I recently participated in the International Meeting on Simulation in Healthcare (MSH2011) sponsored by the Society for Simulation in Healthcare (SSH). SSH was established in 2004 to represent the rapidly growing group of educators and researchers who utilize simulation for education, testing, and research in the medical and healthcare areas. The majority of SSH members are from medical/healthcare professions and therefore fell into the user category of simulation. While there were 121 vendors of simulation products exhibiting at the meeting, the society itself seemed to lack membership from the technical M&S community. It was for that purpose that VMASC had a strong presence at this meeting.

My goal was to bring the M&S research and developer community and medical/healthcare community closer together to properly serve their simulation requirements. As one medical professional stated during the meeting, we often purchase simulation products because they are cool and it is the thing to do. Missing from this approach is a coordinated effort between the two communities to produce medical/healthcare simulations that are designed to fulfill specific requirements and to meet specific standards. To accomplish these goals requires a much closer coordination between these two communities. A prerequisite for this coordination is a basic understanding of each other’s area to facilitate the exchange of ideas and information that will lead to development of better simulation products.

The developer community must understand the medical community needs and simulation purposes. The medical/healthcare professionals must have an understanding of the capabilities and limitations of simulation to meet their needs. The meeting of the minds will only occur if the two groups work closely together to define requirements and to design systems to meet those requirements. I think we took a significant step forward to bring these two groups together and will continue to work in this area to help our healthcare system is able to provide the best care possible.

I should mention one specific observation about the medical/healthcare area’s use of simulation. It mainly consists of mannequins or parts of mannequins that have been instrumented to allow for the practice of specific medical skills. Missing were virtual environments that can provide a rich immersion into very realistic settings that support decision making and go beyond physical skill training. This is an area ripe for the M&S community to contribute to.

Multidisciplinary Grant Awarded for Joint VMASC/EVMS Blood Management Project

"Tool Development for Perioperative Blood Management Simulation Training" ($37,000) - Catherine Banks (PI), Virginia Modeling, Analysis and Simulation Center (VMASC); John Sokolowski (Co-PI), VMASC; Paul Hakim, M.D. (Co-PI), VMASC/EVMS; Aryeh Shander, M.D. (Co-PI), Englewood Hospital and Medical Center/MT, Sinai Medical Center; Karen Gillikin (Co-PI), nursing.

This innovative project combines simulation training in medicine developed by ODU’s VMASC and EVMS with the case studies and everyday needs of a major United States teaching hospital, Englewood Hospital and Medical Center in New Jersey. The work proposes to develop a virtual training environment in blood management for surgeons and anesthesiologists.

Blood transfusions are expensive and carry the risk of blood-borne illnesses including HIV, Hepatitis B, Hepatitis C, Human Lymphocytotrophic Virus, Cytomegalovirus, West Nile and sepsis among others. These facts have led to the development of blood management programs in several major hospitals in the United States. One such program at Englewood Hospital was able to reduce blood use by 42 percent over four years, which lowers patient morbidity and mortality, while also lowering cost.

Surgeons and anesthesiologists who are experts in the field of bloodless surgery have inquired with VMASC about the development of a blood management training tool, and this project has been the result of those inquiries. VMASC/EVMS are providing the technology-development expertise that has already resulted in the creation of a virtual operating room. The new training tool will also use real patient case studies, and analytical and verification capabilities of hospitals such as Englewood.

The tool will provide hands-on exercises. Simulations will consist of perioperative bleeding conditions due to unexpected, unexpected, and persistent blood loss as well as resuscitative scenarios. The tool will comprise computer simulations of patient vital signs (and projections) accompanied by haptic devices interfacing with the visual representations.
A team of Old Dominion University researchers has won a $270,000 two-year grant to supply research expertise for Advanced Anti-Terror Technologies (AAT2) in the continued development of a virtual reality based system to determine whether soldiers who have suffered mild traumatic brain injury are fit to return to duty through a Small Business Innovation Research (SBIR) phase II grant.

The ODU team, led by principal investigator for ODU Dr. Stacie Ringleb, assistant professor of mechanical and aerospace engineering, also includes Ginger Watson-Papels, associate professor of STEM education studies; Steve Morrison, associate professor of physical therapy; and Jim Blais, associate professor of psychology.

This project is necessary “because nobody really knows how to determine if the warfighters are fit for duty after they have completed rehabilitation,” Ringleb said. The request for proposals from the Department of Defense seeks the development of a virtual-reality, game-based patient assessment system.

The ODU team designed a testing procedure during phase I, which included combining physical and cognitive challenges. Specifically, cognitive challenges were embedded into a prototype shooting simulator called CAPTURE (Cognitive and Physiological Testing Under Real Environment Research). The participant would complete the cognitive tasks, followed by a battery of physical tasks, followed by repeat data collected in CAPTURE. Thus, determining if the physical stress has an affect on the cognitive and functional performance of the participant.

“The issue with people with mild traumatic brain injury is that they might pass all the neuropsychological tests, and they might pass all the practical tests. However, if you combine a cognitive with a physical stress, the patient may not perform well. Therefore, the goal of this study is to combine the two stressors after the patient has passed the neuropsychological and physical tests, and has been cleared by their physician to move to this step. Hopefully, this will allow us to determine with more certainty that someone is fit to return to duty,” Ringleb said.

