Proceedings of the 2015 Winter Simulation Conference
L. Yilmaz, W. K. V. Chan, I. Moon, T. M. K. Roeder, C. Macal, and M. D. Rossetti, eds.

COMPUTER SIMULATION IN FEDERAL GOVERNMENT AT THE NATIONAL INSTITUTES OF HEALTH (NIH)

Antonio R. Rodriguez and Joseph J. Wolski

National Institutes of Health
Office of Research Services / Office of Quality Management
31 Center Drive, Room 3C36
Bethesda, MD 20892 USA

ABSTRACT

Although computer simulation (CS) modeling is gaining popularity in government and industry, its use in administrative/operational settings in the Federal government is limited. The benefits realized through use of this tool have enabled programs to gain greater understanding of delivery processes; identify problem areas or bottlenecks; evaluate the effect of systems changes such as demand, resources, and constraints; identify actions needed upstream or downstream of a given operation, organization, or activity to make improvements, assess cost reduction alternatives; and evaluate the impact of changes in policy prior to implementation. The NIH/ORS Office of Quality Management (OQM) acquired and implemented the software tools and developed the internal staff capability needed to support these efforts. OQM has implemented a variety of CS efforts that enhanced emergency planning and the cost effective delivery of ORS services to the NIH. This approach should be used widely throughout the government.

1 INTRODUCTION

Federal Executive Branch agencies have an obligation to the public to be good stewards of taxpayer dollars, and ensure that program operations are executed in the most efficient and effective way possible. In light of the recent budgetary challenges due to ongoing flat and reduced budgets, sequestration, and accountability measures, agencies are under increasing pressure to do either the "same with less" or even "more with less" resources available to carry out their missions.

In response to these challenges, agencies must constantly understand, measure, and improve the product/service delivery processes to their internal agency customers and the American Public. Computer simulation (CS) enables agencies to experiment with changes to existing business processes to test potential improvements in a cost effective manner, and with no disruption to day-to-day activities.

The use of CS as a decision support methodology in the areas of policy making, administration, and operations could become the state of the art approach in the Federal government.

2 BACKGROUND

OQM efforts promote process improvement and accountability to ensure the delivery of best-value services to the NIH research community. OQM's application of computer simulation (CS) to these challenges demonstrates the first time these techniques are being used as a method to improve administrative services and operations at the NIH, and based on our research, in the Federal government.

OQM has acquired and implemented the necessary software tools and developed internal staff capability needed to support these efforts in the ORS organization at the NIH. OQM has thus far implemented several CS models that have supported enhanced emergency planning and improvement in the cost effective delivery of ORS services to the NIH community. These efforts are designed to integrate into a holistic "Campus Operations Decision Support Tool" (CODS) that will provide a flexible platform for understanding and testing improvements to service delivery in a virtual environment.

3 IMPACT

The primary achievement was adding this unique capability from scratch with very limited resources. OQM demonstrated bold leadership in the development, promotion, and application of an innovative technology in the Federal government, utilizing computer simulation (CS) to enhance performance and reduced cost throughout the NIH. So far, it has been utilized to improve emergency preparedness, operational efficiency, and overall effectiveness of administrative programs. In addition NIH is able to better plan for and reduce the risks associated with response to an emergency scenario, such as a road closure, campus evacuation, or an active shooter scenario.

Through use of these simulations, NIH emergency planners are able to run a diverse variety of "what-if" scenarios using a wide range of input conditions in the computer environment. Now these scenarios can be run in accelerated time, orders of magnitude greater than a live drill or tabletop exercise. Furthermore, with this new CS capability such scenarios can be run with no disruption to the NIH research campus operations at significant **cost savings** of applying alternative methods. The increased awareness and understanding of the risks involved in an active shooter scenario gained through the use of CS resulted in **positions** added and **duties** realigned to better prepare to mitigate these risks.

OQM has engaged in an effort to develop a Campus Operations Decision Support computer simulation model. This campus-wide model will be used to experiment with changes in services to better match capacity with demand, thus contributing to the cost-effective use of limited resources. Using this model, recommendations for process improvements were made for campus shuttle services, vehicle and pedestrian egress in emergency and non-emergency scenarios, and enhancements to the **efficiency and effectiveness** of visitor security screening process.

4 LESSSONS LEARNED

Taking a systems approach to the problems in need of solving has been a key lesson learned. For each project, having a clear definition and understanding of what it is that is going to be accomplished, methods for how it will be accomplished, and measures for identifying whether it has been accomplished were critical for ensuring projects had a successful outcome.

Aside from the technical aspects of CS, it is important to understand and tailor the effort based on practical aspects of change such as interest of all the decision makers in adopting this innovative approach. Sometimes an executive is on-board, while lower level personnel do not fully support it, or vice versa. Also, in assessing the feasibility of an innovative and unfamiliar effort, it is important to understand CS as well as process constraints such as whether the activity is performed through contracted services. The lifecycle of the contract needs to be factored in the timeframe of the overall project.

5 CONCLUSIONS

There is significant potential for scalability and transferability by others within NIH, HHS, and other Federal Agencies. The computer simulation (CS) models have been developed specifically for NIH, but other agencies with similar processes or that face similar challenges where prior work that OQM has done can be leveraged to solve them.

In terms of the model building approach, OQM has strived to build the models in such a way that they could be easily scaled or transferred to fit other potential scenarios. One of the fundamental benefits of CS is the ability to easily change input parameters and evaluate the impact of changes, so a good CS by design would be scalable and transferable to other situations.

REFERENCES

WSC BoD (Winter Simulation Conference Board of Directors) 2015. "Winter Simulation Conference." Accessed February 21, 2015. http://www.wintersim.org.