

# Prototyping for social simulation

Maarten Jensen



WASP | WALLENBERG AI,  
AUTONOMOUS SYSTEMS  
AND SOFTWARE PROGRAM

# Introduction



- Maarten Jensen, doctorand at datavetenskap
- Supervisor: Frank Dignum
- Co-supervisor: Helena Lindgren
- Socially aware AI group
  - Christian, René, Cezara, Eren
  
- Socially aware agents project
  - Implementation of socially aware agents
- Prototyping to assist implementation





# Why prototyping?

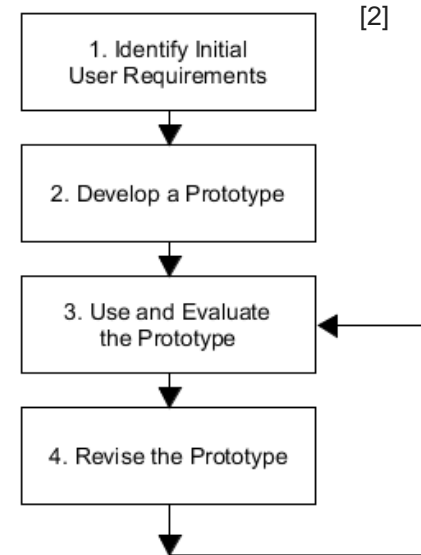
- Social simulation requires defining social concepts
  
- Example: context
- Easy for a person difficult for a machine
- What is the current context?
  
- Vague requirements → prototyping

# Emergence of prototyping

- Software development
- Life cycle method
  - Waterfall method
  - No turning back
- Need more flexibility
- Prototyping (agile)

# What is prototyping?

- *"An information systems prototype is an early version of a system that exhibits the essential features of the later operational system" [1]*
- Prototyping development →
  
- However there is more



[1] Sprague Jr, R. H., & Carlson, E. D. (1982). *Building effective decision support systems*. Prentice Hall Professional Technical Reference.

[2] Alavi, M. (1984). An assessment of the prototyping approach to information systems development. *Communications of the ACM*, 27(6), 556-563.



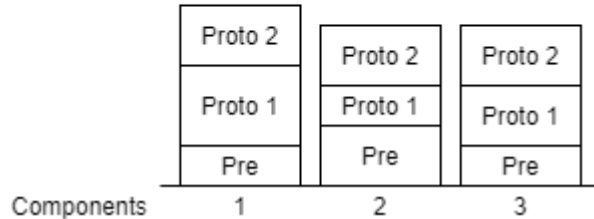
# Categorizations of prototyping

- Exploratory prototyping
  - Clarifying requirements and desirable features
  - Quick, throwaway prototyping
- Experimental prototyping
  - Interaction with user, stakeholder
  - Is technique useful?
- Evolutionary prototyping
  - Iterative development
  - Prototype evolves into product

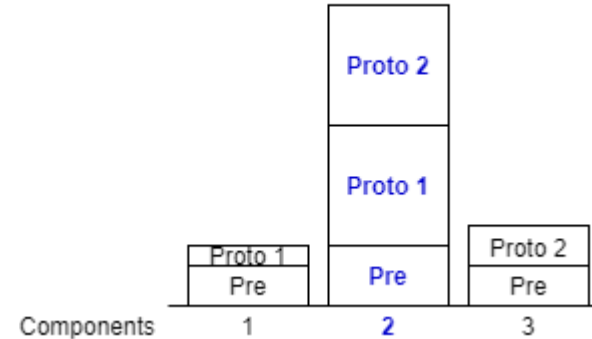
# Horizontal vs vertical prototyping

- Evolutionary prototyping

Horizontal prototyping



Vertical prototyping





# An issue in social simulation

- Social simulation model behavior of people
- Many (social) theories
  - Multiple interpretations [1]
  - Multiple implementations [1]
- Modelers often use only one
- A platform can help

