It has certainly been a busy year here in the Department of Engineering Management and Systems Engineering (EMSE)!  2009-2010 marks the 25th anniversary of EMSE and from 1984-1985 when we first started we have certainly come a long way.  The Department continues to thrive with outstanding students, faculty, and programs.

As we continue on our path of educating students and performing cutting-edge research, we need to be reminded of the accomplishments from years past.  From working out of a trailer to our current location in Kaufman Hall, we look to the future in continued leadership in engineering management and systems engineering education and research.  Our National Center for Systems of Systems Engineering (NCSOSE), now an enterprise center, is in the top ranks of the University in securing research grants.  In 2012-13, we will be moving to the brand new Engineering Systems Building.  These are just a few examples of our growth and the value placed on the EMSE Department’s contributions to the University.  We are no longer “The Best Kept Secret”!

Our newest program, the Doctor of Engineering is also off to a strong start.  Created to provide an applied degree for engineering practitioners, the D.Eng. provides a doctoral-level degree to those who do not want to take the Ph.D. path.  Our other programs are also doing very well, I’m excited to report.

With growth and time, also comes change.  This year, we say goodbye to Dr. Gnaana Bharathy and Dr. Rani Kady, who have left to pursue other careers, but we also say hello to Dr. Holley Handley, who comes to us with great excitement and great skills, particularly on the management and leadership fronts.

Throughout this newsletter, you will find, interspersed pictures of us as they years have gone by.  We certainly hope that you’ll enjoy seeing us age (some more than others!).

This latest edition of the newsletter is full of exciting news of what our Department and our faculty are accomplishing.  We certainly hope that you’ll enjoy it as much as we enjoyed putting it together.
The Society for Modeling and Simulation provides a list with the most noteworthy publications on Modeling and Systems. Congratulations to Dr. Andreas Tolk for being considered as an expert in the field of M&S by the Society!

EMSE & CBPA faculty members win seed grant to look at Emerging & Complex Risk. A joint group of faculty members from Engineering Management & Systems Engineering (EMSE) and the College of Business and Public Administration (CBPA) was recently awarded an ODU Multidisciplinary Seed Funding for 2010 to study emerging and complex engineering and business risks in industries in Hampton Roads. Michael McShane (CBPA), Rani Kady (EMSE), and Gnana Bharathy (EMSE), in collaboration with Ariel Pinto (EMSE), Adrian Gheorghe (EMSE), Anil Nair (CBPA), and Wayne Talley (CBPA), were awarded the seed grant with the ultimate goal of developing ODU’s expertise as a leader in the area of cross-disciplinary risk management. As members of the Emergent Risk Initiative [http://www.odu.edu/~cpinto/], they believe that recent events all over the globe point to the need for systems-of-systems and enterprise-systems approach in dealing with modern-day emerging risks and envision the creation of a next generation body of knowledge in risk management for current and future organizations.

Shannon Bowling, Rafael Landaeta, Ghaith Rabadi, Patrick Hester, Pilar Pazos, Rani Kady, Charlie Daniels, and Ariel Pinto were awarded a Faculty Innovator Grant, The Usefulness of Mini Lectures Supplements in an Online Teaching Environment for 2008-2009.

Shannon Bowling is the recipient of the 2009 Teaching with Technology Award. This award is a means to recognize the excellence of Old Dominion University’s faculty and their innovative contributions to the quality of teaching and learning through the application of information technology.

Ariel Pinto, Rani Kady, and Andreas Tolk were awarded the 2010 BCET Dean’s Faculty Development Grant to organize and hold a symposium and workshop on how Simulation and Modeling can be applied to managing Emergent Risk to be held in November 2010 with the objectives of benchmarking current practices on how M&S are being used in managing emergent risks, of identifying important and high-yield research activities towards better application of M&S in managing emergent risk, and of developing synergistic collaboration among participants. The event was hosted by researchers, academics, and practitioners in the following areas: M&S research and/or application, Risk assessment and management, and system engineering and management in complex and system-of-system environments.

Adrian Gheorghe served as the symposium chair for the “Emerging M&S Applications in Industry and Academia” (EAIA’10). Dr. Patrick Hester served as the co-chair.

The Huntsville Simulation Conference, 2010, will be chaired by Dr. Adrian Gheorghe (general chair). Dr. Patrick Hester will serve as the Proceedings Chair. The conference will be held on October 26-28, 2010 in Huntsville, AL. For more information on the conference, please go to http://www.scs.org/hsc/.

Samuel Kovacic and Andres Sousa-Poza, in partnership with Systems Engineering Solutions, Inc. (SESI; Prime), were recently awarded a multi-year contract to support the implementation of an Operational Integration Center (OIC) at Selfridge, MI. The OIC is being established by the Department of Homeland Security (DHS) Secure Border Initiative (SBI) and Customs and Border Protection (CBP) to encourage and facilitate collaboration between offices within CBP, other agencies within DHS and the federal government, and Michigan State and local law enforcement and agencies. There will also be representation at the OIC by the Royal Canadian Mounted Police (RCMP) and the Canadian Border Services Agency (CBSA). (See http://www.cbp.gov/xp/cgov/border_security/sbi/nbp/). The success of the OIC will depend on the exceptional team that SBI/CBP has put together, which includes the Naval Surface Warfare Center...
(NSWC) Dahlgren that will be acting as the lead integrator, MIT’s Lincoln Labs, the ODU/SESI partnership and others. This project forms an important milestone in the Complex Adaptive Situations Methodology (CASM) and Environment (CASE) research that ODU has been undertaking since 2005 under the sponsorship of DHS Science and Technology (S&T). This effort marks a significant technology transfer effort between the research arm of DHS and its operational entities, as well as an important transition of research at ODU to production that will be undertaken by SESI. The insertion of the CASE tools in the OIC will enable decision makers in the field to (1) rapidly make more effective decisions based on faster availability of analyzed data, and (2) expand the real-time capability to generate robust concepts of operation (CONOP). These tools represent the first iteration of emergent technology providing near real-time decision capabilities to support strategic, operational and tactical functions within complex situations that CBP border agents must deal with on a continual basis.

