SIMULTECH'14
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Opening Panel:
"Recent Issues and Trends in the Validation and Verification of Simulation Models"

Organized by Prof. Dr. Mohammad Obaidat)

"Some Normative Views"

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Sometimes it is not easy to perceive the order of the things.

Even if we have a closer look.

We can see the order clearly
when we change our point of view
(or when we have a paradigm shift).

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(or when we have a paradigm shift).

I would like to offer
some **paradigms** for V&V
to see additional possibilities
in a **systematic** way.

FA (Failure Avoidance)

QA (Quality Assurance)

V&V (Validation and Verification)

To explore more cases
in a systematic way

FA (Failure Avoidance)

QA (Quality Assurance)

V&V (Validation and Verification)

QA (Quality Assurance)

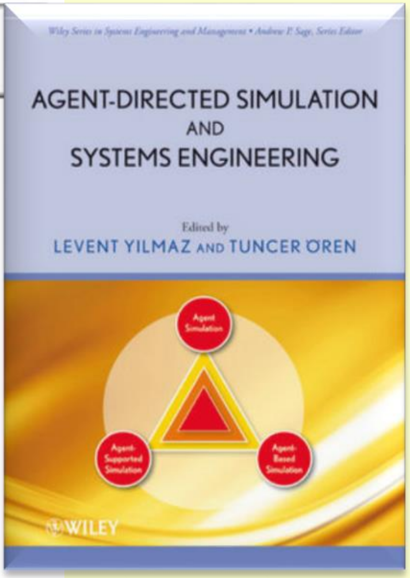
Ören, T.I. (1981).
Concepts and Criteria to Assess Acceptability of Simulation Studies: A Frame of Reference. CACM, 24:4, 180-189.

Sheng, G., Elzas, M.S., Ören, T.I., Cronhjort, B.T. (1993). Model Validation: A Systemic and Systematic Approach. Reliability Engineering and System Safety (Elsevier), 42: 247-259.

A list of about 90 publications / presentations on Reliability, QA, and FA

Table 7.6 Examples of erroneous inference rules.

Type of erroneous	Rules examples
Ambiguous rules	if a and b then x if a and b then y
Contradictory rules (conflicting rules)	Contradictory antecedent if a then x if c then x Contradictory consequent if a then x if a then y
Dead-end rules	(Unreachable conclusions) if a then x (where x is not a terminal condition and there are no antecedents containing x)
Inconsistent rules	if a then x if a then ¬x
Redundant rules	if a and b then x if b and a then x Another example if a and b then x and y if a and b then x (redundant)
Rules with incompatible premises	if a and b then x (where a and b are incompatible)
Rules with irrelevant literals	if a and b then x if a and ¬b then c Equivalent rule is: if a then x
Rules with unreferenced attributes	if a and b then c (where b is not used)



Failure avoidance:

Ören, T.I. and L. Yilmaz (2009). **Failure Avoidance in Agent-Directed Simulation: Beyond Conventional V&V and QA**. In L. Yilmaz and T.I. Ören (eds.). Agent-Directed Simulation and Systems Engineering. Systems Engineering Series, Wiley-Berlin, Germany, pp. 189-217.

Table 7.5 Terms related to sources of failure.

blunder	fault	mistake
corruption	flaw	malfunction
defect	fraud	omission
deficiency	illusion	paralogism
deviation	imperfection	pitfall
error	incorrect	risk
failure	misconception	sophism
fallacy	misfunction	wrong

- Contribution of Simulation to Failure Avoidance (pp. 192-193)
- Need for Failure Avoidance in Simulation Studies (pp. 194-196)

In M&S, sources of failures can be:

Project management
Goal of the study
Instrumentation
Data collection
Assumptions (explicit and/or implicit) in specifications of models, experiments (scenarios, experimental frames), and (model, experimental frame) pairs
Modeling (conceptual models)
Scenarios (experimental conditions) (realism and applicability of scenarios, consistency of joint scenarios in federations and federations of federations)
Design of experiments
Experimentation (behavior generation)
Computerization of (models, experiments, runtime libraries and infrastructure)
Computation (numerical computing, soft computing)
Logic (fallacies in logic (paralogisms, sophisms))
Artificial intelligence (rule-based expert systems, software agents (trustworthy agents, moral agents))
M&S infrastructure (including runtime facilities)
Documentation (inconsistent, erroneous, non existing)
Communication (between stakeholders)
Recommendations of the simulation study
Not or late implementing the recommendations

Table 7.3 Elements of M&S to be assessed.

People **(Including CEO of the M&S company)**
- system analyst/simulationist
- programmer

Problem solving paradigm
- decision process

Background knowledge
- problem (or domain) dependent knowledge
- methodology-based knowledge
  - knowledge of simulation
    modeling
    experimentation (design of experiments)
    data analysis
    result analysis
  - knowledge of support areas

Goal of the study
Restrictions (and their trade-offs)
Experimental conditions
Real system (its environment, structure, and behavior)
Model (its environment, structure, and behavior)
Model behavior
- generation
- processing (collection, compression, display, interpretation)

Computer
Computer environment/language

Table 7.2 Criteria for assessment.

Ethical considerations
Pragmatic considerations
Problem solving (paradigm, time, cost)
Goal of the study
Resources (available, to be procured, developed)
Real system
- (existing, to be engineered)
- (structure, behavior)

Technical system specification
Model
- parametric model
- parameter values
  (point values, vector vales, distribution functions)
  (range of acceptable values)

Experimental conditions
Simulation
- (run, study)
- (transition period, steady-state period)

Ethics

Ören, T.I., M.S. Elzas, I. Smit, and L.G. Birta (2002). A Code of Professional Ethics for Simulationists. Proceedings of the 2002 Summer Computer Simulation Conference, pp. 434-435.

SimEthics - A Code of Professional Ethics for Simulationists
http://scs.org/ethics

Increasing importance of M&S necessitates that more individuals and companies adopt and follow the Code of Professional Ethics for Simulationists.

"DII – Defense Industry Initiative
on Business Ethics and Conduct" exists

"The DII Community is a place for DII signatories to share and discuss best practices on ethical conduct within the Defense Industry."

Modeling and Simulation Industry needs SII (Simulation Industry Initiative - or SI2) on Professional Ethics
to be a place for the signatories to share and discuss best practices on professional ethical conduct in modeling and simulation. (Tuncer Ören)