M&S Newsletter

PUBLISHED BY THE DoD MODELING AND SIMULATION COORDINATION OFFICE (M&SCO) APRIL/MAY 2014

WELCOME TO THE APRIL/MAY 2014 EDITION *of the M&S Newsletter. This issue presents articles ranging from flight operations in an MV-22B Osprey simulator to a four month simulation of exploration on Mars. Additional articles feature a figure skating simulation, evaluating touchscreen interfaces with simulations, and how students in Germany received a lesson in science, technology, engineering, and mathematics (STEM) education. Please note that the complete or original articles are available through the links provided.*

We hope the April/May 2014 M&S Newsletter provides valuable insight into the world of M&S and we welcome your comments.

—M&S Newsletter Staff

Japan Defense, Ministry Officials Experience Osprey Simulator

Photo Credit: Cpl. Anne K. Henry, Lance Cpl. Diamond N. Peden

Major John P. Arnold (left) teaches Toshihiko Matsumoto how the controls of an MV-22B Osprey tiltrotor aircraft work in a flight simulator January 28 during a visit by Japan defense officials to Marine Corps Air Station Futenma. The simulator allowed the visiting officials to see the importance of the aircraft and the level of training the pilots undergo. Matsumoto is the deputy director general with the Okinawa Defense Bureau, and Arnold is the current operations officer with Marine Aircraft Group 36, 1st Marine Aircraft Wing, III Marine Expeditionary Force.

MEMBERS OF THE OKINAWA DEFENSE BUREAU AND MINISTRY OF FOREIGN AFFAIRS visited Marine Corps Air Station (MCAS) Futenma January 28th to experience flight operations in an MV-22B Osprey tilt rotor aircraft via flight simulator.

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Visits like these create opportunities to improve communication and build upon already existing relationships between the Marine Corps and its host nation.

"These visits allow us the opportunity to share what our capabilities and missions are on Futenma," said Colonel James G. Flynn, the commanding officer of MCAS Futenma, Marine Corps Base Camp Smedley D. Butler, Marine Corps Installations Pacific. "[It also] allows us to reinforce that we are in support of the alliance and that we are conducting operations here safely."

Having the opportunity to practice flying the Osprey, even if only in a simulator, allowed the officials to see the importance of the aircraft and the high-quality training the pilots experience, according to Major John P. Arnold, the current operations officer with Marine Aircraft Group 36, 1st Marine Aircraft Wing, III Marine Expeditionary Force.

"It is important for the ambassador and local officials from both Okinawa and mainland Japan to see our simulators," said Arnold. "We can set any environment or condition in the simulator, which allows us to show them how safe this aircraft is."

"I think the officials walked away from this with a better understanding of how we operate," Flynn explained. "They will also have a better appreciation [for the aircraft] by seeing firsthand, through the simulator, how professional our air crews are conducting themselves."

This article originally appeared on the U.S. Marine Corps website. For complete article, **click here.**

Virtual Simulation Training Prepares Hospital Corpsman for Reality

AS PART OF A NEW TRAINING EVOLUTION, the Surface Warfare Medical Institute's (SWMI) Independent Duty Corpsman (IDC) are being trained in the desert and aboard ships before they deploy.

Two new state-of-the-art Virtual Reality Medical Simulation rooms were unveiled February 14th as part of a $7.6 million building renovation to enhance the learning environment for both students and instructors.

"We train IDCs to ensure they are ready for anything out in the field and fleet," said IDC program director Master Chief Hospital Corspman Brad Kowitz, from Portland, OR.

During one realistic training scenario, darkness surrounded the instructors and students as smoke filled the room. Students practiced transporting a mannequin in the shipboard simulation room. Moving to the next simulation room, students endured a cacophony of gunfire and shouting as they raced to provide combat casualty care trauma in the desert simulation room.

"Virtual rooms give the students natural distractions while they try to maintain focus on the task at hand," said Kowitz.

Both virtual reality rooms were built with moveable walls and include a variety of props that include a 20-foot-dual projection screen, smoke machines, and movie studio quality props and audio that allow different scenarios to play out within their primary environments.

This article originally appeared on the U.S. Navy website. For complete article, **click here.**

Novel Collaborative Software Helps Systems Engineers Link Performance and Cost

TODAY'S MODELING AND SIMULATION (M&S) SOFTWARE provides indispensable tools for systems engineering challenges. Such programs allow investigators to experiment with "what-ifs" by adjusting design parameters and examining potential outcomes.