Ariel Pinto recently gave an invited discussion at the monthly meeting of the Hampton Roads Association of Contingency Planners (HR-ACP). In May 18 2010, HR-ACP held their monthly meeting on the topic of Risk Evaluation and Control as it relates to business continuity and disaster recovery attended by practitioners and researchers from various organization in the Hampton Roads region. During the meeting, Dr. Pinto highlighted the importance and potential game-changing influence of modeling and simulation for extreme and rare event risk analysis. He highlighted previous and current research projects at EMSE with significant M&S content, including those in ports operation, enterprise risk management, and pandemic analysis.

Adrian Gheorghe was commissioned to write a book on “Engineering Principles for Combat Modeling and Distributed Simulation”. The book will have two parts. Part one will be written by Dr. Gheorghe and cover foundations. Part two will be edited by Dr. Gheorghe and will feature current developments in special topic areas, with international experts contributing chapters.

Georges Arnaout, a Ph.D. student in engineering management, was awarded the ODU Alumni Association’s Outstanding Scholar Fellowship for 2009-10. The fellowship was established to assist graduate students who have demonstrated academic excellence.

Rani Kady, Ariel Pinto (EMSE) and Michael McShane (CBPA) have successfully conducted a workshop on Enterprise Risk Management (ERM) at Old Dominion University with more than forty participants. The event was capped by a tour of the facilities at the Virginia Modeling Analysis and Simulation Center (VMASC) and demonstrations of their state-of-the-art projects.

ERM Workshop

- Dr. Nancy Bagranoff (ODU), former Dean of the College of Business and Public Administration, with opening remarks, Dr. M. McShane (ODU), on ERM, Dr. A. Pinto (ODU), on ERM and risk management, Dr. A. Gheorghe (ODU), Risk Management and Vulnerability: An Academic Perspective: [http://connect.odu.edu/p71378740/](http://connect.odu.edu/p71378740/)
- Mr. A. Dörig, (Dörig + Partner Ltd), A Pragmatic Approach for Strategic Risk and Opportunity Management, Mr. B. Jordan, (Grant Thornton LLP), Enterprise Risk Management - Practical Perspective, Dr. C. Ketcham (AICPCU - Insurance Institute of America), Educating Your Risk Owners: [http://connect.odu.edu/p48636466/](http://connect.odu.edu/p48636466/).
- Dr. Holly Gaff (ODU), Dr. Pinto, Dr. Kady, on the applications of Modeling and Simulation, Dr. M. McShane, final remarks: [http://connect.odu.edu/p68568459/](http://connect.odu.edu/p68568459/)

NEW GRADUATE PROGRAM DIRECTORS!

Dr. Shannon Bowling (sbowling@odu.edu) has assumed the duty of graduate program director for the following programs:
- Engineering Management (M.E.M., M.S., Ph.D., D.Eng.)

Dr. Ariel Pinto (cpinto@odu.edu) has assumed the duty of graduate program director for the following programs:
- Systems Engineering (M.E., D.Eng.)
PH.D. STUDENT ATTENDS NEXT GENERATION INFRASTRUCTURES CONFERENCE IN THE NETHERLANDS

Ersin Ancel, a Ph.D. student in engineering management and systems engineering at Old Dominion University, was awarded a $4,500 scholarship that allowed him to be a participant in an international think tank on infrastructure security issues Sept. 21-25, 2009 in the Netherlands. The Next Generation Infrastructures (NGInfra) Foundation headquartered in Delft, Netherlands, selected Ancel in a worldwide competition for scholarships to the NGInfra Academy, which was held at a castle in the southern Dutch province of Limburg. The scholarship covers the registration fee as well as travel expenses. Ancel has studied infrastructure transition and emerging infrastructures for the past two years with Adrian Gheorghe, ODU's Batten Endowed Chair in Systems Engineering. Infrastructures are the complex systems for transportation, energy, communications and other services that people depend upon daily. Gheorghe, who nominated Ancel for the scholarship, said, "Participating in this exceptional learning opportunity for forward-thinking infrastructure design and management will bring the most current knowledge, tools and capabilities to both Ersin's research and other related research efforts at Old Dominion." The academy exposed participants to the latest developments in infrastructure research, gave practical tools for addressing many of the challenges facing the design of tomorrow's infrastructure systems, and allowed for interaction with talented researchers and young professionals from government ministries, regulatory agencies and international knowledge institutions.

