# Table of Contents

VMASC Overview ........................................... 4-5  
Center Activities ........................................... 6-9  
The Chairman’s Message ................................. 10  
Engineering & Technical Services Contracts ........ 11  
Directors’ Columns 
  Thomas Reese, Business Development .................. 12-13  
  Sheila Flanagan, Administrative Services ............... 14  
  Dr. Roland R. Mielke, Academics ......................... 17  
  Dr. John Sokolowski, Research ......................... 18-19  
Awards & Publications .................................. 20-41  
Faculty & Staff ............................................. 42-43  
New Members .............................................. 44-45  
2009 VMASC Members .................................. 46-47
Engage in scholarly research in modeling and simulation (M&S), visualization, and analysis that yields significant contributions to the M&S body of knowledge, provides constructive solutions to critical challenges facing academic, government, and industry partners, and fosters the international advancement of the discipline of M&S.

Promote economic development through collaboration with industry and through the continued maturation of research ideas and analysis to create tangible products and applications suitable for commercial development or public investment.

Support M&S education and workforce development through classroom instruction and through active engagement of students in the research process.

Virginia Modeling, Analysis and Simulation Center (VMASC) is a multi-disciplinary research center of Old Dominion University. VMASC supports the University’s Modeling & Simulation (M&S) degree programs, offering M&S Bachelors, Masters and Ph.D. degrees to students across the Colleges of Engineering and Technology, Sciences, Education, and Business. Working with more than one hundred industry, government, and academic members, VMASC furthers the development and applications of modeling, simulation and visualization as enterprise decision-making tools to promote economic, business, and academic development.

VMASC concentrated on seven core modeling and simulation applied research areas:

- Transportation
- Homeland Security and Military Defense
- Virtual Environments
- Social Sciences
- Medicine & Health Care
- Game-based Learning
- Business & Supply Chain Modeling

VMASC moved to its new facility, located at 1030 University Boulevard in Suffolk, Virginia on September 24, 2007, where we have since hosted over 100 conferences, workshops, and special events. State-of-the-art capabilities consist of approximately 6,000 square feet of lab space including two general purpose labs, a visualization lab, a human factors lab, and a 74-seat virtual reality theater supporting live, virtual, and constructive simulation integration.

VMASC’s accomplished faculty members work in varied fields of expertise to successfully expand on and bring unique innovations to modeling and simulation research and development. Our staff consists of approximately 50 people including research faculty, project scientists, support personnel for technology, program & budget management, institutional advancement, and embedded technical expertise as well as affiliated M&S faculty from Old Dominion University’s main campus.

Old Dominion University, through VMASC, is a leader in modeling and simulation (M&S), analysis, and visualization, and is recognized for its multidisciplinary approach to M&S research, education, and application.
C E N T E R  
activities

2008–2009

OCTOBER 2008

On October 17, Partners in M&S Education presented a workshop focused on Modeling & Simulation in Nursing at the Virginia Modeling, Analysis, and Simulation Center. The workshop, sponsored by VMASC-ODU, the Hampton Roads Research Partnership, Meti, and Laerdal, featured demonstrations and poster sessions as well as podium sessions with such topics as “The Use of Simulation in Nursing as well as Modeling & Simulation in Advanced Practice.”

Dr. Stacie Ringleb, VMASC’s Medical & Health Care cluster lead, and Dr. John Sokolowski, VMASC’s Director of Research, welcomed the workshop participants, and opening remarks were provided by Dr. Andrew Balas, ODU’s Dean of the College of Health Sciences. The event’s keynote address was provided by Dr. Jean Giddens. Dr. Giddens is the Interim Senior Associate Dean for Academic Affairs at the University of New Mexico, and coordinator for the MSN Nursing Education program at UNM. Her clinical expertise is adult health, medical surgical, and emergency nursing, but her career focus has been teaching, learning, and educational excellence. Dr. Giddens’ keynote speech at the workshop focused on “New Directions for Nursing Education: Virtual Experiential Communities.”

Based on a contract awarded in October 2008, from 2009 until 2013, VMASC will be the “go to” organization to satisfy Department of Homeland Security (DHS) requirements, while continuing to provide M&S support to the military defense community through a strong partnership with the U.S. Joint Forces Command (JFCOM) and Congressmen on Capital Hill February 3 and February 5. The model, funded by the Commonwealth of Virginia Office of Preparedness, simulates the evacuation of more than 900,000 residents of Hampton Roads, via six different routes at any given time. The model incorporates growth in population figures and current flood zone mapping by the U.S. Army Corps of Engineers. It also accounts for the inevitable congestion that will occur with traffic accidents and incidents.

November 26 – 28, 2008: VMASC, in collaboration with USFJCOM, participated in the I/ITSEC Conference hosted at the Orange County Convention Center in Orlando, Florida. With many of our industry partners participating and exhibiting, VMASC was represented by faculty and staff members on hand to demonstrate & discuss M&S research in the following focus areas: Transportation, Medical & Health Care, Social Science, Homeland Security & Military Defense. VMASC was given a special opportunity to present its research to Congressman Randy Forbes, Congressman Bobby Scott, Delegate John Cosgrove, Dr. James Blake (PEO STR), and Lieutenant General James Lynch.

FEBRUARY 2009

In February, VMASC was pleased to host “GIS & Public Health: A Modeling and Simulation Short Course”, jointly offered by VMASC and EVMS, for ODU/VMASC modeling and simulation students, VMASC industry partners, and ODU-EVMS MPH students. The short course was lead by VMASC’s Dr. Joshua G. Behr and Old Dominion University’s Dr. Hua Liu. With the increasing use of geographical information systems (GIS) to study public health problems, such as vectorborne disease and environmental health, this short course introduced participants to the use of GIS as an applied tool for a better understanding of infectious disease and environmental health interactions. It also provided a brief exposure to approaches in modeling and simulation. The course, geared towards those with little or no hands on GIS experience and/or those interested in a brief introduction to modeling and simulation, was successful in its goal to give the participants a combination of theoretical background, examples of applications in the literature, and hands-on experience in using ArcGIS software. Students took part in several different exercises, including Introduction to GIS, Getting Started with ArcGIS, Applications of GIS in Public Health, Disease Surveillance Mapping, General GIS Analysis in Public Health, Location Analysis of Health Services, Spatial Analysis in Public Health, Spatial Interpolation of Populations at Risk, Spatial Statistics in Public Health, Spatial Statistics Analysis of Behavioral Risk Factor Surveillance System, and Basic Approaches to M&S.