A team from the Georgia Tech Research Institute (GTRI) has produced an advanced web-based tool that lets physically separated participants collaborate on model-based systems engineering projects. Known as the Framework for Assessing Cost and Technology (FACT), the program utilizes open-source software components to allow users to visualize a system's potential expense alongside its performance, reliability and other factors.

The research is sponsored by the U.S. Marine Corps Systems Command (MCSC). The work was most recently reported in March in the Proceedings of the 11th Conference on Systems Engineering Research.

The FACT tool enables users to pull all aspects of a project into a single modeling and simulation process, explained Tommer Ender, a GTRI senior research engineer who co-leads the effort.

The FACT framework lets multiple users work together online to create entire systems, including complex technology systems," Ender said. "All they need is access to a web browser." FACT's features include:

- Capacity to weigh cost along with performance factors;
- Adaptability to a wide range of systems engineering problems;
- Ability to track the entire collaborative process;
- Advanced security and configurability features;
- Collaboration among any systems engineering platforms with web access.

FACT is currently in use at the GTRI field office in Quantico, Virginia, located on the Quantico Marine Corps Base.

This article originally appeared on the Georgia Institute of Technology website. For complete article, **click here.**

Mission Behind the Mission

THE OFFICE OF THE UNDER SECRETARY OF DEFENSE for Acquisition, Technology and Logistics (AT&L), the Department of Defense (DoD) Modeling and Simulation Steering Committee (M&S SC) and the DoD Modeling and Simulation Coordination Office (M&SCO) have sponsored an information video titled, ***Environmental Data and Effects Representation – Mission Behind the Mission***. The video showcases a government-owned (free) technology available to M&S users to help improve simulated scenarios. Mission planners and analysts will learn how using environmental representation technology can provide accurate, high-resolution data that improves modeling and simulation application outcome. Training with more realistic weather conditions with consistent effects will meet the long term training needs of warfighters, planners, trainers, analysts, weapon system developers, testers, and evaluators. The video demonstrates how environmental representation technology helps create realistic weather – informed effects for virtual and constructive simulation exercises. The video also highlights areas for future work and community engagement.

To receive more information about this exciting technology, contact ASK MSCO via email at **osd.pentagon.ousd-atl.list.msco-ask-msco@mail.mil** *or phone 1-888-566-7672. To access the video,* **click here.** *(CAC Required)*

Military Training Equals Skills in STEM Education

Photo Credit: Spc. Franklin R. Moore, Training Support Activity Europe

Skyler Smith, age 9, a student at the Grafenwoehr Elementary School in Germany, listens as trainers give a briefing on the Virtual BattleSpace 2 during a visit to the Joint Multinational Training Command's simulation center. Trainers demonstrated for 93 fourth graders how science, technology, engineering and math could be applied in the military environment..

TODAY ABOUT 3 MILLION POSITIONS ARE VACANT because companies can't find workers with basic technical skills in science, technology, engineering, and math, also known as STEM, according to the U.S. News and World Report, if unchecked, they say that number grows to about 10 million by 2020.

That is why 93 students, fourth graders from the Grafenwoehr Elementary school in Germany, took a field trip, January 14th, to the Joint Multinational Training Command. Every day, trainers prepare troops for deployment, but students learned how they could use complex simulations, graphics, training aids, and devices in real-world situations. The students saw firsthand not only how the devices worked, but how computer codes and scientific principles facilitated the military training.

The students saw common military training tools like the Training Support Activity Europe's Reconfigurable Vehicle Tactical Trainer, a virtual training device that provides Soldiers hands-on experience with a life-size High Mobility Multi-purpose Wheeled Vehicle or Humvee. It surrounds trainees in a 360-degree virtual world.

Another tool, Virtual BattleSpace 2, at the Joint Multinational Simulation Center, showed how video game technology could provide real-world application, while the Dismounted Soldier Training System, a system that allows nine trainees to perform ground missions, demonstrated another virtual training environment.

"I learned a lot about the military and how they operate, instead of actually being in danger they can try it [missions] on their [virtual systems] instead of having someone have the chance of being killed," said Skyler Smith, 9. "I learned a lot about the technology and the javascript they use."

Smith said she's already considering a career in engineering. "I'm thinking about being an engineer of some sort," she said. "This helps explain another side of technology and science."

