



UNIVERSITY OF
CALGARY

Model Validation

Carey Williamson

Department of Computer Science

University of Calgary

- Plan:
 - Discuss verification and validation
 - Define concepts and terminology
 - Example: Barber Shop simulator
 - Effect of arrival rate
 - Effect of service rate(s)
 - Effect of waiting room size
 - Effect of dispatch policy

- Simulation is a widely used (and abused!) technique for systems performance eval
- It is important to establish trust and confidence in the results generated and reported via simulation
- Two (slightly different) aspects:
 - Verification: results are correct (built model right)
 - Validation: results match reality (built right model)

- Verification is mostly about establishing correctness (i.e., veracity, truthfulness)
- Does it do what it is supposed to do?
 - Meets requirements specifications (if any)
- Does it produce correct results?
 - Check results on known cases (input/output)
 - Handles special “corner” cases
 - Results are mathematically plausible

- Validation is more about the practical applicability of the simulator (usefulness)
- Does it give answers that make sense?
- Are the results intuitively plausible?
- Can it predict results for unknown cases?
- Can results be corroborated in some way?
 - Analytical model
 - Expert opinion (could you fool an expert in a Turing test?)
 - Experimental measurement data
- Relationship to reality is key!

- Suppose you have a simulator for the Barber Shop problem
- How to do “V & V” for simulation model?
 - Manual tracing with printf statements
 - Try boundary cases (extreme and/or special)
 - Numerical comparisons to analytical model
 - Comparison to M/M/1/K analytical model
 - Comparison to M/M/2 analytical model



- Simulation validation is an important step in establishing the correctness of results
- Rarely discussed in papers themselves
- Important “behind the scenes” effort
- Should be part of your science “checklist”
- If results don’t make sense, then find simplest possible example showing the problem, so you can debug and fix it!