

ABMS & DES for Modelling an Emergency Department

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Computer Model Development: Software



Implementation in Simul8



Figure 1: Resources in Simul8. Adapted from [Molina, A. and Gómez, M. and Sánchez, V. , 2015]

Implementation in Simul8

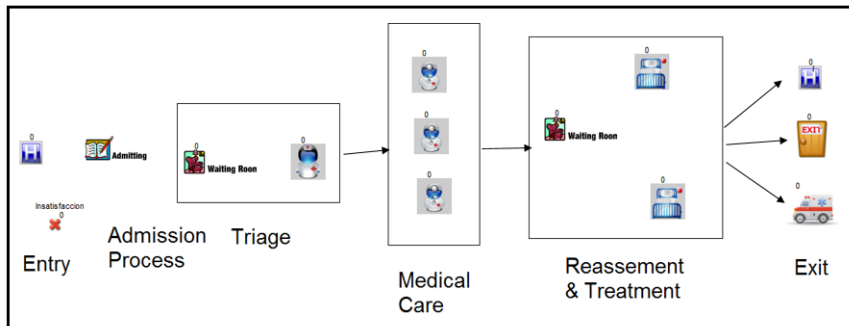


Figure 2: Patients flow. Adapted from [Molina, A. and Gómez, M. and Sánchez, V. , 2015]

Discrete Event Simulation

Features of the DES model:

- Schedule events (simulation clock)
- Graphical interface
- Resources and resources' pool
- Patients flow

Agent Based Modelling and Simulation

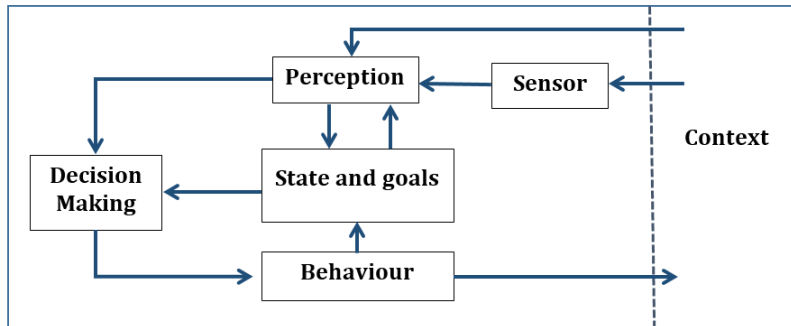


Figure 3: Description of an agent's behavior

Agent Based Modelling and Simulation

Doctors as agents: behavior

- **Context**

- Resources available
- Number of patients in the system
- Patients' time in the system
- Staff available
- Doctors' worked time

- **States**

- Physical: fatigue
- Emotional: stress
- Cognitive: knowledge level about patient condition

Agent Based Modelling and Simulation

Doctors as agents: behavior

- **Goals**

- To give the best diagnosis to each patient
- To release patients within 4 hours

- **Possible Decisions**

- To take a break
- To release a patient faster
- To order more tests to patients

Hybrid Model: DES & ABMS

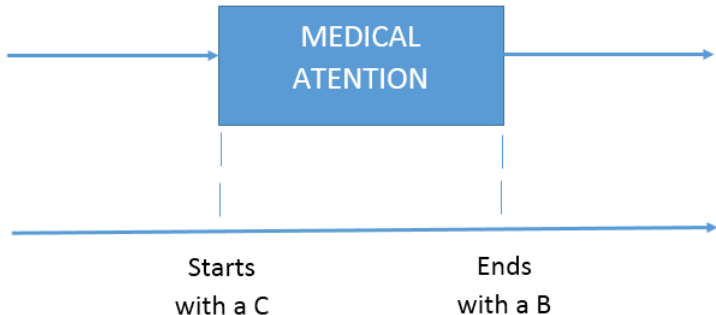
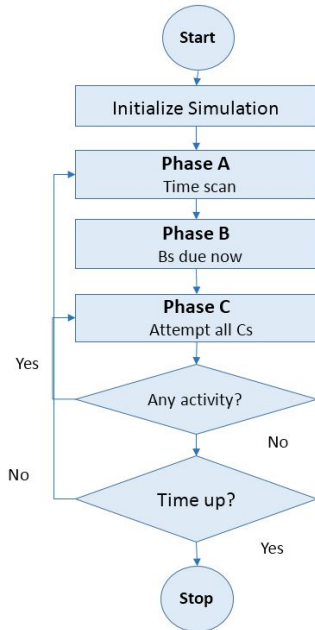


Figure 4: Bs and Cs in active states [Pidd, 2005, p 87]



Methodology

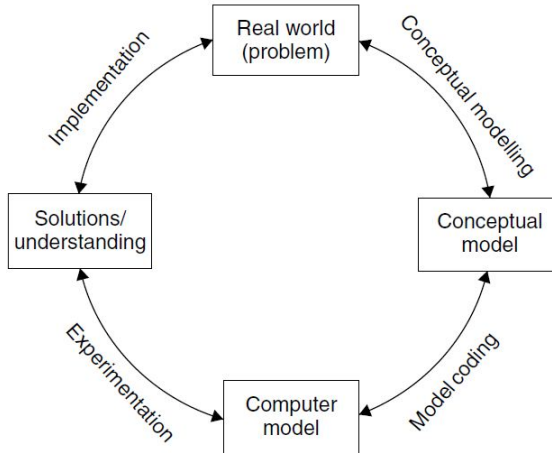




Figure 6: Simulation Studies: Key Stages and Processes.
[Robinson, 2014, p 52]




Further work:

- To model doctor's multitasking:
currently in DES is modeled as mini-doctors
- To find more suitable functions to model PECS variables:
currently all functions are assumed linear

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