MARCH 2009

Old Dominion University acquired the Virginia, Modeling, Analysis and Simulation Center (VMASC) building from HRC VMASC, LLC. This permanent investment will expand research and economic development efforts aimed at attracting new modeling, simulation and visualization (M&S)V companies by creating accelerator facilities and services at VMASC, according to a city press release. “ODU is a strong educational resource to our community. With the modeling and simulation industry growing at such a rapid pace, the city of Suffolk continues to be excited about the opportunity to be a part of this momentum,” said Harold Faulk, Economic Development Authority Chairman. “The purchase of this building by ODU shows their long-term commitment to our community and for our citizens.”
**2008–2009**

Suffolk realizes that the quality of our community tomorrow will be based on the quality of our students’ preparation today.” ODU had previously leased the VMASC building, adjacent to the Tri-Cities Higher Education Building, which it currently owns. “This investment enables Old Dominion University and the City of Suffolk to strengthen our collaborative efforts in attracting new modeling, simulation and visualization firms and expanding Hampton Roads’ national reputation as a hub for MS&V activity,” said ODU President John R. Broderick.

**APRIL 2009**

The Virginia Modeling, Analysis, and Simulation Center was pleased to host the 2009 Modeling, Simulation & Gaming (MS&G) Student Capstone Conference on April 9, 2009. The annual conference featured students from universities and colleges across the country. The student research and projects submitted to the conference were central to their research and academic careers. These students were recognized at the evening’s Capstone Banquet. The guest speakers for this year’s Capstone Conference were Dr. Gabriel Wainer of Carleton University (Ottawa, Canada) and Dr. R. Bowen Loftin of Texas A&M (Galveston, Texas). Also participating in the conference were Old Dominion University Modeling and Simulation faculty who graciously volunteered their time to impart direct support to their students’ research by facilitating the various conference tracks, serving as referees for papers, serving as judges for each of the tracks, and providing overall assistance to this conference.

**JUNE 2009**

Dr. John Sokolowski, the top researcher at Old Dominion University’s Virginia Modeling, Analysis and Simulation Center (VMASC), was appointed interim executive director of the center. He succeeds Dr. Michael McGinnis, who departed VMASC after three years as its leader to become executive director and chief science and technology officer of the Peter Kiewit Institute at the University of Nebraska.

Sokolowski joined VMASC as a project scientist in 2001 after he retired from the Navy. At the time, he held a bachelor’s degree in computer science from Purdue University and a master’s in engineering management from Old Dominion University. In 2003, the Frank Batten College of Engineering and Technology awarded him a Ph.D. in modeling and simulation/engineering, the first degree of its kind to be earned worldwide.

Since the fall of 2006, Sokolowski has been a research professor and director of research for VMASC. He is credited with expanding the areas and amount of research being conducted at the center, and he is an author and co-editor of *Principles of Modeling and Simulation - A Multidisciplinary Approach*, the first multidisciplinary textbook in the M&S field.

From June 22 to June 26, 2009, VMASC hosted the first Game Development Summer Camp sponsored by Old Dominion University. The camp, led by ODU assistant professor Dr. Yuzhong Shen, attracted 20 students ranging in age from 12 to 16. While attending the weeklong camp, students learned game design and 3D modeling through daily interactive lectures, hands-on exercises and game play sessions.

With instructors such as Norview High School teacher Kent Collins and VMASC project scientists Hector Garcia and Peter Foytik, the students’ creative and enjoyable foray into designing interactive environments was highly successful in promoted the camp’s aim of boosting teen interest in STEM as well game development for education and learning purposes.

VMASC was awarded a $640,000 contract by the Department of Defense (DoD) to spend the next three years creating codes of conduct and best practices for M&S. The creation of M&S standards is expected to reduce future model development and reuse costs, promote the open distribution of technology across different disciplines, and open up the contract awards environment, thereby strengthening the marketplace.

The three-year contract’s two major goals are to (1) design law, policy, regulation and governance processes by which national M&S standards can be proposed, considered, reviewed and approved, and (2) research past and current modeling methods to establish benchmark M&S standards derived from industry, academia and government best practices.

VMASC is slated to create policy, and governance processes by which national M&S standards can be proposed, vetted, and approved. It will also research past and current M&S techniques to baseline and benchmark industry standards.

**AUGUST 2009**

A grant from the U.S. Department of Health and Human Services (DHHS) will help Old Dominion University’s School of Nursing teach undergraduate nursing students the fundamentals they need to use electronic health records, no matter where they eventually work. The goal is to make it easier to share health information between providers.

The grant will enable the nursing school to partner with ODU’s Virginia Modeling, Analysis and Simulation Center (VMASC), Center for Learning Technologies (CLT) and Office of Computing and Communications Services (OCCS) to develop the technology to teach students critical skills for electronic documentation. The School of Nursing’s virtual hospital, Monarch General, will receive a series of avatars, or virtual patients, created and designed by nursing faculty and VMASC engineers. This grant is indicative of the type of research VMASC is attempting to incorporate into its core mandate - multi-disciplinary simulations that involve faculty across disciplines.
From the Advisory Board Chairman

In reflecting over this past year’s events, it’s clear to me that only the very best Monte Carlo simulation would have predicted the randomness of 2009. Early in the year we bid farewell to Dr. Mike McGinnis as he departed for the University of Nebraska to become the Executive Director of the Peter Kiewit Institute. Mike’s accomplishments were many, but most notably he was pivotal in elevating VMASC onto the national stage as a center of excellence in modeling and simulation. Fortunately for VMASC, Dr. John Sokolowski stood ready to step in and assume the role of Interim Executive Director. John’s outstanding reputation as a researcher and professor has allowed us to successfully navigate through this transition period.

Under John’s stewardship and in coordination with Dr. Roland Mielke the University has moved forward with plans to establish the nation’s first undergraduate degree in modeling and simulation. This development adds to a legacy of M&S ‘firsts’ at VMASC and completes an academic ‘trifecta’ for ODU. Our academic programs ensure that companies throughout the region have ready access to highly qualified graduates skilled in the latest techniques of M&S.

I’m very pleased to report that our industry membership has benefited from the recent addition of Mr. Thomas Reese who joined the VMASC staff as Director of Business and Program Development. Tom has quickly demonstrated his value by increasing communications between VMASC and its industry partners. We welcome Tom to the VMASC team and offer our support as we move into the future.

