

Simulation modeling to right-size a strategic plan

Simulating real world processes in a virtual environment to assess countless different scenarios over multiple cycles and project outcomes.

A regional hospital in mountain community in Colorado commissioned Boulder Associates to prepare a master plan that projected its space needs through 2026. They sought a way to validate the recommendations of the facility master plan to ensure that they were correctly planning for capital investments over the next ten years. Boulder Associates performed this work using process modeling and digital simulation.

The starting point for developing a simulation model is always to obtain good data to establish a baseline. To that end, the team first had to document the existing space program to establish an understanding of the facility and the potential impact of regulatory changes to each functional area. The team then gathered national benchmark data to establish how the hospital ranked in their peer group.

Existing operational process flow was documented through careful on-site observations. This exercise captured between ten and 30 direct observations for each process step across seven departments. Historical data was used to understand patient arrival patterns by patient type.

A FlexSim model was created using the above information to generate a functional model that replicated the current operational performance of each department. The accuracy of this model was vetted by leadership and staff and certified as accurate.

Once the base model was complete, historical and industry-standard growth data was used to project anticipated 2026 patient volume. Simulations were then run for 2026 for each department to understand how many resources were needing to perform at the top quartile. For example, the scenarios tested the number of OR rooms, pre/post op beds required, and how many registration stations were needed. This analysis was done at each hour of the day for each month of the year. This in-depth analysis allowed for

a clearer understanding of demand patterns throughout the year. This was critical in-order to demonstrate what processes truly impact the size of each department. The outcome of the analysis provided projections for 2026 departmental sizes, against which the team could compare the recommendations of the master plan.

In addition, for central registration, sports therapy, and surgery, the team ran multiple scenarios for each to test the impact of shifts in staffing, acuity, and bed counts. The team was able to identify the ideal scenario and required space program for the departments if the hospital adopted specific improvements. For example, in the ED simulation, the team ran nine scenarios and recommended a program calling for eight treatment rooms, as it resulted in the lowest length of stay, and allowed for operational ratios of 1:4 RN to PT and 1:8 physician to PT.



Length of stay scenarios for ED

The team then created two space programs for 2026. The first was based on the operations team implementing process improvements and the second space program was based on no improvements. The most important discovery was that the overall master facility plan had the correct overall square footage, but that the allocation or distribution of square footage needed to be adjusted between departments. As a result, revisions to the master plan were made to better align facility priorities and direction.

"Without the simulation process, we would have built out the wrong areas and created bottlenecks."

- Hospital CFO



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Operational Excellence is a catalyst for improvement and innovation.

Our expertise comes from more than two decades of using process-driven design to deliver healthcare facilities. In that time, the ideas of optimizing flow, reducing inefficiencies, and operational assessments have informed the design services we provided. From our years of full engagement with the concept of lean, we have now established Boulder Associates Operational Excellence as a consultancy that provides a range of services from training to assessments to custom data visualizations to clients in various sectors worldwide.

We believe that being a lean organization is an advantage in the marketplace. We teach lean, but we also act lean. When we provide coaching, we anchor our work in the real world solutions that have benefited us in our design practice. While we are quite comfortable working with our clients at a strategic level, we are at our best when we join our clients and team members in the trenches, rolling up our sleeves and collaborating on tactical solutions that add value.

CONTACT US AT OPEX@BOULDERASSOCIATES.COM
800.499.7796