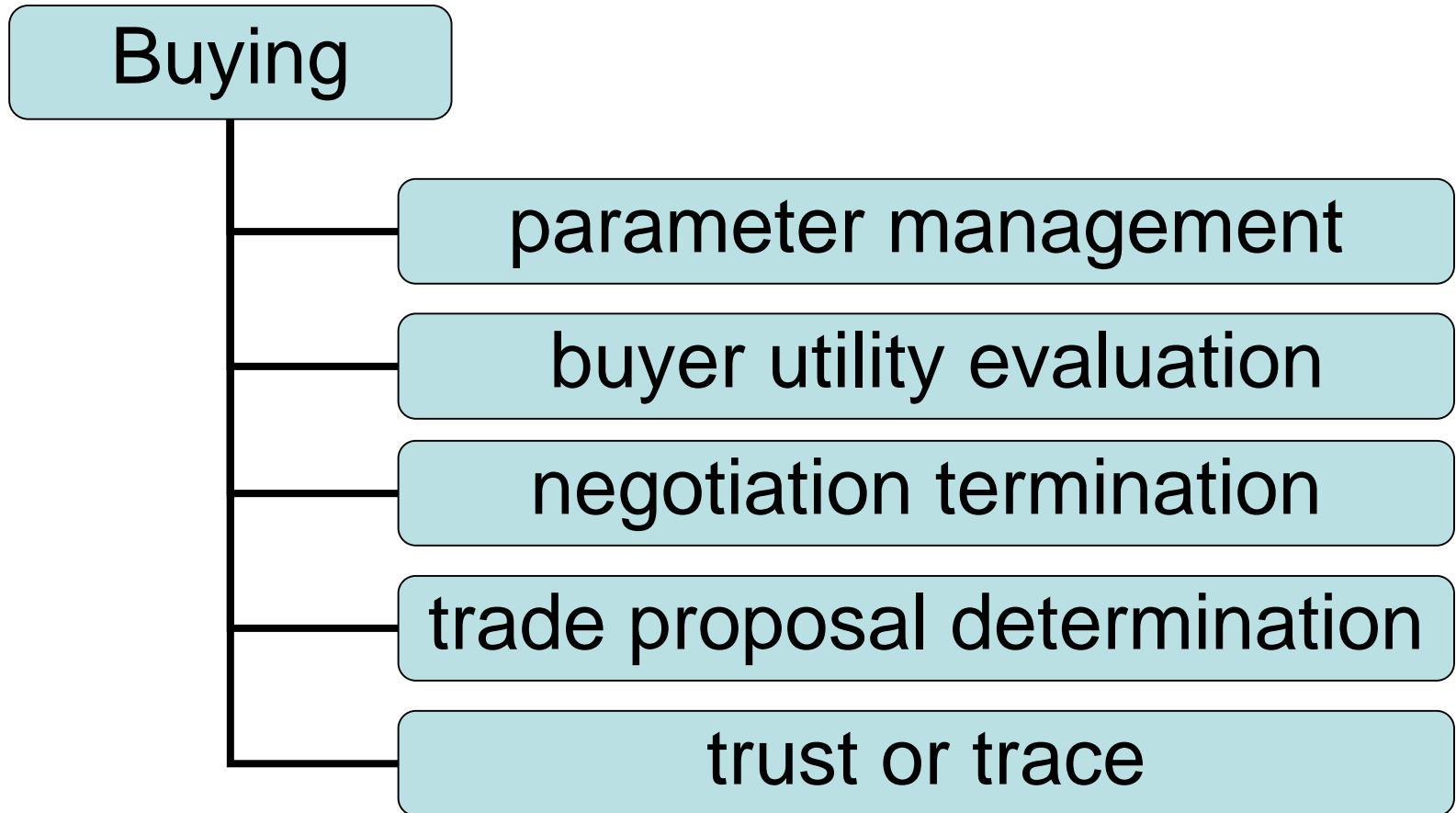
Purpose of MAS

- Simulate the human game (not the supply chain)
- Validate models of player's behaviour
- Select useful game configurations for testing of hypotheses about system behaviour under various institutional and cultural settings