The Board of Advisors has been fortunate to have the strong support of many advocates throughout the year to help champion VMASC and the modeling and simulation industry here in Hampton Roads. Most notably I’d like to recognize the support of ODU President John Broderick, Senator Mark Warner, Congressman Randy Forbes, VA Delegate John Consrove, Dana Dickens from the Hampton Roads Partnership and Dr. Lee Beach from the Hampton Roads Research Partnership for their leadership and tireless support of the growth of M&S in Hampton Roads.

I would also like to highlight the continued success of MODSIM World and VMASC’s sponsorship of Senator Mark Warner’s M&S Summit. Both of these events would not have happened without the support and participation of a vibrant industry relationship.

As we close out 2009 we are actively engaged in a search for a permanent VMASC Executive Director. We anticipate the first-ever release and implementation of the official “Hampton Road Modeling and Simulation Strategy 2020” laying out actions to be taken by industry and others as we continue the growth of M&S in Hampton Roads. The success of this strategy hinges upon increased collaboration, outreach and participation of all VMASC members. Even with the many successes outlined above, we look forward to the challenges ahead.

VMASC provides support to JFCOM with technical and engineering expertise through our engineering and technical services contract. As a non-partisan team, we have no product to sell and provide valuable unbiased technical reviews and reports to various staff sections within USJFCOM. Currently there are team members in the J-2, J-6, J-8, JSIC, and JWFC. There are IPs in various staff sections and several are former ETS teammates. The majority of the teammates are retired senior officers and enlisted members from the U.S. Marine Corps, U.S. Navy, U.S. Air Force and the Air National Guard. The experience of these individuals is the keystone of our success. They are relied upon to provide their sponsors with technical recommendations and have no hidden agenda. We currently are on a five year contract [base year with four Option Years]. Currently, we are in Option Year 5, which will end on 30 September 2010.

A quick synopsis of what the ETS team does:

- J-2: Provide technical analysis on the J2 Investment Plan that links technological initiative development to experiments and operational testing.
- J-6 (C4ISR/C2): Provide technical analysis and engineering services in support of operational requirements, concepts and functional requirements for both ground C4 systems and Intelligence Systems.
- J-8 (OMN and R&D): Provide technical research, qualitative and quantitative engineering analysis, cost estimation test planning and evaluation and timeline and report drafting in support of the J-8 Mission.
- JSIC: Provide project reports on research and analysis performed, identifying technology solution sets, conducting desk top reviews identifying “best of breed” within the technology sets.
- JWFC/NATO: Provide technical and engineering services to JFCOM on NATO/Multi-National M&S activities and represent the JWFC on NATO workgroups and committees in support of the overall M&S mission.

The ETS Team

William Ciaston - Senior Program Manager
John Dorris - Senior Program Manager
Joseph Grosel - Senior Program Manager
Thomas Jarrell - Senior Program Manager
Ernest McDuffie - Project Analyst
David Meyr - Project Analyst
Gary Norman - Project Analyst
Andrew Nelson - Project Analyst
Linda Pascoe - Technical Analyst
Jonathan Phillips - Project Engineer
Robert Powers - Senior Program Manager
Robert Priest - Senior Project Manager
Paul Skurski - Program Analyst
Charles Triplett - Senior Project Manager

John Dannon
VMASC Advisory Board Chairman
Strengthening existing and developing new relationships with industry, government and academia have been priority initiatives from day one as Director of Business Development and Technology Transfer at VMASC. Initiatives to further advance and promote key objectives of VMASC and its role in the M&S community have been equally important. These initiatives and others have resulted in measurable successes in the 2009 academic year while forthcoming initiatives promise to garner even greater success in the year ahead.

The Year Past

Throughout industry, academia and government, the importance and value of positive branding is widely understood. Recognizing this fact, VMASC engaged Earwork Media to develop its second and new video promotion aimed at branding Hampton Roads as the center of modeling and simulation (M&S) research and education in Virginia and potentially the nation. The message in this new video delivers as intended in promoting and branding Hampton Roads as the center of M&S research, education and application. This production alone is a single touch point yet strategic asset in our current and planned portfolio of promotional materials highlighting the region, the discipline of M&S, and ODUS/VMASC’s connection to the broader M&S community. Copies of the video will be disseminated at trade shows and conferences domestically and internationally. Our sincere thanks go to our industry and government partners who provided interviews and content material for the production. Their participation exemplifies our focus and need for continued growth in collaboration between VMASC, industry, government and the academic community. To say the least, we are pleased to have a strong, active and engaged membership. Moreover, representatives from each of these partner groups have cooperatively engaged with VMASC staff on common short and long-term goals to advance the discipline of M&S, its commercial utilization and help shape the image and role of VMASC going forward. Undeniably, collaboration has been the buzz in 2009 at VMASC and will certainly heighten as the new year unfolds. Other instances to communicate the message of VMASC and make announcements on M&S events was realized through various media including television and radio interviews, press releases and newsletter publications.

Another important area of focus at VMASC is economic development, partly through new job creation, higher wages, intellectual property, and support to our membership increases.

The Year Ahead

A new year is upon us and with it comes new challenges and new opportunities. From our vantage point, opportunities far outweigh any challenges we may face. Two opportunities being pursued in the coming year focus on increasing our members’ return on investment in VMASC and continuing efforts of branding the Hampton Roads region as the center of modeling and simulation research and development support. The first and foremost initiative under development is an international bi-annual marketing and advertising publication. This publication is designed specifically to highlight and promote scholarly M&S research being conducted at ODU/VMASC and the vast array of M&S capabilities available through our industry/academia consortium. The overall theme and differentiator from other M&S publications will be its focus on our government, academia and industry collaboration and connection, and the Hampton Roads region as the center of M&S research and advancement. It further purposes to make the application or hands-on individual as well as top leaders in academia, industry and government aware of our presence, capabilities and successes in developing M&S solutions to complex problems faced by military and industry leaders. It will include, but not be limited to, articles on current M&S trends and technologies, legislative briefs, member advertisements, and peer reviewed subject matter authored primarily by ODUS/VMASC faculty and staff. We further seek to include articles from industry and academic partners as well as comments from Virginia’s Governor-elect Bob McDonnell and the offices of Senator Warner and Congressman Forbes. Individuals targeted to receive this publication include program managers, Program Executive Officers, local, state and federal leaders and legislators, industry leaders, and potential customers and partners.