NGInfra is connected to Delft University of Technology. The think tank had students look at introducing smartmeters to Dutch Electric. These meters send out information automatically as opposed to having meter readers come to individual houses and businesses; and the individual readings are on a monthly basis. These SmartMeters can look at consumption down to the minute-level. The Dutch were concerned that people would not want to participate in the SmartMeters, so before producing the meters, they had the students use serious gaming to help to educate the Dutch on the usefulness of SmartMeter. The invited students were able to play a game called SimPort where they extended the port of Rotterdam, as well as building cities with wooden blocks, to examine human behavior, followed by extensive debriefs to prepare for the SmartMeter scenario. When examining the SmartMeter, the students had to create their own game. Ersin's team came up with a Monopoly-like game where landing on a different square shows a different energy consumption. They found that it is useful to have a SmartMeter because it can allow users to adjust their lives based on different conditions.

Ersin conveyed that all students should attempt to move their research out of the box by attending international conferences. "They have different approaches and different ways to do Ph.D. research," he said. He added that it was eye opening to see how they applied serious gaming to theoretical and project-based applications. The Netherlands had to become a major player in serious gaming because they are constantly facing flooding as they are under sea-level; so they use it to plan for dams and flood protection systems and to see how new technologies will respond.

The NGInfra Foundation was established in 2004 and is a consortium of educational institutions, market players and governmental bodies. Its goal is to improve the way vital infrastructures are planned, designed, operated and maintained. Three subject areas were the focus of the week-long academy: serious gaming and simulation, to facilitate multi-actor decision making in infrastructure design and management; the model factory, exploring agent-based model usage to understand complexities of infrastructure systems design and operation; and energy markets, about how and why these markets work, or sometimes don't work. Gheorghe pointed out that infrastructures are undergoing significant changes, and this is why the foundation focuses on emerging infrastructures. Information and communication technology has become important to all traditional infrastructures, rendering them more intelligent but more vulnerable at the same time, he explained. Ancel, who received a master's degree in aerospace engineering from ODU in 2007, has research interests related to unmanned aerial vehicle flight integration to national airspace for future commercial and civil applications. He also has conducted research to show the interdependencies of today's critical infrastructures on space-based technologies. The risk and vulnerability of space assets and the impact of their losses, along with the investigation of cascading effects on various critical sectors are a part of this research.

Ersin’s next plans is to use a game that NGInfra gave the participants designed for enterprises to see how they collaborate. He’s going to let his friends and fellow students play the game to show them how people think differently in differing scenarios. "If we think holistically, we can solve more puzzles in the same time than we can do alone," he said. He added that this was an excellent networking opportunity for himself; he found someone who was interested in his research who gave him a lot of references and offered to co-author one of his papers.

"They have different approaches and different ways to do Ph.D. research." - Ersin Ancel

GHANA SALT INDUSTRY STUDY IS A WAY FOR DOCTOR OF ENGINEERING STUDENT TO HELP HIS HOMELAND

Yaw Mensah has been working most of his professional life as a chemical engineer in the United States.

But Mensah, a doctoral student at Old Dominion University’s Frank Batten College of Engineering and Technology (BCET), has always maintained a close connection to his native Ghana.

So he has found a way to use the skills he has learned in BCET’s Department of Engineering Management and Systems Engineering (ESME) to study the salt industry in Ghana from a system-of-systems engineering (SOSE) and risk management perspective.

Common salt plays a critical role in the daily lives of Ghanans. Moreover, the country’s rich potential to produce consumer- and industry-grade salt may play a critical role in Ghana’s development. Salt production can support other industries, such as oil refining, medicine and chemical industries in Ghana and throughout West Africa.

However, many enterprises need to be in place, and working effectively together, to harness this potential. This is where system-of-systems engineering comes in.

"SOSE provides a perspective that enables these apparent complexities to be contextualized. In essence, it helps demystify this complex problem and paves the way for analysis," said Ariel Pinto, an assistant professor of EMSE at ODU, and Mensah’s adviser.

Mensah hopes to use SOSE to identify and describe the relationship among these needed enterprises. The research is very personal to him.

"Yaw Mensah, even though he has spent many years of his professional life here in the U.S. as a chemical engineer, has always tried to give back and preserve his ties with Ghana," Pinto said.

"I think now he has found a way to give back and better strengthen his ties via the convergence among his professional expertise, his love for Ghana and his pursuit of higher learning - truly an endeavor from the heart."

Mensah is currently in Ghana attempting to verify and validate, firsthand, much of his analysis, and to gain new insights. Pinto said the further a researcher gets into a project such as this, the more additional research avenues are discovered.

Mensah recently presented some of his findings to ODU audiences through the Emergent Risk Initiative Colloquium Series.

THE STORK COMETH AGAIN...

EMSE was once again blessed by the birth of two beautiful ladies this past academic year.

For those of you who have been avidly following the baby news in EMSE...be prepared for another visit from the stork! More details in the next newsletter!

Later this year, he intends to publish and present his work to a wider audience of engineering managers, systems engineers, public planners and policymakers, both in Ghana and the United States.


Dr. Rabadi, as a new professor in 1998!

April 7, 2009 brought us Maryn Hester, daughter of Dr. Patrick Hester.

August 24, 2009 Arianna Pazos-Lago Delaguala graced us with her presence. She is the daughter of Dr. Pilar Pazos-Lago.
When the subject of a flu pandemic is raised, it's natural to assume that the experts in the field would be medical researchers.