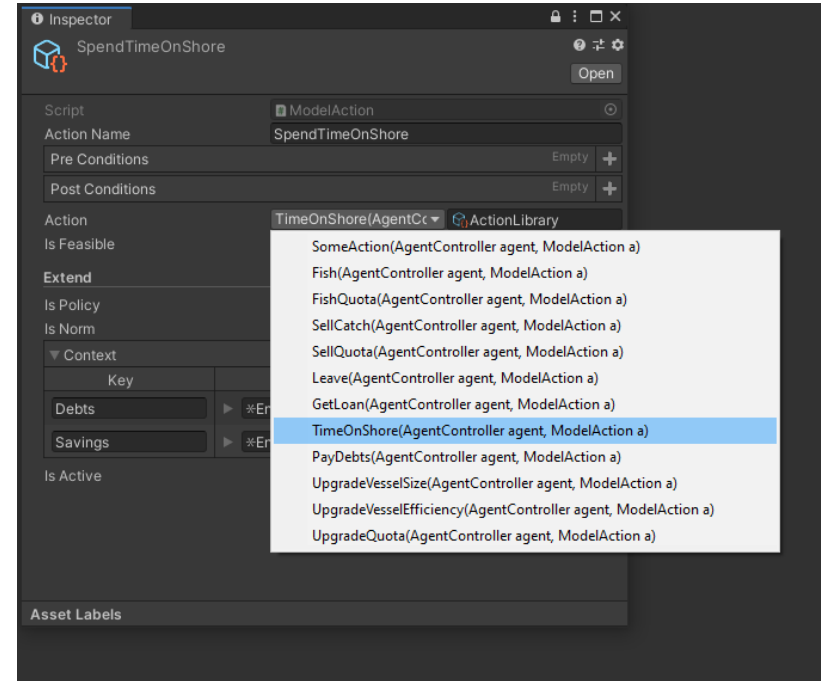


[1] Muelder, H., & Filatova, T. (2018). One theory-many formalizations: testing different code implementations of the theory of planned behaviour in energy agent-based models. *JASSS*.



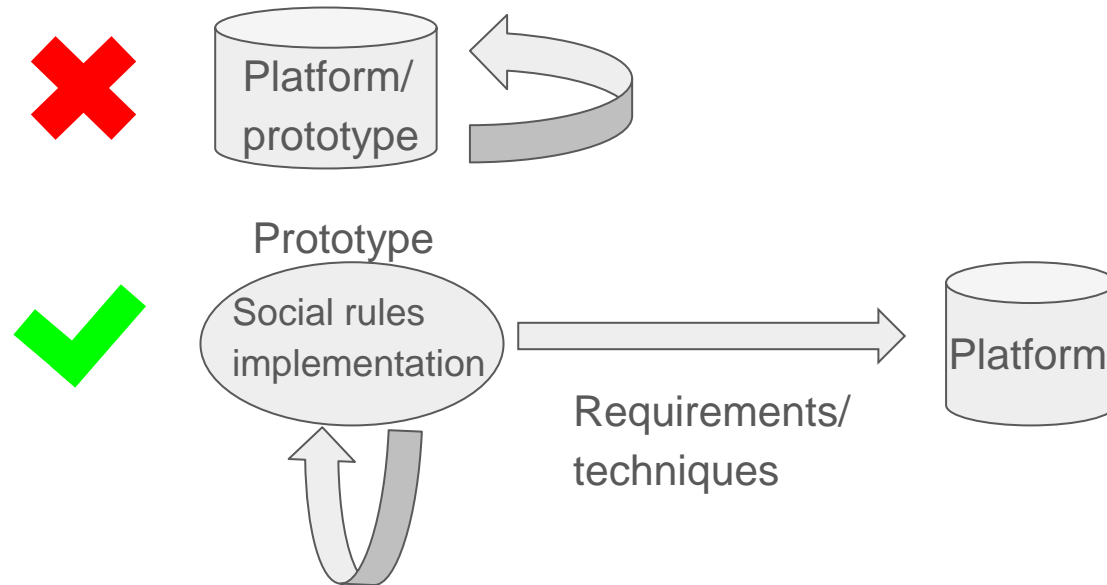
# Platform for social simulation

- Platform easy use of social rules
- First steps with Unity (Cezara Pastrav)
  - Legal/social norms
  - Rationality goal oriented
  - Basic context
- Now add habits, social practices, etc.
- How to do the next steps?



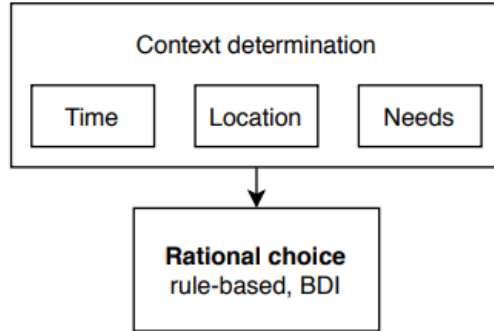
# How can we use prototyping?

- Not evolving the product
- Rather finding requirements

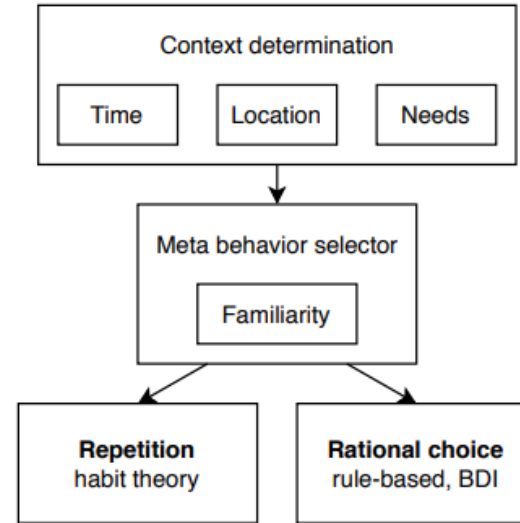


# Our current prototype

- Programming language choice
  - Java, Repast
  - Switch programming language?



Architecture prototype 1



Architecture prototype 2

# Conclusion

- Helps find requirements and issues
- Vertical prototyping gives focus
- Interesting for other researchers



# The end

- Thank you!
  
- Questions?