The plan is to have this new publication available at spring 2010 conferences attended by ODUS/VMASC and industry member representatives. The next successive issue will be released prior to Modsim World 2010 and I/ITSEC 2010.

A second initiative and added benefit of VMASC membership underway is the establishment of a viewing space within VMASC to house and showcase industry member technologies and capabilities through demonstrations. The purpose of developing a demonstration space is to have a one stop location of industry member capabilities readily available for viewing by military, government, industry and academic leaders attending conferences, workshops and seminars held at VMASC. Targeted groups will also be solicited for demonstration presentations. The entire VMASC membership is invited to provide demos to be showcased.

Finally, strategies to form a collaborative effort between Old Dominion University’s VMASC and William & Mary to jointly host a series of executive level business training workshops has been implemented. These workshops go a step further to support economic development in the region and expand the benefits of VMASC membership. Growth in VMASC membership is already occurring and is expected to continue steadily as our outreach and support to our membership increases.
During the academic year 2008-2009, an objective of the Center’s administrative support office was to reorganize the current organizational structure. To meet this objective, it was essential for the administrative staff to reassign duties and responsibilities in order to effectively manage the growth and expansion of the Center research activities that have evolved into seven applied research focus areas. Each of these applied research areas has a dedicated principal investigator, project scientists and graduate research assistants. With the restructuring of the research focus areas, it was imperative that the administrative office restructure in order to support the increased requirements for administrative support.

The implementation of this new staff structure was hugely successful due to the continued support of Ms. Karen Thompson and Ms. Tracey Vann. Both of these ladies continue to be the “go to” people within VMASC. A new addition to the administrative staff, Ms. Cheryl Sparrer, joined the administrative team in September 2009 replacing Ms. Samantha Lindsey, who resigned and relocated to North Carolina to work for General Dynamics. Ms. Sparrer previously served as the Executive Assistant to the Executive Director, Dr. Mike McGinnis, for approximately two years and was promoted into her current position where she is responsible for supporting the researchers with proposal development and financial tracking. Replacing Ms. Sparrer in her Executive Assistant position was Ms. Charlotte Smith. Ms. Smith came to us from VDOT where she served for approximately nine years. She has quickly proven her team spirit and dedication to VMASC.

Through this academic year, the Administrative Office was instrumental in supporting the submission of 81 proposals, valued at more than $14.9M. Of those 81 submissions, more than 67% were accepted for award, with total revenue exceeding $9.9M. In addition to project support, the administrative staff processed all sponsored and Center related travel arrangements, purchased furniture and equipment to outfit six new research laboratories, which included a Driver Simulator, fourteen new computers for graduate student offices and 25 new computers and laboratory furnishings for VMASC East on the ODU Campus. Along with the normal duties of an administrative office, the staff also managed over 200 meetings within the facility providing support for hosted and non-hosted events. With the increase in conference requests, the administrative office instituted a new Conference Service Policy effective July 1, 2009. The policy along with the forms required to reserve space are available on the VMASC website at www.vmasc.odu.edu under conference services. The implementation of this policy has enabled the staff to more effectively and efficiently support our many requests for conference support within our industry and Hampton Roads community.

Outside the administrative area of VMASC is our marketing and communication area. Ms. Terra D’An Knowles, Manager of Marketing and Communication, was hired in July 2008 and since that time has brought extraordinary knowledge of marketing, graphics and web design. Her tireless effort in managing the VMASC website, monthly newsletters, and marketing and media relations has been exceptional. Along with her normal duties, Ms. Knowles was also instrumental in the success of the ModSim World Conference and Expo 2008 and 2009.

Overall, the Center administrative support team continued its exceptional performance in the past year and established an inevitable record of achievement to carry into the next academic year 2009–2010.

Sheila Flanagan
VMASC Director of Administration & Support

Senior Mentorship Program

Old Dominion University’s Virginia Modeling, Analysis and Simulation Center provides non-personal services to support a series of lectures and mentoring sessions to enrich the professional military training development of DoD senior military leaders and operational proficiency of operational joint headquarters.

In academic year 2008–09, the following Senior Mentors joined our program:

- LtGen John Sattler, (Ret)
- LtGen Robert Blackman (Ret)
- GEN Burwell Bell (Ret)
- LtGen Robert Bishop (Ret)
- LTG John Wood (Ret)
- LTG James Lovelace (Ret)
- GEN William Wallace (Ret)
VMASC is a very important contributor to Old Dominion University’s Modeling and Simulation academic programs. Center research faculty teach courses and mentor graduate students, and VMASC research projects often provide the topics and supporting funds for graduate thesis and dissertation research. In return, the academic programs provide faculty and student expertise to assist with the VMASC project workload. This critical partnership between VMASC and ODU’s academic programs has never been stronger.

Academic year 2009 was the first complete year in which all six of Old Dominion University’s academic colleges participated in offering graduate M&S academic programs. The Colleges of Arts & Letters, Business and Public Administration, Education, Health Sciences, and Sciences now offer M&S graduate certificate programs and M&S emphasis areas or tracks within existing degree programs. The Batten College of Engineering & Technology continues to offer M&S graduate degree programs: the Master of Engineering (non-thesis option); the Master of Science (thesis option); the Doctor of Engineering (professional degree); and the Doctor of Philosophy (research degree). The Master of Engineering program now is available outside the region in a hybrid format offered over the Internet. Over 125 students were enrolled in these graduate academic programs during 2009.

In spring 2009, Old Dominion University’s Board of Visitors formally approved a new undergraduate degree program titled Modeling and Simulation Engineering (M&SE). State Council for Higher Education in Virginia (SCHEV) approval followed during summer 2009. The program is scheduled to begin in January 2010. The M&SE program will be administered by the Batten College of Engineering & Technology and is designed to be an ABET-accredited engineering program. The program will be initiated one year at a time, and the first program graduates are expected in May 2013. The program was developed in response to the M&S industry’s requirement for entry-level M&S engineers and scientists. The M&SE program will be the first such program in the United States.

In fall 2009, Dean Oktay Baysal announced that the M&S programs in the Batten College of Engineering & Technology would be reorganized administratively as an academic department. The new department, called the Department of Modeling and Simulation Engineering, will be housed on the first floor of the Engineering and Computational Sciences Building on the Norfolk campus. The Department is expected to open during the spring 2010 term.
Over this past year VMASC’s research and development (R&D) effort has continued its multidisciplinary approach supported by several key basic research areas. In fact, during the past year VMASC saw its second best level of research funding since its inception. From the multidisciplinary perspective we have seven applied research areas (military/homeland security, transportation, medical and health care, social science, virtual environments, game-based learning, and business and supply chain modeling) that support the development of new and innovative approaches to solving real world problems.

