Forensic Whole-Building Simulation

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Forensic Whole-Building Simulation

- Why?
- Work Request
- Model Description
- Problem Statement
- Calibration
- Application
- Conclusions

Start With Why

- Use of computer simulation
- What models can and can’t do
- Accuracy of energy models
- Specific application
- Calibration process
- Conclusions

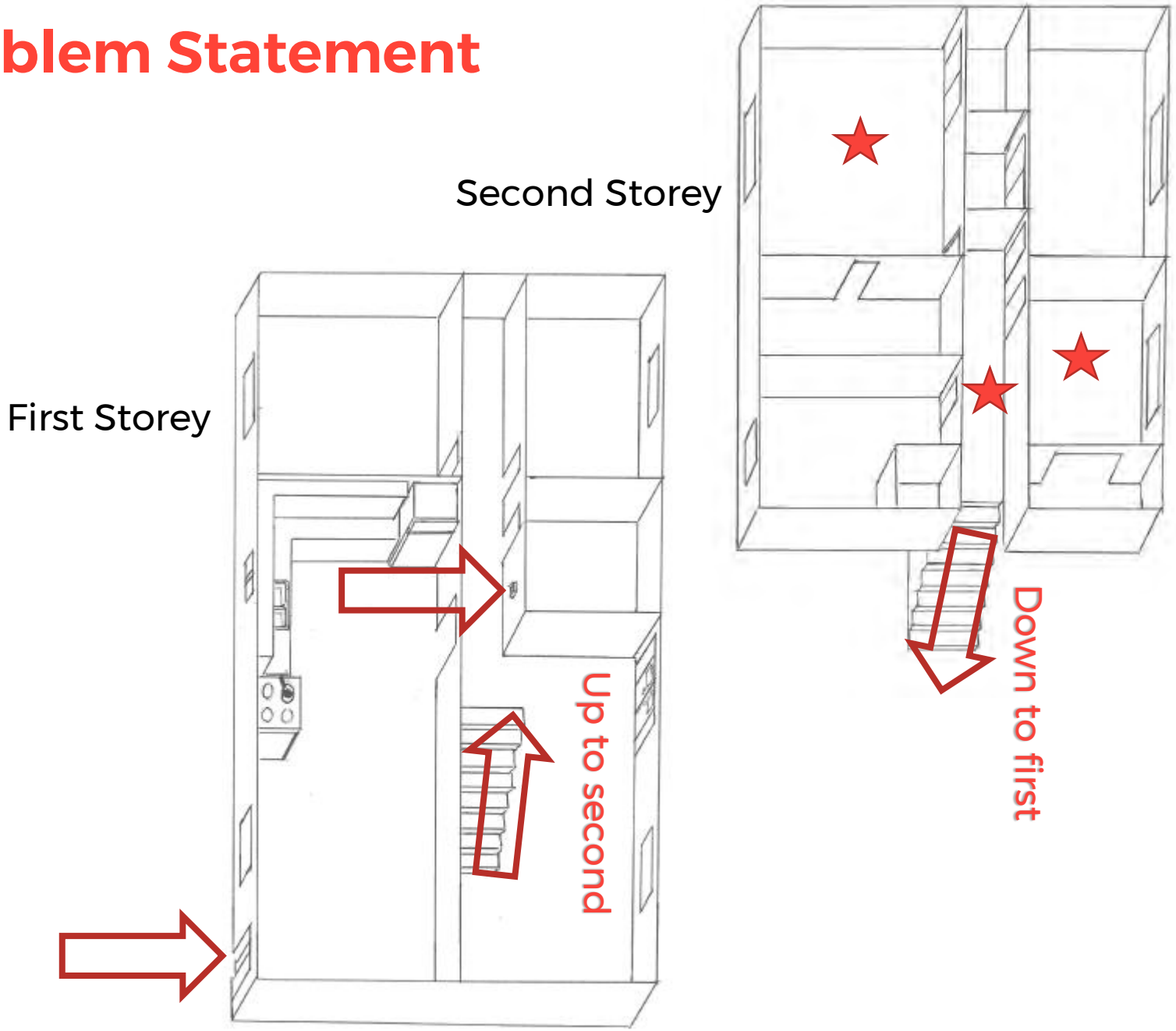
Work Request

- Request: whole-building energy simulation
- Required: T, RH for a known interval of time
- Calibrated model
- Forensic application