But the implementation of the technology required to prevent a flu pandemic has some of the same mathematical qualities of many problems that have vexed engineers for years.

In that spirit, two researchers in Old Dominion University's Engineering Management and Systems Engineering Department of the Frank Batten College of Engineering and Technology have contributed an article to the latest issue of Journal of Homeland Security and Emergency Management.

For the piece, titled "Rapid Sensor Technology: A Risk and System Complexity Analyses of Early Detection of Influenza-Like-Illnesses," researchers Ariel Pinto, assistant professor of engineering management and systems engineering, and adjunct instructor Ipek Bozkurt, teamed up with researchers from Norfolk's Eastern Virginia Medical School.

They wanted to find out what opportunities and challenges accompanied the implementation of a rapid sensor technology to detect influenza at its earliest stages.

"Addressing the risks of a flu pandemic scenario is very complex, involving not only the latest technologies but also people at local and federal agencies and health institutions, as well as everything that comes with these organizations," Pinto said.

Using system of systems engineering, a specialty of the Department of Engineering Management and Systems Engineering, the researchers suggested approaching the problem from various perspectives.

Employing multidisciplinary risk management allows researchers to more efficiently allocate resources to mitigate a flu pandemic. The researchers said that proved to be a valid strategy for divining the best possible solution to a pandemic situation.

"Engineering management and systems engineering enabled us to put all of these at the table for risk analysts to look at in meaningful ways," Pinto said.

In addition to defining the problem and laying out a strategy to combat a pandemic, the paper goes on to discuss possible tools and techniques that can make the solution to the problem a reality.

Pinto said the more ODU engineers and EVMS researchers get to know each other, "the more we realize that our expertise complements each other. Together, we believe we can have greater success answering difficult questions surrounding the risks of flu pandemic than we will be able to have separately."

The Journal of Homeland Security and Emergency Management is the primary source of new, peer-reviewed research and information in the fields of homeland security and emergency management. JHSEM features original, innovative, and timely articles and other information on research and practice from a broad array of professions including: emergency management, engineering, political science, public policy, decision science, and health and medicine.

During the week, Old Dominion University engineering graduate Les Flora works as a senior project manager for Virginia Natural Gas, recently overseeing a 21-mile transmission line extension, linking Newport News and Norfolk.

For the past 30 years, however, Flora has also held down a part-time job that’s been more interesting than most.

The triple-degree holder from ODU ('74 B.S. in math, '80 B.S. in mechanical engineering and '89 M.E.M. in engineering management) spent three decades of Friday nights and Saturday afternoons as a football official.

He retired last fall after eight seasons as a line judge with the Atlantic Coast Conference. His final game was the Army-Navy contest in December.

"On that particular day, it’s one of the biggest games in the country," Flora says. "Those kids put it out there on the line. So you can’t help but get pumped up being in that environment."

Thirty years ago, Flora and his wife, Leigh, both were completing ODU degrees and working full time. "I finished in two years, my wife in three. At the end of my stint, I had a lot of free time on my hands. I had a buddy who was doing high school football, and I went out and started officiating," he says.

After 10 years at the high school level, Flora started doing Division III college games, gradually working his way up until he finally received the call to work for one of the 10 ACC crews who do games in and out of conference, all over the Eastern United States. "It’s more a matter of being in the right place at the right time than anything," Flora says of getting the call from the ACC. "There are 100 guys out there who can do what you do as well as you can."

As a line judge, Flora was responsible for making calls about plays that occur on the line of scrimmage, such as holding and offside penalties.

He’s been all over the eastern United States officiating, working a game in Notre Dame Stadium last fall, something that - along with the Army-Navy game - was on his to-do list.

Flora says the best part of being an official is that you actually get to be part of the games you follow. "There are three teams on the field, the two teams playing against each other and our team," Flora says. "Everyone else is outside the lines."

Of course, you have to be wired a little differently to enjoy, for example, calling a holding penalty that negates a touchdown for Virginia Tech and getting yelled at by 50,000 Hokie fans.

"If you know in your gut you’ve made a good call - you know you’ve nailed it - and the fans are riding your butt, you just about like it. You think to yourself, 'I'm right, and all you other zeros don't know,'" Flora says with a laugh.

Flora knew this past season would be his final one. "A week from today I’m going in for knee replacement. That was the deciding factor for me."

But aside from spending more time at home, Flora sees another benefit of hanging up his whistle - he can now attend football games at his alma mater, ODU.

"I'm very excited. Even though I wasn't able to see any games because I was on the road, I followed them in the newspaper on Sunday," Flora says.

He met head football coach Bobby Wilder a few years ago, when the current ODU coach piloted Maine against Appalachian State in a Football Championship Subdivision playoff game.

"I actually introduced myself to coach Wilder shortly after he started here, and said I had worked that particular game," Flora recalls. "He seems like a great guy, and he’s helped put together a marvelous roadmap for our team."

"In fact, I'm going to have to figure out how to get season tickets, because I'll need something to do on Saturday."

Few Americans would expect news reports relating to nuclear weapons proliferation to come from the commune of Magurele on the outskirts of Bucharest, Romania. But Old Dominion University engineering professor Adrian Gheorghe and several of his critical infrastructures research collaborators in Romania were not at all surprised by the news from Magurele last month.