Examples of research in these applied areas include an assessment of proposed transportation projects and their overall impact on regional congestion, the development of a computer model to investigate policy options for U. S. stability and reconstruction operations, the characterization of human physical performance to support military equipment design and procurement, investigation of a future air traffic control system, and the design of a gaming workshop for middle school and high school students, to name a few.

The applied research areas are supported by several efforts in basic research. We consider these areas as the core research expertise of the VMASC faculty. One of these areas is simulation interoperability. The M&S community faces a grand challenge of designing methods to bring together many types of simulation systems into a coherent combination to address a problem greater than the sum of its parts. VMASC has been exploring several aspects of this problem including web services, database compatibility, and simulation ontology. These efforts have significantly advanced this area over the last year. A second basic research area is that of human and social behavior modeling. VMASC researchers have developed methods for translating qualitative information into a quantitative representation that captures the context of a human system’s behavior. Additionally these researchers are exploring new ways to computationally represent these types of systems using agent-based modeling and system dynamics. A third basic research area involves simulation-based optimization of business and supply chain management. We have developed new simulations that help optimize these types of systems to provide a significant cost savings for those who adopt these methods.

For the upcoming year we are exploring new areas in which simulation can play a major role. One such example is in the real estate market. We are working with faculty from ODU’s College of Business to look at modeling human behavior as it relates to real estate buyer choices. This line of research will lead to tools that will help real estate companies maximize their sales productivity.

M&S at ODU and here in Hampton Roads continues to show its value and applicability in many areas not previously explored. Our research efforts continue to be catalysts in growing these areas not only from a research perspective but also from an economic development aspect. We are looking forward to this next year’s challenges, opportunities, and outcomes.
Old Dominion University’s Virginia Modeling, Analysis and Simulation Center is the international research leader in modeling and simulation, visualization, and M&S supported analysis.

VMASC is honoured to have well-rounded faculty members working in varied fields of expertise to advance the multi-disciplinary aspects of modeling and simulation research and development.

The preceding and following information provides an accomplished overview of the modeling and simulation research carried out over the last year at VMASC, highlighting the contributions that each researcher has made to the field of modeling and simulation in terms of scholarly work.

**Awards**

**Catherine Banks**
Crowd Model for JFCOM  
JFCOM - $93,000

**Insurgency/Counterinsurgency Modeling**
JFCOM - $147,836

**Mike Robinson**
Hampton Roads Transportation Alternatives Simulation  
ODU - $250,000

**Yannis Papelis**
Airspace & Traffic Operations Simulation enhancement  
NIA - $45,384

**Phase II Technical Evaluation of Synthetic Texture Generation Algorithms**
Diamond Visionics - $225,000

**R&D of Airborne Separation**  
NIA - $20,000.00

**Modeling Crowd Behavior**
JFCOM - $136,789.00

**Barry Ezell**
Bioterrorism Risk Assessment  
Batelle National Biodefense Institute - $85,770.43

**John Sokolowski**
ETS / SFS Contract – J8 Support  
Joint Forces Command - $925,546

**ETS/SFS Contract – JSIC**
Joint Forces Command - $342,334

**ETS/SFS Contract – JI & I Support**  
Joint Forces Command - $595,716

**ETS/SFS Contract – J6 OMN**
Joint Forces Command - $212,625

**ETS/SFS Contract – J6 C4ISR**
Joint Forces Command - $326,937

**EDA II**
Hampton Roads Partnership - $100,000

**Tech Support for G2Q (Dahlgren)**
NSWC - $1,306,585

**Human Behavior Representation Study**
NATO - $24,600

**Shore Force Training Center**
Aliion Science & Technology - $13,600

PMESII  
General Dynamics - $85,365

**Network Operations – JUO**
Joint Forces Command - $272,923

**J7 / JWFC Support**
Joint Forces Command - $327,035

**M&S Short Course**
NATO - $6,262.50

**DDR&E Analyst**
Aliion - $19,132.00

**Hybrid Warfare Analysis**
JFCOM - $16,852.00

**Major Urban Environment**
JFCOM - $105,693.00

**Developing Insurgency**
JFCOM - $148,680.00

**Mike McGinnis**
Feasibility Study Modeling & Simulation Center  
Crater Planning District Commission - $46,000

**Capstone Seminar**
Joint Forces Command - $12,092.95

**DHS Workshop**
DHS - $39,591.00

**MAJIC Support**
General Dynamics - $189,451.27

**MODSIM World 2008**
CP3 - $142,331.00

**DDR&E Analyst**
Aliion - $81,149.00

**DDR&E Analyst**
Aliion - $100,608.00

**Lecture Series – SFS**
JFCOM - $240,825.00

**Grand Strategy**
JFCOM - $83,167.95

**Strategic Communicator**
JFCOM - $236,243.00

**Awards & publications**  
2008–2009
Book Chapters Written


Refereed Journal Articles


Banks, C.M., J.A. Sokolowski, “From War on Drugs to War against Terrorism: Modeling the evolution of Colombia’s Counter-Insurgency”, Social Science Research. (2008), doi:10.1016/j.sssresearch.2008.08.001

Banks, C.M., J.A. Sokolowski, “Nigeria as a Pivotal State: Modeling the Niger Delta Insurgency”. International Studies Quarterly. (Submitted 9/26/08)


Banks, C.M., J.A. Sokolowski, “Advancing Cognitive Agent-Based Modeling: Personifying the Agents”. International Studies Quarterly. (Submitted 2009)


Conference Papers


Creative Research/Exhibitions


Keynote Speakers


Old Dominion University Affiliated Faculty • M&S Research

Awards

Tal Ezer
Collaborative research: Modeling sea-ice-ocean-ecosystem responses to climate changes in the Bering-Chukh-Beaufort seas with data assimilation of RUSALCA measurements
National Oceanic & Atmospheric Admin. - $108,000