"We are trying to get students to see and experience science in reality, or real applications of science," said Eric G. Heilman, a science advisor. "I hope they have a common experience, but also take away a basic understanding of how simulations and technology can be used in their everyday life.

This article originally appeared on the U.S. Army website. For complete article, **click here.**

Researchers Develop First Detailed Model for a 3-D Strand of Curly Hair

THE HEROES AND VILLAINS IN ANIMATED FILMS tend to be on opposite ends of the moral spectrum. But they're often similar in their hair, which is usually extremely rigid or — if it moves at all — is straight and swings to and fro. It's rare to see an animated character with bouncy, curly hair, since computer animators don't have a simple mathematical means for describing it.

However, change may be coming soon to a theater near you: In a paper appearing in the February 13 issue of Physical Review Letters, researchers at MIT and the Université Pierre et Marie Curie in Paris provide the first detailed model for the 3-D shape of a strand of curly hair.

This work could have applications in the computer animation film industry, but it also could be used by engineers to predict the curve that long steel pipes, tubing, and cable develop after being coiled around a spool for transport. In the field, these materials often act like a stubborn garden hose whose intrinsic curves make it behave in unpredictable ways. In engineering terminology, these items — and hair — are all examples of a slender, flexible rod.

Co-authors on the paper are Pedro Reis, an assistant professor in MIT's Department of Civil and Environmental Engineering and Department of Mechanical Engineering; Basile Audoly and Arnaud Lazarus, of the Université Pierre et Marie Curie; and former MIT graduate student James Miller, who is now a research associate at Schlumberger-Doll Research. Miller worked on this project as part of his doctoral thesis research and is lead author of the paper.

"Our work doesn't deal with the collisions of all the hairs on a head, which is a very important effect for animators to control a hairstyle," Reis says. "But it characterizes all the different degrees of curliness of a hair and describes mathematically how the properties of the curl change along the arc length of a hair."

When Reis set out to investigate the natural curvature in flexible rods, he wasn't thinking of hair. But as he studied several small flexible, curved segments of tubing suspended from a structure in his lab, he realized they weren't so different from strands of curly hair hanging on a head. That's when he contacted Audoly, who had previously developed a theory to explain the 2-D shape of human hair.

Using lab experimentation, computer simulation, and theory — "the perfect triangle of science," Reis says — the team identified the main parameters for curly hair and simplified them into two dimensionless parameters for curvature (relating to the ratio of curvature and length) and weight (relating to the ratio of weight and stiffness). Given curvature, length, weight, and stiffness, their model will predict the shape of a hair, steel pipe, or Internet cable suspended under its own weight.

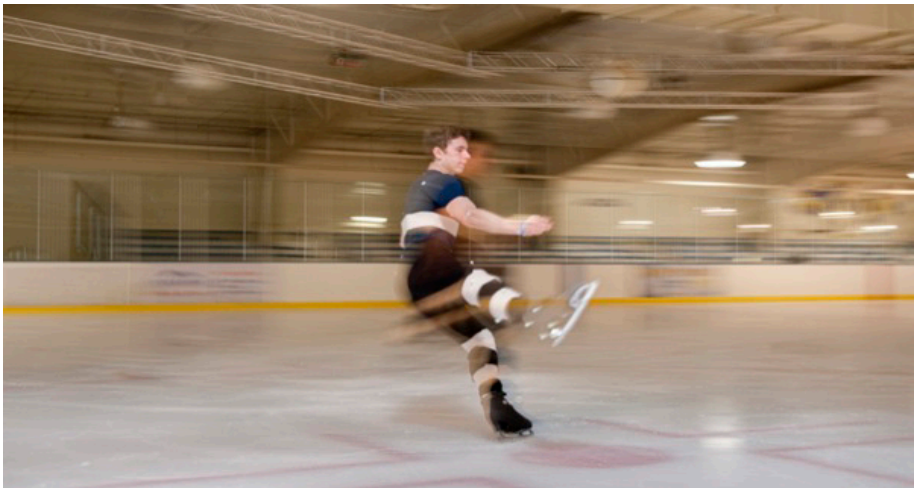
This article originally appeared on the Massachusetts Institute of Technology website. For complete article, **click here.**

M&S Journal

The latest issue of the *M&S Journal* is available now and focuses on M&S Acquisition. You can download a copy and access all the previous issues of the *M&S Journal* at: **http://msco.mil/MSJournal.html**.

Airborne on Ice

Photo Credit: University of Delaware



A simulation developed at the University of Delaware may help Olympic skaters nail those triple axels and quadruple toe loops.