The U.S. National Nuclear Security Administration (NNSA) announced on June 30 that it had removed more than 50 pounds of highly enriched uranium from a nuclear research facility in Magurele and safely transported it by aircraft to a secure nuclear facility in Russia. "This represents a major step forward in NNSA's ongoing efforts to implement President Obama's unprecedented nuclear security agenda by securing vulnerable nuclear materials worldwide and reducing the threat of nuclear terrorism," said the agency's administrator, Thomas D'Agostino.

Media reports about this development were brief compared to others about nuclear threats in North Korea and Iran, and even about President Obama's pledge in a speech in Prague in April to secure all vulnerable nuclear material in the world within four years.

But it did not take screaming headlines from Magurele to support Gheorghe's contention that "academic research often is conducted ahead of the news."

Gheorghe, who holds the Batten Endowed Chair in Systems Engineering at ODU, said the NNSA administrator was right to place the Magurele operation in a broader perspective, and he noted an academic precedence. This was a technical paper issued in the spring of 2009 authored by Gheorghe along with Dan Vamanu, Valentin Acasandrei and Bogdan Vamanu, researchers at Romania’s National Institute of Physics and Nuclear Engineering, which operated the Magurele research facility.

The paper states that it sought to draw attention "to a number of issues that may go underplayed on the agenda of the critical infrastructure analysts concerned with risks: the vulnerabilities induced by nuclear research facilities facing decommissioning. " The authors concluded that the smaller nuclear research facilities scattered throughout the world pose sizeable risks, even in comparison with the bigger nuclear facilities such as nuclear power plants. Why? Because abnormal things are more likely to happen at these so-called "minor league" facilities, at least partially because a lot of them are in 'resource- and management-deficient... and geopolitically-uncertain environments.'"

Gheorghe said the authors tried to work around political entanglements and, instead, projected "the cool light of facts supported by convincing quantitative assessments of how to manage one of the legacies of the early years of the Nuclear Era."

This takes us back to Magurele. In 1957, when Romania was part of the Soviet block, a Russian-designed nuclear research reactor was installed in this sparsely populated commune. At the time, there was beginning among the superpowers a concerted effort to promote peaceful uses of nuclear energy, and this reactor near Bucharest was designed to further this goal via a broad agenda of research and the production of radioisotopes for use in medicine and industry. Hundreds of similar facilities eventually were built, the majority before 1980, with the greatest concentrations being in the United States and the countries of the old Soviet Union. But these powers also helped to distribute research reactors to countries around the globe.

Spring forward nearly five decades to the first years of the new century. One finds a research reactor in Magurele that is no longer a bright and shining example of technological progress. In fact, it has outlived its designed life span, although it is still harboring weapons-grade, highly enriched uranium fuel. In addition, Magurele is no longer a sparsely populated commune. The Bucharest metropolis has grown out to almost meet the research facility.

This may well be a pattern of some generic significance, Gheorghe said. The research paper he and his colleagues wrote documents the existence of 671 research reactors that are operating, or have been shut down but not yet fully decommissioned, meaning that highly radioactive fuel and/or radioactive materials from the reactor itself or from the enclosing structure are still on the site. At the time the paper was drafted there were fewer of the much larger nuclear power reactors either operating or not yet decommissioned -589 by a cursory count.

These totals are not the whole story, however. As the paper's authors note, research reactors overall are older than the power reactors and they are more widely scattered throughout the world, meaning that developing countries have more research reactors than power reactors.

Moreover, the decommissioning of any nuclear reactor is a long, costly and
dangerous process that is rife with security and political concerns. Workers who take down the reactor facility and the nearby populations could be exposed to radiation in excess of the legally admissible levels. The facilities often are more difficult to secure during decommissioning than they are during normal operations. In many countries, decommissionings are drawn out and money is tight, resulting in cutbacks in highly trained reactor personnel and erosion of maintenance and security routines. Breakdowns can occur in the redundant safeguards of the "defense in depth" design and operational procedures that have been mandated for nuclear reactors. Terrorists and insurgents could take advantage of slack administration and security to vandalize facilities, releasing radiation, or to steal radioactive materials that can be used in conventional or dirty bombs.

After being educated in Romania and England, and before joining ODU in 2006, Gheorghe served in several positions in Europe, including director of the Centre of Excellence on Risk and Safety Sciences of the Swiss Federal Institute of Technology. At ODU he is working with the National Centers for System of Systems Engineering and the Virginia Modeling, Analysis and Simulation Center.
ODU RESEARCHERS TO HELP NAVY WITH VEXING PROBLEM OF INFORMATION EXCHANGE

Researchers from Old Dominion University's National Centers for System of Systems Engineering (NCSOSE) have received a substantial grant from the U.S. Department of Defense's Space and Warfare Command (SPAWAR) to tackle the information exchange issues within a Carrier Strike Group. Information exchange is a vexing problem for the U.S. Navy.

The $250,000 grant will allow a team from the Frank Batten College of Engineering and Technology to develop and deploy a research-based training model for the application of System of Systems Engineering (SoSE) to Carrier Strike Group information exchange.

The project will be led by principal investigator Dr. Kevin Adams, a principal research scientist at NCSOSE.

"This represents an opportunity to develop and deploy a unique model that integrates research and training, while simultaneously addressing a complex system problem," Adams said.