Patrick Hester (Co-PI)
Configurable Aggregation Layers
Referenica - $30,000

Andreas Tolk (PI)
Joint Technology and Simulation Division: Simulation Roadmap PEO Soldier (Part 2), JFCOM - $80,000
Joint Technology and Simulation Division: Simulation Roadmap PEO Soldier (Part 1) JFCOM - $20,000
Support for Joint Experimentation (JEXP) on Global Political Military Economic Social Infrastructure and Information (PMESII) Community of Excellence (COE) General Dynamics AIS - $66,200
Consultancy on Data Engineering and System Architecture TEI/U.S. Army Test and Evaluation Command (ATEC) - $40,000
Support for Joint Experimentation (JEXP) on Political Military Economic Social Infrastructure and Information (PMESII) Community of Excellence (COE) Questionnaire General Dynamics AIS - $6,050
Holly Gaff (consultant)
RUI: Collaborative Research: Optimal Control Studies for Cholera Outbreaks NSF - $200,000

Yuzhong Shen (Co-PI)
Phase II Technical Evaluation of Synthetic Texture Generation Algorithms Diamond Visionics - $225,000
Continuation of Commonwealth Transportation Project Commonwealth of VA - $200,000
Analysis of Proposed Changes to the Hampton Roads Transportation System Commonwealth of VA - $250,000

Yuzhong Shen (PI)
Brain Injury Rehabilitation Delivery System via Xbox 360 and Zune MYMIC - $30,000

Yuzhong Shen (Co-PI)
Characterization of Insoluble Organic Matter from Carbonaceous Meteorites by Advanced Solid-State Nuclear Magnetic Resonance and Computer Fitting ODU Research Foundation - $17,000

Jiang Li (PI)
Dental Implant Site Preparation and Placement Using 3D Imaging and Robotics: Initial Phase Quality Dental Labs - $40,000
Hybrid Texture Imaging and Molecular Biomarker Classification of Prostate Cancer Tumor Cells ODU Research Foundation - $80,000
Cognitive Modeling for Closed-loop Task Mitigation Intelligent Automation - $15,000

Mecit Cetin (PI)
Exploratory Methods for Truck Re-identification in a Statewide Network OTREC - $98,295
Development of Truck Trip Generation Models JECUTC - $47,611
Hampton Roads Transportation Alternatives ODU Research Foundation - $250,000
Multimodal Transportation Planning City of Suffolk - $205,000

Randi Kady (PI)
Modeling and Simulation Education and Certification Support Boeing - $100,000

Gianluca DeLeo (PI)
Improving Quality of Life and Short-term Memory Loss in Patients with Alzheimer’s Dementia: Smartphone Application for Capturing Daily Life Moments Virginia Center for Aging - $9,288
Software to Assess Readiness and Train Medical Support Operation Teams MYMIC - $90,000

Julie Hao (PI)
Robust Design of High Performance MEMS Resonators National Science Foundation - $343,762

MRI Image Artifacts Correction and De-noising Medical Image Engine, LLC - $7,500

Publications

MRI Image Artifacts Correction and De-noising Medical Image Engine, LLC

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Tal Ezer
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MRI Image Artifacts Correction and De-noising Medical Image Engine, LLC - $7,500

Publications

MRI Image Artifacts Correction and De-noising Medical Image Engine, LLC
Journal Editors

Andreas Tolk
International Command and Control Journal, Command and Control Research Program Press
International Journal for Intelligent Decision Technologies, IOS Press
International Journal for Modeling and Simulation Engineering, Hindawi Publishers
SIMULATION – Transactions of the Society for Modeling and Simulation International, SAGE Publishers

Tal Ezer
Co-Editor (2001-present), Ocean Dynamics (Springer-Verlag Publ.)

Dean Chatfield
Elected to the editorial board of the International Journal of Operations Research and Information Systems and reviewed articles for:
Automation in Construction
International Journal of Operations Research and Information Systems
International Journal of Production Research
Simulation Modeling Practice and Theory

Rani Kady
Reviewer for the Simulation: Transactions of the Society for Modeling and Simulation International

Editors of Books and Journal Special Issues


Tolk, Andreas. Special Issue on “M&S for Net-centric Command and Control” for the Journal for Command and Control, CCRP

Tolk A; Using Simulation Systems for Decision Support; in Abu-Taieh and El Sheikh (Eds.): Handbook of Research on Discrete Event Simulation Environments: Technologies and Applications, IGI Global, Hershey, PA, 2009


Tolk A, Uhrmacher AM; Agents: Agenthood, Agent Architectures, and Agent Taxonomies; in Yilmaz and Oren (Eds.): Agent-Directed Simulation and Systems Engineering. Wiley-Berlin, 2009


Books Authored


Book Chapters Written


Referred Journal Articles


Andreas Tollk, Robert D. Aaron: “Data Engineering for Data-Rich Integration Projects: Case Studies Addressing the Challenges of Knowledge Transfer,” Engineering Management Journal

Andreas Tollk, Donald Merino, Ghaith Rababi: ”Embedding Simulation Education into the Engineering Management Body of Knowledge,” International Journal of Simulation and Process Modeling, Special Issue on Modelling and Simulation Education


Jianhua Yao, Jiang Li and Ronald Summers, “Colonic Polyp Detection and measurement using Topographical Height Map”, in print, Pattern recognition.


Guangfan Zhang, Roger Xu, Wei Wang, Jiang Li, Tom Schnell and Mike Keller, “Individualized Cognitive Modeling for Closed-Loop Task Mitigation”, accepted by MODSIM 2009.


Jihong Wang, PhD, Yufei Shen, John DeGroot, MD, Yuzhong Shen, PhD and Jiang Li, “Using CSF as an Internal Quality Assurance Tool in Diffusion Tensor Imaging Studies of Brain Tumor”, SPIE Medical Imaging, 2009.


Book Reviews
Poornima Madhavan

Conference Papers


Tolk, A., Bowen, R.J., Hester, P. “Using Agent Technology To Move From Intention Based To Effect-Based Models,” Manuscript accepted for publication in WinterSim Proceedings, Miami, FL.


2008-2009

A W A R D S & publications


Jihong Wang, PhD, Yufei Shen, John DeGroot, MD, Yuzhong Shen, PhD and Jiang Li, “Using CSF as an Internal Quality Assurance Tool in Diffusion Tensor Imaging Studies of Brain Tumor”, accepted by SPIE, 2009.


Ramu Pedada, Emin Kugu, Jiang Li, Zhanfeng Yue, Yuzhong Shen, “Parameter Optimization for Image Denoising Based on Block Matching and 3D Collaborative Filtering”, accepted by SPIE, 2009.


AWARDS & publications 2008–2009


Keynote Addresses


Kady, R. (2008). “The incorporation of empirical crawling data into an existing computational egress tool.” Presented at the M&S Faculty Colloquio, VMAH, Old Dominion University, Norfolk, VA.