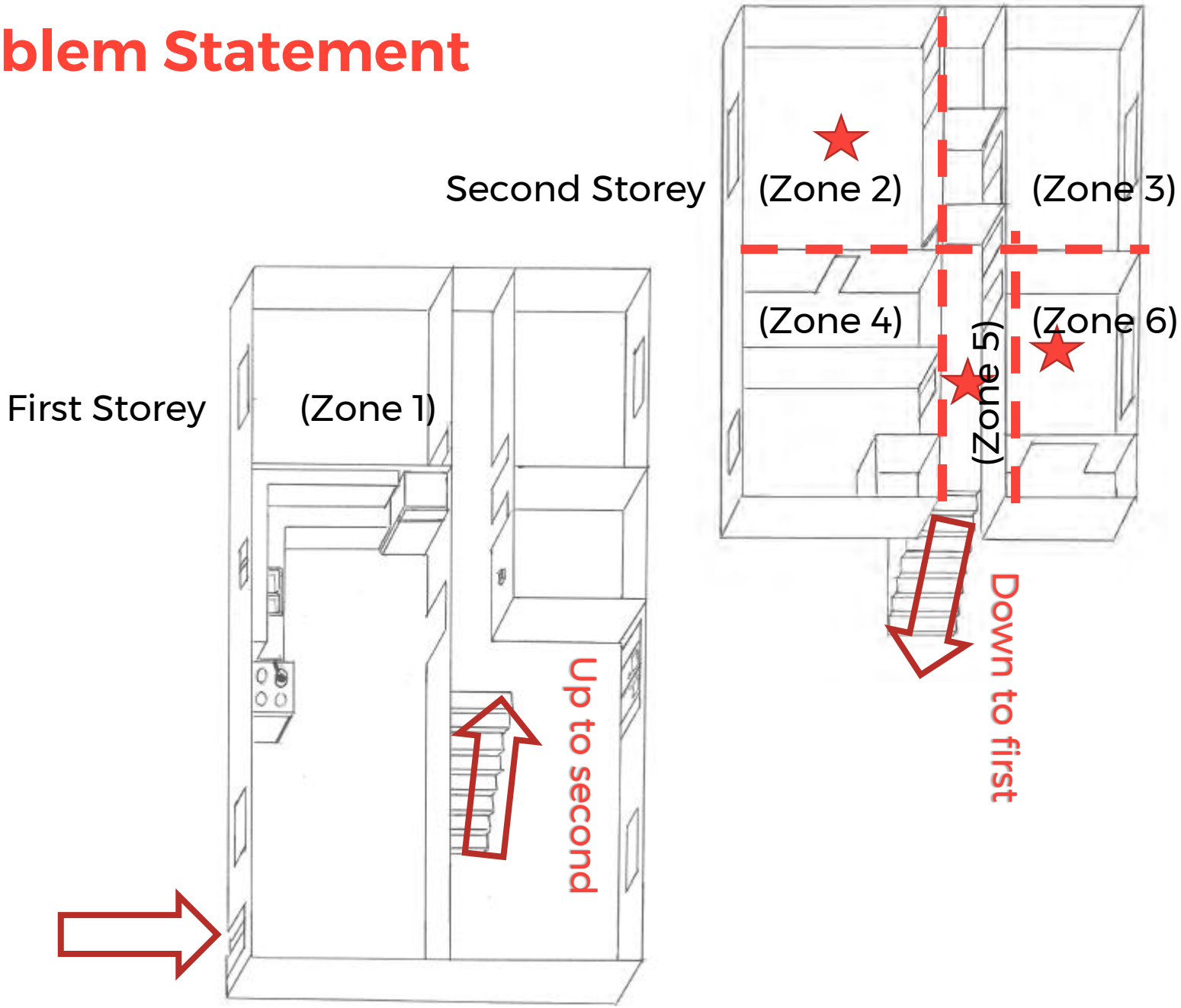
The Model

- Multi-zone whole-building energy model
- Passive solar, thermal mass, full HVAC
- Direct solver (not bin, matrix, Laplace, etc.)
- Infiltration model (ELA_4, adjusted for wind speed)
- 24-hour schedules for HVAC, lights, occupancy, water, rates, process loads, variable daily profiles (e.g., weekends)