"We are pleased that SPAWAR has elected to draw on both the training and research capabilities of NCSOSE for this effort."

A total of 17 SPAWAR engineers will participate in the year-long training/research exercise. By the time the project ends in December of this year, all 17 should be certified in SoSE by NCSOSE, and a technical report will be generated, addressing information exchange problems in Carrier Strike Group.

"This will serve as an exciting new model that demonstrates how research can be simultaneously integrated with training to address a real world problem," said NCSOSE director Chuck Keating, a professor in engineering management and systems engineering at ODU.

"SPAWAR is definitely looking to break the traditional barriers between training, research and application."

Launched in 2002, NCSOSE is a national resource for developing and testing theory, methods, and tools to address complex system problems faced by government and industry. It emphasizes a collaborative relationship among university, government, and industrial entities concerned with design, deployment, and transformation of complex systems.


ENGINEERING MANAGEMENT HONOR SOCIETY WELCOMES 12 NEW MEMBERS AT ODU

A dozen Old Dominion University engineering management students have been inducted into the Alpha Alpha Chapter of Epsilon Mu Eta, the engineering management honor society. The students received the honor at a ceremony in September 2009.

The graduate students in engineering management have an average GPA of 3.92. They are Thomas Bock, Ipek Bozkurt, Van Brewer, Behnido Calida, Paul Garvey, Joseph Gelardi, George Guvernator, Garrett Haltiwanger, Christos Kaltsonoudis, Samuel Kovacic, Mark Leary and Breton Wilburn. They join 42 other students previously inducted into Epsilon Mu Eta.

The Alpha Alpha Chapter is open to students enrolled in master's and doctoral programs in engineering management. The chapter was founded in April 2003, and membership is by invitation only.

Faculty adviser Rafael Landaeta, an assistant professor of engineering management and systems engineering at ODU, said members must display superior academic achievement and exemplary character.

"Superior character is defined by the student’s leadership, professionalism, integrity and other demonstrated principles that define the core values of engineering managers," Landaeta said.

More information about the honor society can be found in the website of the American Society for Engineering Management at: http://www.asem.org/members/hs.html.

More information about the Alpha Alpha Chapter at ODU can be found at: http://www.odu.edu/~rlandaet/EMHS/EMHSWeb.htm.

L-R—Dr. Rafael Landaeta, Behnido Calida, Joseph Gelardi, Thomas Bock, Garrett Haltiwanger, Ipek Bozkurt, and Christos Kaltsonoudis
This story can fit 150-200 words.

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Much of the content you put in your newsletter can also be used for your Web site. Microsoft Publisher offers a simple way to convert your newsletter to a Web publication. So, when you're finished writing your newsletter, convert it to a Web site and post it.

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**ALUMNEWS**

**Alonzo Barber III** (M.E.M. ’02) was appointed by Maryland Governor Martin O’Malley to the Maryland Military Installation Council. A former US Navy Officer and resident of Dunkirk, Maryland, he is council for BET Networks and a registered patent agent.

**Kevin Barclay** (M.E.M. ’05) is the new resident inspector at the Kewaunee Power Station. He is a US Navy veteran and former nuclear propulsion specialist on the aircraft carrier USS Ronald Reagan. Commercial nuclear power plants have at least two Nuclear Regulatory Commission resident inspectors, who are the agency’s eyes and ears. The 556-megawatt plant is located in Carlton, WI, on Lake Michigan, about 35 miles southeast of Green Bay.

**LCDR John L. Beaver** (M.E.M. ’03) earned two graduate degrees from the Massachusetts Institute of Technology: the degree of naval engineer and a M.S. in nuclear science and engineering. His next military assignment is at Naval Reactors, in Washington, D.C.

**William Olivier Hedgepeth** (Ph.D. ’95) received the Teacher of the Year Award for 2008-09 from the College of Business and Public Policy of the University of Alaska, Anchorage. He is an associate professor of logistics.

**Thomas Taylor** (M.E.M. ’06) was named in September by the US Nuclear Regulatory Commission as resident inspector at the Palisades Nuclear Power Plant in Covert, MI. He joined the NRC as a reactor engineer in Region III in 2007.

**Thomas G. Wears** (M.E.M. ’04), Rear Admiral (select), relieved RADM David C. Johnson as the 12th commander of Naval Undersea Warfare Center headquarters on November 4, 2009. Additionally, Wears has a Level 3 Certification in program management from the Defense Acquisition University. Wears is the recipient of the Legion of Merit, Meritorious Service Medal, Navy Commendation Medal, and the Navy Achievement Medal. He is also the deputy commander of undersea technology at NAVSEA.

**James Gale** (M.E.M. ’00) was honored as Information Government Engineer of the Year at the Engineers Club of Hampton Roads 2009 Engineering Excellence Banquet. Gale has also been awarded NAVFAC’s 2006 Atlantic’s Employee of the Year, and in 2008 was made an Honorary Seabee, an award given sparingly by NAVFAC’s chief of naval engineers.

**Patrick Finney** (M.E.M. ’02) has been named senior inspector at the Susquehanna Steam Electric Station by the U.S. Nuclear Regulatory Commission. He had worked as a resident inspector at the plant in Salem Township, PA since 2007. Patrick joined the NRC in 2004.