Madhavan P. “The pleasures and pains of interacting with technology: To trust or not to trust, that is the question”, Workshop on Prospective Design in Human-Technology Interaction. Berlin: Germany. June 2009.
Gaff, Holly:


Primary Lecturer, DIMACS Bio-Math Connection Field Testers Workshop, Rutgers University, New Jersey, July 8-15, 2009.


Seminar, “Mathematical modeling of tick-borne diseases”, Department of Ocean, Earth and Atmospheric Sciences, Old Dominion University, February 2009.

Seminar, “Tick-borne disease modeling: Spread and control of Ehrlichiosis”, Department of Biological Sciences, Old Dominion University, January 2009.


Invited seminar, “Mathematical modeling of tick-borne diseases”, Virginia Bioinformatics Institute, Virginia Tech University, November 18, 2008.

Invited seminar, “Ticks can give you more than the creeps - mathematical modeling of tick-borne diseases”, Mathematical Biology Seminar, Truman State University, November 13, 2008.

Invited seminar, “Ticks can give you more than the creeps - mathematical modeling of tick-borne diseases”, Biomathematics Seminar, Benedictine University and College of DuPage, October 28-29, 2008.


Honorary Awards

Poornima Madhavan:


Rani Kady.

The Society of Fire Protection Engineers (SFPE) Educational and Scientific Foundation Scholar Award.

Patrick Hester:

Paper nominated for Best Paper Award at Simulation Interoperability Workshop, 2009.

Paper Awarded Society of Allied Weight Engineers’ L.R. “Mike” Hackney Best Technical Paper Award at the 68th International Conference, 2009.
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Peter Foytik   Senior Project Scientist    757-638-6316  pfoytik@odu.edu
Hector Garcia   Senior Project Scientist    757-683-6367  hgarcia@odu.edu
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Will Richards   Project Scientist    757-686-6228  wxrichar@odu.edu
Sol Sherfy   Senior Project Scientist    757-686-6209  ssherfy@odu.edu
Chuck Turnitsa   Senior Project Scientist    757-638-6315  ctturnits@odu.edu
Suchitra Manepalli   Project Scientist    757-618-1641  smanepal@odu.edu

Old Dominion University Modeling & Simulation Faculty
In addition to the full-time research staff, ODU faculty supports the research efforts carried out by VMASC.
Mecit Cetin, Ph.D.   Assistant Professor    757-683-6700  mctetin@odu.edu
Dean Chatfield, Ph.D.   Associate Professor    757-683-3520  dchatfi@odu.edu
Gianluca De Leo, Ph.D.   Associate Professor    757-683-6733  gdeleo@odu.edu
Tal Ezer, Ph.D.   Associate Professor    757-683-5162  tezer@odu.edu
Holly Gaff, Ph.D.   Assistant Professor    757-683-6903  hgaaff@odu.edu
Julie Hao, Ph.D.   Assistant Professor    757-683-6734  zlihao@odu.edu
Patrick Hester, Ph.D.   Assistant Professor    757-683-5205  pthester@odu.edu
Rani Kady, Ph.D.   Assistant Professor    757-683-5379  rikady@odu.edu
Jiang Li, Ph.D.   Assistant Professor    757-683-6748  ji@odu.edu
Poornima Madhavan, Ph.D.   Assistant Professor    757-683-6424  pmadhava@odu.edu
Zia Rahman, Ph.D.   Associate Professor    757-683-3745  zrahman@odu.edu
Stacie Ringleb, Ph.D.   Assistant Professor    757-686-6230  sringleb@odu.edu
Andreas Tolk, Ph.D.   Associate Professor    757-683-4500  atolk@odu.edu
Ginger Watson, Ph.D.   Associate Professor    757-683-3246  gwatson@odu.edu
Semantisys is a Semantic Technologies company focused on commercial applications of the emerging Semantic Web. Semantisys is located on Sunrise Valley Drive in Reston, Virginia, at the epicenter of the Washington, DC technology corridor. Principles in the company have in excess of 70 years of government contacting experience. Key personnel include senior retired military officers and active senior Information Technology architects. Semantisys is a minority owned, women owned, small, disadvantaged business. The mission of Semantisys is the application of emerging Semantic Web technologies to enterprise information problems. These technologies include: Ontologies, Natural Language Understanding and Machine Intelligence. Leveraging these technologies within the enterprise, Semantisys transforms institutional information into operational change through Semantic Service Oriented Architecture (Semantic SOA). Semantisys has a patent application for a distributed movie distribution system. The company met with the patent office to resolve all issues and expect the patent to be issued this year. Semantisys also has a proprietary methodology for Ontology Engineering and delivering the Semantic SOA. www.semantisyss.com

Semantisys was a principal company in the Modeling and Simulation Data Ecosystem (MSDE) program. MSDE is supported by the Office of the Secretary of Defense. MSDE is a program that develops and integrates software technologies across the Military Services to enable interoperable and reusable architecture, systems engineering, M&S, and simulation methodologies. The MSDE program is managed by the Air Force Research Laboratory under the USAF Information Dominance Corps. MSDE supports the development of a modeling and simulation data exchange concept from engineering to synthetic simulation environments for the U.S. Navy, provides architecture, M&S, and T&E systems analysis support to Joint Forces Command (JFCOM) J8 as part of the Joint Capability Support Team, provides lead systems engineering, operations research analysis, and architecture support to the Joint Test and Evaluation Methodology (JTEM) Joint Test and Evaluation project supported by the Director, Operational Test and Evaluation, Department of Defense. This development includes the Capability Test Methodology (CTM) and Capability Evaluation Metamodel (CEM) analytic framework for Testing in a Joint Environment. Semantisys’ recent contracts include developing the Netcentric Systems Test Evaluation Capability Module (NECM) for the Interoperability Test and Evaluation Capability (InterTEC) S&T program. www.visense.com

Wisdom Harvest is a full-service conference and meeting planning and production service. Their services are designed to assist corporate, government, and trade organizations meet their goals at every step in the event process. Wisdom Harvest will identify the best locations, secure the best prices, design an event web registration site, invite your guests, and care for their needs. Their philosophy is, you can’t focus on growth if you’re mired in the administration and logistics of producing an event. www.wisdomharvest.com

KIDA is a government funded, public research institute that addresses a wide range of defense issues concerning the Korean peninsula and beyond. Established in 1979, KIDA has actively assisted defense policy-making in diverse areas. KIDA undertakes some 100 research projects annually that cover virtually all areas related to defense policy, including security, defense transformation, cyber warfare, peace and national defense, and defense information systems. Besides research publications, KIDA’s vernacular publications such as the Weekly Defense Review, the Quarterly Journal of Defense Policy, the Korean Journal of Defense Analysis and others are recognized as the most authoritative in Korea. KIDA is actively engaged in research cooperation with the US, China, Russia, Japan, France, Israel, and other countries. It hosts some ten international conferences annually, contributing to the nation’s military diplomacy as well as to the field of defense research. The 21st century has brought about drastic changes in the international security environment and inter-Korean relations. KIDA, as the premier defense think-tank in Korea, will continue to exert its utmost to fulfill its research mission.