The Problem Statement



The Problem Statement

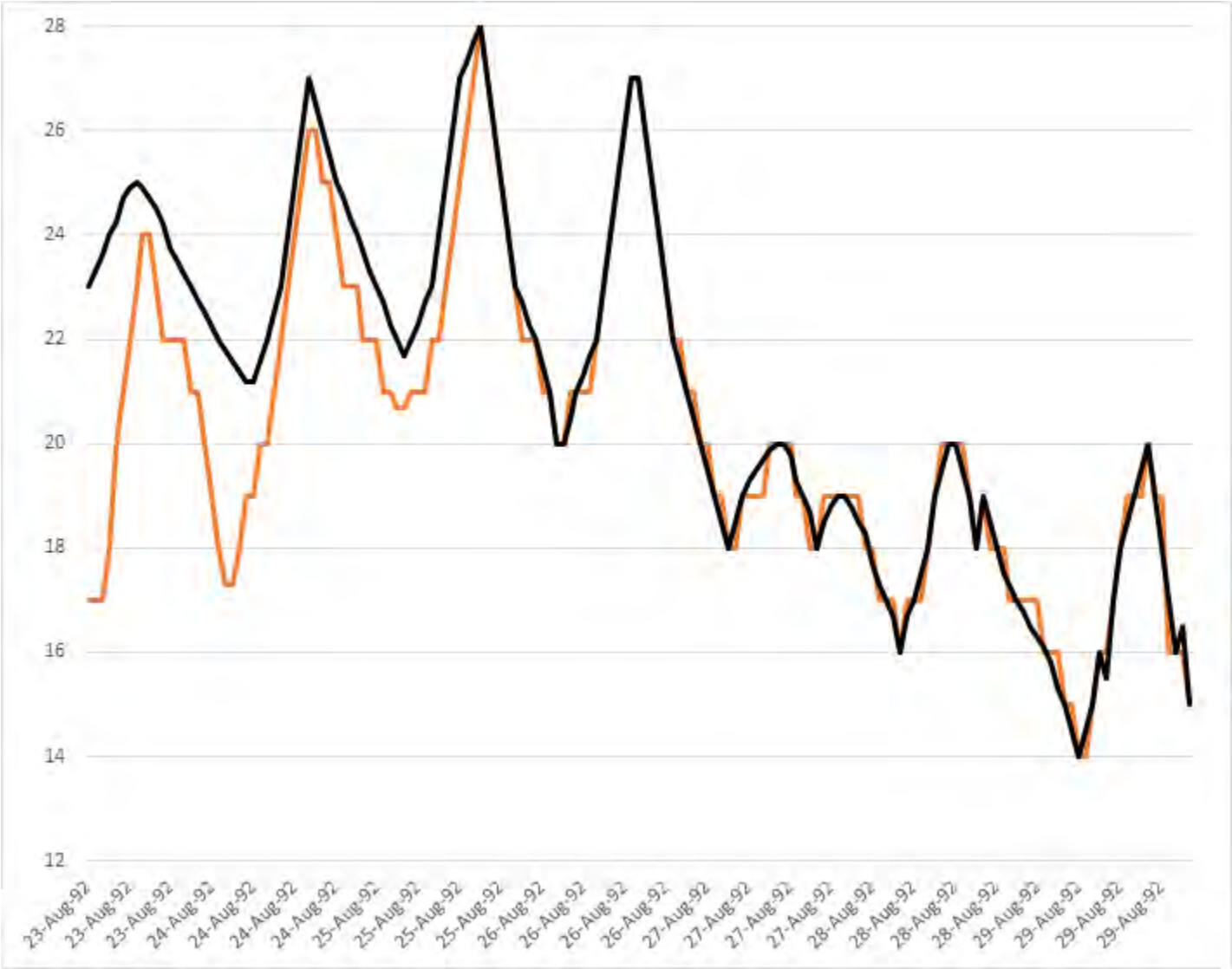


Calibration

- Accurate model (geometry, construction, controls, schedules, openings, HVAC equipment, infiltration, occupant behaviour)
- Hourly weather (solar, T_{db}, RH or T_{wb}, wind speed/direction)
- Calibration datum (measured values of T, RH)