Agent's process composition



Buying process composition



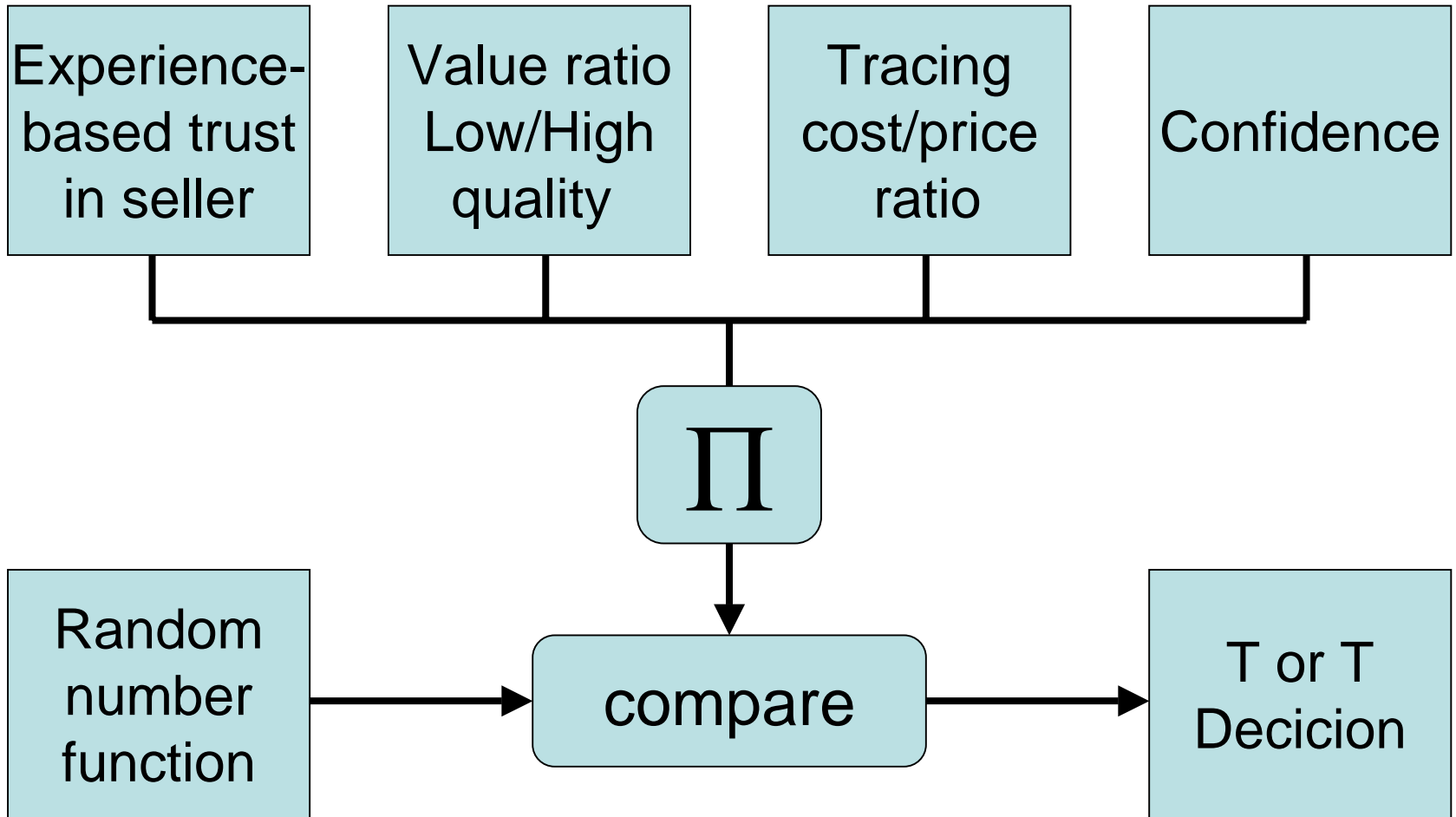
Utility of a bid

- Configuration of bid b is a tuple:
(product, quality, price, certificate, guarantee)
- Utility evaluation:
$$U(b) = w_1 P(b) + w_2 V(b) + w_3 R(b)$$
- (w_1, w_2, w_3) represents the buyer's strategy:
 - *Quality-minded*: low value of w_1
 - *Suspicious*: low value of w_2
 - *Opportunistic*: low value of w_3

Trust model



Trust or trace decision



Experience-based trust update

- Jonker and Treur (1999):

$$g(ev, tv) = d tv + (1 - d) ev$$

- Buyer agent maintains trust in each individual seller

Agent's traits (personality? culture?)

- Strategic preference (w_1, w_2, w_3)
 - Quality-minded
 - Suspicious
 - Opportunistic
- Confidence c
- Durability of trust d
- *Similar model for selling / deceit, offering the choice between honest and opportunistic selling strategies and involving honesty h as a trait*

Conclusions

- We offer a MAS where individual traits and institutional arrangements can be set
- The MAS does not simulate supply chains; it simulates human games for SC research
- Purpose of the MAS is to validate models of behaviour and select new game configurations
- Preliminary experiments show aggregated MAS tendencies similar to human games
- This is not not a validation of the behavioral models, but a validation of the approach