TerraSim, Inc. develops advanced software solutions that rapidly creates complex geospatial visualizations derived from a variety of source data. The TerraTools(R) Core product line supports rapid construction of correlated visual and constructive simulations on multi-threaded multi-core Windows workstations. The optional plug-ins for TerraTools export correlated OneSAF OTF, JSAT, CTDB, JCATS, Virtual Battlespace 2, GDB for MAX VR-Forces, and SEDRIS databases with enhanced support for exercises requiring complex urban details. TerraTools also processes USAR and range data for urban modeling and automatically generates building interiors and underground structures. The TerraTools(R) real-time 3D viewer uses GISLink(TM) to support interactive geospatial query using 3D visualizations linked to collateral source data including videos, still photography, CAD drawings, and web-based information. TerraSim products provide customers with the highest processing performance at the lowest fixed cost. They support customers in diverse markets, including defense modeling and simulation, site modeling, and civil applications. Their customers worldwide include Lockheed Martin, SAIC, L-3 Communications, BAE Systems, Alion Technology, and US Army Modeling and Simulation and Battle Lab Centers, including OneSAF, WARSIM, and Future Combat Systems. www.terrasim.com

Visense is an engineering firm specializing in enterprise visualization, simulation, and analysis. Visense focuses on providing Enterprise Visualization, Modeling & Simulation (M&S) and, Analysis engineering services and software to government and industry organizations. Visense has moved from VMASC’s building to the MAST Center’s Maze One Building, Suite 103, 2140 University Boulevard, Portsmouth, VA and will be opening in the fall of 2009. Visense supports the development of a modeling and simulation data exchange concept from engineering to synthetic simulation environments for the U.S. Navy, provides architecture, M&S, and T&E systems analysis support to Joint Forces Command (JFCOM) J8 as part of the Joint Capability Support Team, provides lead systems engineering, operations research analysis, and architecture support to the Joint Test and Evaluation Methodology (JTEM) Joint Test and Evaluation project supported by the Director, Operational Test and Evaluation, Department of Defense. This development includes the Capability Test Methodology (CTM) and Capability Evaluation Metamodel (CEM) analytic framework for Testing in a Joint Environment. Visense’s recent contracts include developing the Netcentric Systems Test Evaluation Capability Module (NECM) for the Interoperability Test and Evaluation Capability (InterTEC) S&T program. www.visense.com

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Craig Technologies is a Woman-Owned, Service-Disabled Veteran-Owned, HUBZone and 8(a) certified company in operations since 1999, providing high-end custom technical, engineering and IT services solutions to defense and government agencies. Their primary service offerings include systems / software engineering, IT support services, web-based application development, data migration, modeling & simulation, courseware development and instructional training. Craig Technologies’ clients are a diverse group including NASA, the Department of Homeland Security, Navy Chief of Education and Training, Air Force Special Operations Command and the US Joint Forces Command. They are a registered ISO 9001-2000 business: www.craightechinc.com

Command Post Technologies, Inc. (CPT) is a service disabled veteran owned small business (SDVOSB) formed in 2008 to offer professional services in support of Government and Commercial sectors. CPT specializes in Joint and Service Training, Cyberspace and Information Operations, Irregular Warfare, test and evaluation, and C2 System Interoperability assessments. Visit our website at www.commandposttech.com or email us at scott@commandposttech.com

2008-2009
### VMASC members 2008-2009

#### Industry
- Adayana
- Alion Science and Technology
- Blue Force LLC
- The Boeing Company
- Booz Allen Hamilton
- C3 Technologies, Inc.
- CAE
- Command Post Technologies, Inc.
- Computer Sciences Corporation (CSC)
- Craig Technologies
- Cubic Defense Application
- Defense Training & Technologies
- DDL Omni Engineering
- Divurgent
- Earworks Media
- Evidence Based Research
- FGM, Inc.
- General Dynamics - AIL
- General Dynamics - IT
- IP Systems International, LLC
- ITA International
- Julian Swedish
- Lockheed Martin Center for Innovation
- Loyola Enterprises, Inc.
- MAK Technologies
- NASA Group
- MYMIC
- Northrop Grumman Mission Systems
- Raytheon
- SAIC
- Semantadyne
- SimG
- TerraSim, Inc.
- Tidewater Technology Group, Inc.
- Visense
- VMD Systems Integrators, Inc.
- Whitney, Bradley, and Brown, Inc.
- Werner Anderson, Inc.
- Wisdom Harvest

#### Academic
- Christopher Newport University
- College of William & Mary
- Eastern Virginia Medical School
- George Mason University
- James Madison University
- ITT Technical Institute
- Korean Institute for Defense Analyses
- Naval Postgraduate School
- Norfolk State University
- Old Dominion University
- San Diego City College
- Tidewater Community College
- University of Virginia
- Virginia Commonwealth University
- Virginia Tech

#### Government
- Air Force Agency for Modeling & Simulation
- Air Force Operational Plans and Joint Matters
- Air Force Research Lab
- Army Capabilities Integration Center
- Army Research Institute
- Army Research Lab
- Commander Operational Test and Evaluation Force (COMOPTEVFOR)
- Combat Direction Systems Activity (CDSA) - Dam Neck
- Defense Modeling and Simulation
- Emergency Management Training, Analysis & Simulation Center (EMTASC)
- Joint War Fighting Center
- NASA Langley RC
- NATO Allied Command Transformation
- Surface Deployment and Distribution Command Transportation Engineering Agency (SDDCTEA)
- U.S. Army Training and Doctrine Command (TRADOC)
- U.S. Joint Forces Command

#### Local Government
- City of Suffolk
- Hampton Roads Economic Development Alliance
- Hampton Roads Partnership
- Virginia’s Center for Innovative Technology