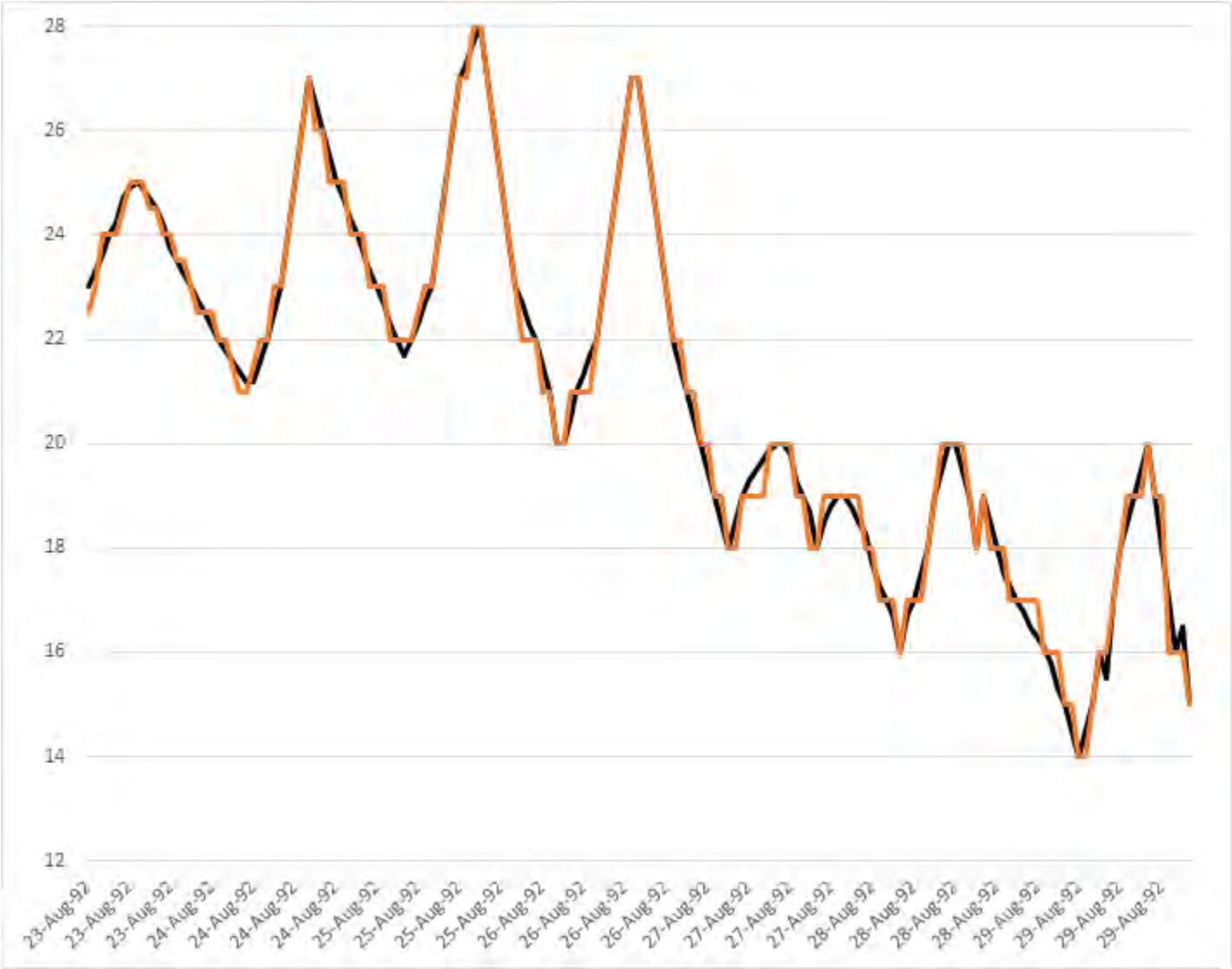
Calibration

Calibration

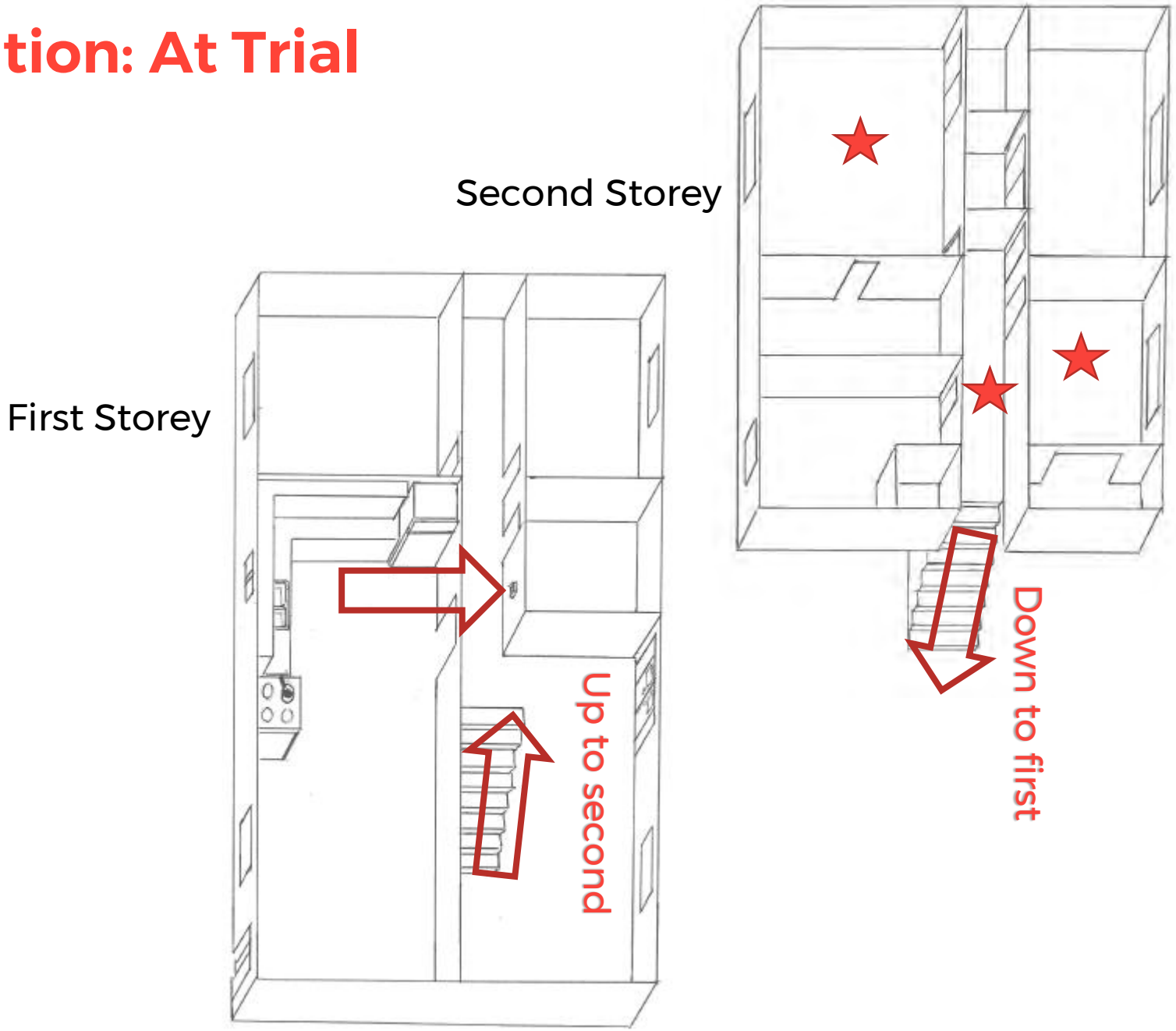


Calibration

Calibration



Application: At Trial



Conclusions

- Use of computer simulation
- What models can and can't do
- Accuracy of energy models – only as accurate as inputs
- Specific application – what are you simulating?
- Calibration process – reasons for differences

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