

Healthcare Operations Guidance for the Hospital Model

isee systems | MIT Alumni System Dynamics EMI Workshop

Workshop Challenge

A regional hospital faces persistent emergency department congestion, long patient wait times, and rising staff burnout. Explore how staffing, inpatient bed availability, patient flow, and resource allocation influence care quality and operating costs. Your task is to investigate assumptions and test possible strategies—not to accept AI recommendations without scrutiny.

Get Started in Stella Architect

1. Launch Stella Architect. Choose **File → Open**, then locate and open Hospital.stmx. Confirm the filename appears in the application title bar.
2. Locate the model canvas. You can pan or zoom as needed to inspect its variables and connecting arrows. *Do not worry about understanding every part of the model yet.*
3. From the menu bar, choose **Window**, then select **Open AI Assistant Panel**. A separate AI Assistant window should appear.
4. Move the AI Assistant next to the model, or select the docking icon in the assistant's upper-right corner to attach it to the Stella workspace. Keep both the model and the prompt field visible.
5. In the assistant, select Agent mode and choose **Socrates – Coach**.
6. Confirm the sd-ai URL is <https://ai.iseesystems.com>. Use the AI provider and other settings specified by the workshop facilitators.
7. Click the Prompt box at the bottom of the panel, type or paste your question, and select the **Send** arrow button. Read the response, then follow up with questions or request an explanation of the relevant model elements. *Suggested questions are on page 2 under “Guided Exploration: Three Stages”.*

How to Read the Model

System Dynamics models use several key structural components.

- **Stocks (rectangles):** Quantities that accumulate or deplete over time.
- **Flows (pipes and valves):** Rates that increase or decrease stocks.
- **Connectors (arrows):** Relationships showing how variables influence one another.
- **Converters (circles):** Variables, calculations, or parameters that influence system behavior.
- **Graphs:** Visual representations of how model variables change over time.

Using Socrates

Ask questions to explore the model's structure, behavior, and underlying assumptions. Evaluate its explanations against the model's relationships, equations, and simulation results.

Guided Exploration: Three Stages

UNDERSTAND

"What is happening in this hospital model? Identify the key variables and feedback loops affecting patient flow, waiting times, and staff burnout."

INVESTIGATE

"Why might congestion and burnout increase over time? Point me to the relevant relationships and assumptions in the model."

EXPERIMENT

"Suggest one strategy for reducing emergency department congestion while maintaining care quality and balancing staffing and operating costs. Can we compare its simulated effects with the current scenario?"

Tip: After each response, ask "What in the model supports that conclusion?" and inspect the corresponding structure or results. If a proposed action cannot be executed, ask for a conceptual explanation instead.

Optional Prompts if Time Permits

- What limitations of this model could make its recommendations unreliable?
- What changes to staffing or bed capacity could improve patient flow, and what trade-offs might arise?
- Does the model adequately represent the costs of providing care? If not, what structure or evidence would be needed?
- Can this model support optimization or uncertainty analysis? If so, explain the assumptions; if not, explain what would be required.

Before Returning to the Main Session

Discuss the following questions with your team and record your responses in the Google Sheet shared during the workshop.

- (1) Choose one observation to share during the workshop report-out.
- (2) What did Socrates help you understand?
- (3) Which assumptions or recommendations remain questionable?

(4) What additional evidence would you need before acting on a recommendation?