The ODU researchers will also use this test to determine if personnel are taking symptoms to avoid being declared fit to return to duty. “One of the things in our proposal is to have college students pretend to perform poorly, so to see if we can find a metric to identify malingerers, rather than people who actually have an impairment,” Ringleb said.

The goal in Phase II of the SBIR is to continue refining the prototype and testing protocol, and then to run the first tests on military personnel who are recovering from mild traumatic brain injury.

The ultimate goal of the SBIR is to have a product developed that can be marketed and commercialized. Ringleb said if the group is able to bring its product through Phase III of the SBIR, it could be the type of low-cost diagnostic tool that regional hospitals can afford.

The ODU researchers are still designing the cognitive and physical tasks that will be included in the phase II prototype. The hope is to have the design for Phase II in place within 12 to 18 months, to allow for data collection in the last six to 12 months of the project.

The real estate market nationwide faces severe challenges from its current trajectory. There are difficult questions being asked about the best course of action for banks and governments to take to limit the damage caused by people defaulting on their mortgages.

Researchers at Old Dominion University are using modeling and simulation in an attempt to help solve this vexing economic problem. In a recently written paper, the answers they’ve found suggest a different course of action should be taken nationwide when it comes to properties in default.

Researchers Michael Seiler, professor of finance and Robert M. Stanton Chair of Real Estate and Economic Development, and Andy Collins, an assistant professor at ODU’s Virginia Modeling, Analysis and Simulation Center, used a model of 2,500 homes to try to predict how a flurry of foreclosures on the mortgage would affect other homeowners who have not defaulted. “The further and further underwater you get, the more likely you get to walk away,” Seiler said. “The ultimate choice is a tradeoff between moral values and economics,” Seiler said.

The model, built by master’s student Marshall Gangel, suggests that the best course of action for a community troubled by mortgage defaults is to speed up the foreclosure process.

“The neighbor who is paying the mortgage finds out about his neighbor who sort of, creates something called the moral hazard problem,” Seiler said. “The paying neighbor asks himself why should I keep paying his mortgage when his neighbor stopped paying a year ago and nothing bad has happened to him. It creates an incentive for people to default in a bad sense, that’s harmful to others in the market. This problem is getting out of control and someone needs to step in.”

Seiler said the average foreclosure in a judicial foreclosure state takes 5.8 months to work its way through the system. “All the uncertainty, vagary and lengthening of the foreclosure process causes the market. So our paper suggests the strongest influence that the housing market is delay is in the reaching of the foreclosure. Get the home into the hands of a healthy buyer quickly, however painful the foreclosure process is. It’s like taking off a Band-Aid at a neighbor’s deficit, it’s best for both. But if the foreclosed home owners, it’s going to be horrible for me.”

The agent-based model was set up so each of the 2,500 homes in the model would have its own set of rules — some would be in a more precarious financial situation than others, and some would feature owners more willing to keep paying a mortgage at all cost.

“You program the model at the micro level and it runs, and what you get is emergent behavior when it comes to market collapse? Does it drop 25 percent? Is it able to recover?” Seiler said.

Seiler recently returned from presenting the paper, “Exploring the Foreclosure Contagion Effect Using Agent-Based Modeling,” at the Massachusetts Institute of Technology. He’s excited to extend this work to examine the “strategic foreclosure contagion effect” — meaning, the effect a foreclosures has on homeowners who might be able to meet their mortgage payments, but choose not to.

There are researchers who study the spread of diseases like the bird flu and SARS,” Seiler said. “I’m interested in how fast this can physically spread throughout our society and potentially become a widespread epidemic, or pandemic. And we can use their models and say, instead of a virus, could this be a notion, a concept, a way of thinking?”

Fifty years ago it was verboten to miss mortgage payments. Seiler said. Shave off the zeros from 1956 and now you’re paying credit cards first, because they have the highest interest rate. “People think, ‘No one’s taking homes away from you unless you get to it,’ ” he said. “They’re taking vacations before they’re paying their mortgage. The whole market has gone nuts,” Seiler said.

The researchers also are hoping to study how experts in real estate, whom they term “market mavens,” and well-known people, whom they call “social connectors” affect the spread of this contagion.

“The key to solving the housing crisis is for home prices to go back up — or at least level off. That’s easier said than done. In the meantime, we’re wondering if home prices will come up faster than this contagion will spread, and cause a complete collapse of the market.”

Once again, it was VMASe’s honor to partner with the Hampton Roads Economic Development Alliance (HREDA) to co-host the 3rd annual I/ITSEC Hampton Roads Reception in Orlando, which drew M&S leaders from industry, government and academia. “Over 100 representatives of companies and institutions attended the event to show support for this burgeoning industry in our community. This was also a great networking opportunity for existing and potential companies interested in expanding to our region,” said HREDA’s Steve Cook.

These relationships are very important in efforts to bring more M&S companies to the Hampton Roads area. VMAS Director John Sokolowski stated, “This event truly shows the regional partnerships that exist among academia, industry, and government organizations. Our region is clearly recognized as a leader in modeling and simulation not only on a national level, but also internationally.”

“VMASe is dedicated to advancing this recognition and supporting economic development within Hampton Roads and the infrastructure of Virginia. We are one of the first organizations dedicated to the field of modeling and simulation and helping to lead M&S initiatives for the benefit of all. We look forward to our continued partnerships with all of you in the coming year.” Sokolowski concluded.

VMASC and HREDA Take Part in I/ITSEC 2010