ACCORDING TO A RECENT POLL, almost a fourth of Americans say figure skating is their favorite Olympic sport.

But while most of us just sit back and enjoy the show in all its grace, beauty, and athleticism, Jim Richards zeroes in on the skaters' "air position."

From his decades of skating research, Richards, Distinguished Professor of Kinesiology and Applied Physiology at the University of Delaware [UD], knows that proper air position is critical to successful jumps.

A computer simulation developed by Richards's team at UD in collaboration with Maryland-based C-Motion Inc. enables skaters and their coaches to observe an athlete's actual movements on a computer screen and then see how those movements can be manipulated to improve jumping technique.

"The best part is that within just a few minutes, we can show them how making a small but specific change can effect a big change in terms of their ability to land their jumps and avoid repeated falls," Richards says.

The system looks almost ridiculously simple on the computer screen: two little mannequins, one representing the actual skater and the other a mathematical model of that individual.

"After years of fine-tuning the motion capture system, collecting data, and writing software, the end result was almost anticlimactic," Richards says. "All that work went into producing those two little figures."

But Richards learned the hard way that simplicity was what the figure skating world needed. "Initially, we used a lot of tables and graphs and charts to describe recommended performance changes, but these ended up having little value to the skaters or their coaches," he says. "We couldn't translate numbers and graphs into useful information for them — we needed something that was more visual."

Over the past several years, some 80 elite figure skaters have turned to the simulation for valuable feedback on how they can turn doubles into triples and triples into quadruples. This group included four of the five U.S. Olympic singles skaters competed in Sochi — Jeremy Abbott, Jason Brown, Gracie Gold, and Ashley Wagner. More than a dozen of the skaters who have used the system have already won medals at national competitions.

Simulations have been widely used to improve athletic equipment. For example, the bobsleds, luge sleds, and skeleton sleds used by Olympians have all been modernized and optimized by engineers using motion capture technology, 3D modeling, and wind-tunnel testing.

This article originally appeared on the University of Delaware website. For complete article, **click here.**

Second SARDA Human-in-the-Loop Simulation Evaluation Completed

ON FEBRUARY 18-20, 2014, the Spot and Runway Departure Advisor (SARDA) team successfully conducted its second human-in-the-loop (HITL) simulation experiment using the Charlotte-Douglas International Airport (CLT) surface traffic model.

This HITL simulation was built upon the software and hardware developed in the first HITL simulation (December 2013). The objective of this recent simulation was to examine usability and functionality of the Ramp Traffic Console (RTC), NASA's new touchscreen-based user interface for ramp controllers. Two current CLT ramp controllers from US Airways and four pseudo-pilots participated in the study.

Results from the simulation, in which SARDA's scheduling functions were not tested, demonstrated lower self-reported controller workload relative to today's paper-strip system and resulted in positive feedback from the ramp controllers. The third HITL simulation (planned for late April 2014), will incorporate SARDA pushback time advisories via the RTC with dynamic updates as the traffic situation evolves.

This article originally appeared on NASA's SimLabs website. For complete article, **click here.**

Team Performance Factors the Focus of New Mars Simulation

Photo Credit: Sian Proctor

A crew member from the 2013 HI-SEAS mission at the remote habitat site

THE UNIVERSITY OF HAWAI'I AT MĀNOA has announced the crew for the second mission of the Hawai'i Space Exploration Analog and Simulation (HI-SEAS) program. The next extended simulation of Mars exploration here on Earth began March 28.

"The mission is focused on the social, interpersonal, and cognitive factors that affect team performance over time," said Kim Binsted, associate professor at UH Mānoa and principal investigator for the next three HI-SEAS missions planned for 2014 and 2015. "Hawai'i provides a unique setting to simulate the challenging conditions for human exploration to Mars. We have selected a strong crew for our next four-month study."

HI-SEAS crew members were required to have "astronaut-like characteristics," including the ability to pass a class 2 flight physical examination and undergraduate training as a scientist or engineer. The youngest crew member is 26; the oldest is 60 years old. Like the astronaut mission specialists they represent, each participant is expected to bring a significant research project or other scholarly work of his or her own to complete while inside the space analog habitat.