**CDR Mark Prokopius** (M.E.M. ’03) is the commanding officer of the USS New Mexico, a Virginia-class attack submarine that was commissioned March 27, 2010 at Naval Station Norfolk. He leads a crew of about 134 officers and enlisted personnel.

If you have any updates, please send them to enmagpd@odu.edu. We’d love to hear how you are succeeding!

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**NEW CERTIFICATIONS FOR ENGINEERING MANAGERS!**

**Associate Engineering Manager (AEM)**

The certification at this level is designed for young technical professionals seeking to establish credentials in preparation for early technical management or supervisory assignments. Certification is valid for three years.

**Professional Engineering Manager (PEM)**

The certification at this level is designed for experienced technical managers seeking to validate their skills and experience with a professional certification. Certification is valid for three years.

For more information, please go to: https://www.netforumondemand.com//eWeb/DynamicPage.aspx?&WebCode=EMPCP

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**Shannon Bowling at his Ph.D. graduation in '03**
One of the shows that I watch on television is called “How to Boil Water”, where a seasoned chef shows someone who can barely cook the simple steps to create great meals. Being the only non-engineer on the faculty, I often find myself in discussion where the topics go over my head. This recurring feature of the newsletter will be my attempt to take some of these new, complex engineering ideas and put them into simpler, laymen’s terms, so that the casual reader, and not just the engineers, can understand. Wish me luck!

The votes are in for this newsletter and I am proud to announce my latest interviewee: The National Center for Systems of Systems Engineering…what? That isn’t a person, you say? True, however, NCSOSE, or as we pronounce it “nexus” (do not ask how that worked out—there is no answer!) just got a promotion! It is now an enterprise center…a what? Well, I’ll let Dr. Chuck Keating explain in his own words, thus making this an un-interview for all intents and purposes :)

“NCSOSE has been selected to become an Enterprise Center for the Batten College of Engineering and Technology. NCSOSE was established in 2002 as a research center within the Department of Engineering Management and Systems Engineering (EMSE). NCSOSE was born out of a recognized need to more effectively develop, coordinate, and integrate research and applications to engineer increasingly complex systems that must function as integrated systems of systems. From the earliest beginnings, the Center has been focused on developing and testing theory, methods, technologies, and tools to more effectively deal with complex system problems that involve technical, organizational/managerial, human/social, and political/policy considerations. During the eight years since inception, EMSE and the Batten College of Engineering and Technology (BCET) have made significant investment and development to support faculty and researchers engaged in NCSOSE. As a result, NCSOSE has grown substantially in both scholarly stature as well as research funding.

NCSOSE research serves sponsors and colleagues from government, industrial, and academic communities. NCSOSE is staffed by full time research scientists, affiliated faculty, and graduate students. Dr. Chuck Keating serves as the director for the Center, which has been housed in Old Dominion University’s Innovation Research Park since May 2007. The NCSOSE facility includes staff office space plus a 1,700 square foot reconfigurable lab with state of the art technology to support research initiatives and activities. Research and activities conducted at the Center are focused on five primary research areas:

- **System of Systems Engineering Training, Education, & Research** – Training, education, and research for design, analysis, and transformation of multiple complex systems that must function as an integrated system to achieve desirable mission performance. (Lead Researcher, Dr. Kevin Adams, Graduate Research Assistant, Ms. Chris Hoyland, primary sponsor, U.S. Navy Space and Warfare Command)

- **Complex Adaptive Situations Environment** – An environment, including technologies, processes, and underlying conceptual framework to guide advance decision modeling, analysis and decision support. (Researchers, Dr. Andres Sousa-Poza and Mr. Sam Kovacic, primary sponsor, Department of Homeland Security Science and Technology Directorate)

- **Complex System Governance** – From systems theory and cybernetics grounding, exploration and applications targeted to purposeful design, analysis, and transformation of systems for direction, oversight, accountability, projection, and evolution. (Researchers, Dr. Patrick Hester and Dr. Tom Meyers, Graduate Research Assistant, Mr. Behnido Calida, primary sponsor, Department of Homeland Security Science and Technology Directorate)

- **System of Systems Architecture and Modeling** – Applications directed to design, modeling, and analysis of the structure, flow, processes, and interrelationships of information across the enterprise to enhance performance and interoperability. (Lead Researcher, Dr. Andreas Tolk)

- **Critical Infrastructures, Risk, and Vulnerability** – Quantitative and qualitative modeling and analysis of critical infrastructures and their interrelationships to provide for decreased risk, limiting vulnerability, and design for resilience. (Researchers, Dr. Adrian Gheorghe and Dr. Ariel Pinto)

In the future, NCSOSE will continue to mature current research thrusts as well as developing new promising lines of research. New research will be based on the underlying system of systems perspective and development of theory, approaches, and technologies to more effectively deal with complex problem domains.”

Thanks Dr. Keating!
NEW FACE IN THE DEPARTMENT! - DR. HOLLY HANDLEY

Dr. Holly Ann Heine Handley is an Assistant Professor in the Engineering Management and System Engineering Department. Her education includes a BS in Electrical Engineering from Clarkson College (1984), a MS in Electrical Engineering from the University of California at Berkeley (1987), and a MBA from the University of Hawaii (1995). She received a PhD in Information Technology and Engineering from George Mason University in 1999. Dr. Handley is a Licensed Professional Electrical Engineer from the state of Washington. She is a member of the Institute of Electrical and Electronic Engineers (IEEE) Senior Grade, the International Council on System Engineers (INCOSE) and Sigma Xi, the Scientific Research Society.