This article originally appeared on the University of Hawai'i at Mānoa website. For complete article, **click here.**

FEATURED HIGH LEVEL TASK

High level tasks are special technology-related projects that will enhance the applications of M&S throughout the DoD for the benefit of our Warfighters. By focusing on the goals stated in the "Strategic Vision for DoD Modeling and Simulation," these high level tasks are delivering solutions that will contribute to closing fundamental gaps in current M&S capabilities.

The DoD Cyber M&S Technical Working Group

WITH THE EXISTENCE OF CYBER THREATS TO THE DEPARTMENT OF DEFENSE, the DoD modeling and simulation (M&S) enterprise has taken another step toward enabling cyber M&S capabilities.

The Cyber Modeling and Simulation Technical Working Group (CyMSTWG), is a forum for cyber M&S experts across the Department to gather quarterly and share successes and challenges, and to collaborate on M&S related cyber initiatives. The group collaborates with Services, Joint Staff, COCOMS, federally funded research and development centers (FFRDC), industry, and academia. The cooperation among these entities helps identify and align M&S concepts, tools and methodologies that enhance cyber related DoD missions.

Supporting the Assistant Secretary of Defense for Research and Engineering (ASD(R&E)) and reporting through the Modeling and Simulation Coordination Office (M&SCO), CyMSTWG meets to identify technical collaboration opportunities with DoD M&S partners and enable cyber capabilities.

"We structured the CyMSTWG in a very functional way," said Mr. Jesse Citizen, the M&SCO Director. "It consists of a main working group and has the capacity to establish other sub-groups that can address in-depth level cyber issues."

Currently, the CyMSTWG is comprised of two technical capability teams (TCTs). The:

- Interoperability TCT is investigating the integration of existing kinetic and cyber simulations and ranges to provide realistic cyber training and apply M&S solutions, and the
- Mission Effectiveness TCT is working to improve cyber operations and intelligence by providing authoritative cyber data and analytical tools to all DoD M&S Communities.

The CyMSTWG has the capacity to support five TCTs. The group is able to stand up additional teams for action as technical/project-related issues arise. Meeting as frequently as required, the teams typically have three responsibilities:

- Provide a technical review of project artifacts
- Identify and produce deliverables to the CyMSTWG
- Provide technical recommendations to the CyMSTWG.

"Overall, the CyMSTWG has a technical focus and delivers technical solutions. We work to identify problem areas, define deliverables and identify key contributors," said Citizen. "Even though it's a fairly new initiative, we've been able to promote this group's proactive cyber M&S activities throughout the Department."

Established in June 2013, the group has held quarterly meetings with Defense stakeholders on cyber interoperability and cyber effects modeling. This has led to an increased awareness of Cyber M&S capabilities as well as senior leadership support on CyMSTWG initiatives.

The CyMSTWG is forging relationships throughout the M&S enterprise, collaborating on new technology efforts, facilitating reuse and working to establish warfighter enabling standards. With over 70 active participants, it is an important asset to the Department.

Common Access Card (CAC) enabled individuals/organizations can view ongoing initiatives and get involved by accessing the CyMSTWG website at:
https://www.milsuite.mil/book/groups/cyber-ms-technical-working-group
To receive more information, contact ASK MSCO via email at **osd.pentagon.ousd-atl.list.msco-ask-msco@mail.mil**. *or by phone at 1-888-566-7672.*

M&S WHAT AND WHEN

MODELING & SIMULATION CALENDAR OF EVENTS

Training and Simulation Industry Symposium (TSIS)
June 11 – 12, 2014
Orlando, FL

5th Annual Integrated Air Missile Defense Symposium
June 12, 2014
Laurel, MD

82nd MORS Symposium
June 16 – 19, 2014
Alexandria, VA

2014 Summer Simulation Multi-Conference (SummerSim'14)
July 6 – 10, 2014
Monterey, CA

32nd International Conference of the System Dynamics Society
July 20 – 24, 2014
Delft, Netherlands

2014 Pacific Operational Science and Technology Conference
August 26 – 29, 2014
Honolulu, HI

2014 Fall Interoperability Workshop (SIW)
September 8 – 12, 2014
Orlando, FL

2014 Precision Strike Technology Symposium (PSTS-14)
October 21 – 23, 2014
Laurel, MD

17th Annual Systems Engineering Conference
October 27 – 30, 2014
Springfield, VA

I/ITSEC 2014: Interservice/Industry Training, Simulation & Education Conference
December 1 – 4, 2014
Orlando, FL

26th Annual SO/LIC Symposium & Exhibition
January 26 – 28, 2015
Washington, DC

The M&S Newsletter

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