Dr. Handley applies systems engineering principles and experience in computational modeling to conduct research and perform analysis on challenging problems of complex organizational systems. Her research has been funded by the Office of Naval Research, SPAWAR Systems Center, and the Army Research Labs. Dr. Handley has performed analyses on organizational architectures to illustrate how role relationships change as organizations adapt to different environments. She has identified metrics to evaluate distributed role performance as well as standardized engineering products to represent organizational issues in system design. Dr. Handley participated in a panel to develop human view representations to augment system engineering design products to assist in the modeling and simulation of human-system interactions.

Dr. Handley began her career as a Design Engineer at Raytheon Submarine Signal Division in Portsmouth, RI. She then accepted a position as a CMOS Application Engineer at Raytheon Semiconductor Division in Mountain View, CA, and later became a Senior Field Engineer in Vicenza, Italy. After completing a post doctoral position as a Research Associate Professor at the System Architecture Laboratory at George Mason University in Fairfax, VA, Dr. Handley became a Principal Investigator at Pacific Science & Engineering Group in San Diego, CA.

Dr. Handley believes that learning should be a collaborative experience, and encourages students to work together and share experiences. She will be teaching Leadership for Engineering Managers and will ensure that engineering students have the skills required for success as future managers and leaders.

ODU RESEARCHERS CONTRIBUTE TO CREATION OF CASE TOOLKIT FOR US BORDER PATROL

Two Old Dominion University researchers are helping provide the "brains" for a Complex Adaptive Situations Environment (CASE) toolkit, a software-enabled process that will help officer's securing the country's northern border.

The effort, part of a $2.2 million grant funded by the U.S. Department of Homeland Security's Customs and Border Protection, will see CASE research pioneered in the past few years by Sam Kovacic and Andres Sousa-Poza tested in the field for the first time.

"Every researcher wants to see their work go from the lab to the field," said Kovacic, a research scientist with ODU's National Centers for System of Systems Engineering (NCSoSE). "The work doesn't stop at basic science. The end result of our research is that our theories will directly influence how software will be developed and implemented in the field to provide value to the operators."

Sousa-Poza, an associate professor of engineering management/systems engineering (EMSE) in the Batten College of Engineering and Technology, said it's important to point out that Customs and Border Protection employees already do an excellent job. "We're not teaching them how to do their own jobs. They're excellent at their jobs," he said. "The toolkit will simply give them the tools they need to best apply their skills."

The funding proposal "Complex Adaptive Situations Environment Decision Aid Software" was submitted in tandem with Systems Engineering Solutions Inc. (SESI) The intention was to tailor a toolkit for the Northern Border's Operation Integration Center, a pilot site that will begin operating this fall at the Selfridge Air National Guard station in Michigan, north of Detroit.

The heart of the proposal is the novel way Sousa-Poza and Kovacic have creatively used engineering to address complex problems, via the Complex Adaptive Situation Methodology. CASM accepts that there is no "golden bullet" for complex problems, such as securing a vast, undefended border. Instead, CASM helps engineers become comfortable with the intractability of problems, and gets them to accept that situations will evolve, along with the solutions required to deal with them.

(continued on p. 16)
EMSE 25TH ANNIVERSARY CELEBRATION—MAY 20, 2010

Dr. Rabadi, Dr. Bowling, and Dr. Pinto

Chevella Baker, Gabriella Landaeta, Kim Sibson, Shereen Rabadi, Luna Magpili

Dr. Rabadi, Charlie Daniels, Dr. Safford, Dr. Pinto and Dr. Landaeta

Dr. Landaeta, Dr. Unal, Dr. Pinto, and Charlie Daniels

Dr. Rabadi and his wife, Shereen

Dr. Unal and Dr. Landaeta
Dr. Safford, and his wife Marian, came back to spend the evening with us!

Dr. Unal and Dr. Unal!

Dr. Unal gives a speech to everyone!

Dr. Unal receives a gift of appreciation for his wonderful leadership of the Department!
Kovacic uses the example of learning to swim.

"You can read 50 books about swimming, but that doesn't mean you know how to swim. There are some activities you can only learn by doing," he said.

The toolkit created by SESI will provide the analyst with the ability to quickly and efficiently extract, compile and present real-time data from multiple, disparate sources; provide tools for the manipulation of data to allow the generation of scenarios and alternatives for a decision maker; and provide the decision maker with the ability to make comparisons of multiple alternatives and assist in choosing an alternative.

SESI uses a proprietary software development process, Web SoNesis, designed under the careful oversight of ODU researchers, utilizing their work in CASM. CASE is the architecture that provides the framework for CASM theories to be put to practical use, such as in Web SoNesis.

NCSoSE’s portion of the grant is more than $500,000, spread over three years. The ODU researchers are tasked with providing the expertise behind the methodology, and overseeing its architecture development and subsequent data gathering through workshops and site visits.

The project will also call for upgrades of the base-year tools with additional tool prototypes, offering more analytical tools for agents in the field. ODU will provide the internal CASE environment for demonstrations, presentations and testing, as well as a culminating point for all tasks to be finalized. This will take place at an NCSoSE headquarters lab in Innovation Research Park @ ODU.