

# NM&SC 2017 NATIONAL MEETING

September 25-26, 2017

Dearborn, Michigan

The annual national meeting was conducted 25-26 September 2017, in Dearborn, MI.

*25 September 2017*

## TOURS

Preceding the formal meeting, on Monday, a group of about 30 attendees enjoyed a tour of Greenfield Village, followed by a demonstration of the MS&V capabilities of the **Ford immersive Vehicle Environment Lab (FiVE Lab)**, a multi-technology/multi-disciplinary VR/AR laboratory of the Ford Motor Company. Hosted by Policy Committee member Elizabeth Baron, Ford's Virtual Reality and Advanced Visualization Technical Specialist, and inventor of the FiVE lab, the 90-minute session offered insight and exposure to this state-of-the-art facility supporting Ford vehicle design, modeling, engineering, ergonomics, and simulation capabilities. The FiVE lab facilitates a rapid collaboration design process among Ford designers and engineers, and permits real-time collaboration with Ford's international divisions.

Short video clips about the FiVE lab are available at:

Ford Virtual Reality Specialists:

<https://www.youtube.com/watch?v=-C-QB4GwqhY>

Ford use of Augmented Reality:

<http://www.autonews.com/article/20170921/OEM03/170929971/ford-expands-use-of-augmented-reality-for-design>

An addendum providing further description of the FiVE lab is included at the end of this summary report.

*26 September 2017*

## INTRODUCTIONS

**Mr. Rick Darter**, CEO Rave Computer, NM&SC Policy Committee member and our local host, called the meeting to order, with comments on the value of the NM&SC and the objectives of the meeting.

Rick introduced **Dr. Linda Brent**, CEO ASTA Group, who provided a welcome on behalf of RADM Jim Robb, USN (Ret), President, National Training & Simulation Association.

Following her welcome, **Rick Severinghaus**, Chairman, Policy Committee, NM&SC, provided remarks to set the stage for the day's agenda, providing an overview of NM&SC, and offering observations to set the context for the day's focus on MS&V and workforce development. His presentation slides can be viewed by clicking < [here](#) >. A short video overview (4:53) of NM&SC is also available by clicking <[here](#)>.

## KEYNOTE ADDRESS

**Kevin Williams**, Enterprise Account Executive, NVIDIA, & **Bill Veenhuis**, Senior Solutions Architect, NVIDIA, provided the keynote address titled:

*“Remarkable Virtuality: Awesome Realism and Amazingly Efficient Product Design”*

Kevin provided an informative and highly engaging talk, with extensive use of video, to explain the huge impact that deep learning, artificial intelligence, robotics, and neural networks are having on computer-based design in many areas of business. One message in particular came through in his presentation – the stunning rate of technology innovation and change now driving companies, and indeed entire industries, to embrace the technologies shown in his presentation. Listed below are a selection of links to video presentations that concisely highlight some of the topics addressed in Kevin's keynote.

### Deep Learning

1. Deep Learning Revolution (2:35): <https://www.youtube.com/watch?v=Dy0hJWltsyE>
2. Why is deep learning hot right now (4:07): <https://www.youtube.com/watch?v=1G0e-mR9a4k>
3. Why GPUs for Deep Learning (4:25): <https://youtu.be/kZhiQDcsi2I>

### Artificial Intelligence (AI)

4. AI car demonstration (NVIDIA) (1:49): – <https://youtu.be/-96BEoXJMs0>
5. Abdul Hamid Halabi on TEDx: Can AI provide a second opinion on cancer? (17:12): <https://youtu.be/cqmJkn6l1Jo> A TEDx UVA2017 talk. Addresses

misdiagnosis and medical errors – and how deep learning can reduce both. Also, a tutorial on how deep learning is made to happen, with examples of how it can be useful in everyday life.

### Robotics, Deep Learning, and AI

6. NYU advancing robotics, physics, and medicine w/ deep learning (2:30): <https://youtu.be/t5XstVrCiVg> A brief description of various ongoing investigations making use of these technologies.

7. Isaac Robot Simulator (12:44): [https://youtu.be/oa\\_wkSmWUw](https://youtu.be/oa_wkSmWUw)

A talk on how to train robots within useful timeframes. Also, implies the benefit of use of standardized architectures for implementing deep learning, AI, neural networks, and robotics.

8. Drone demo (1:23): [https://youtu.be/4\\_TmPA-qw9U](https://youtu.be/4_TmPA-qw9U)

A drone that navigates without GPS and instead relies on deep learning and computer vision. Video shows it flying along a forest trail, avoiding obstacles, and maintaining a steady position in the center of the trail.

### **KEYNOTE ADDRESS**

**Mr. Greg Melling**, *3D Visualization Expert & North American Director, Mackevision, Inc.* “Digital Product Experience from Design to Marketing”

Greg’s keynote address focused on advanced visualization, and included a number of video segments illustrating the state-of-the-art techniques employed in creating immersive VR/AR experiences that capture audience attention. A sampling of the observations he offered during his presentation:

*On the comparison of the ‘lifespan’ of digital content of various forms:*

Twitter – 2.8 hrs.; Facebook ~5 hrs.; Pinterest ~2 days; blogs ~ 1 month; video ads ~ 4 months; feature stories – up to ~ 1 year. But, and a key for vendors, businesses, and marketing, VR/AR experiences have lifespans approaching 2 years.

As millennials are a key market, for firms in the commercial space, these data are an important business consideration.

*A perspective on today’s smart phone:* it is more powerful than the IBM 7090, the machines that NASA used to go to the moon in 1969. That IBM 7090, in today’s dollars,

cost about \$1Billion. The mobile device 'everyone' carries today is indeed a portable computer.

*On the visualization of data:* It is a key driver for data use and development of new products. The sheer volume of digital data available for industry & commercial use dictates use of advanced visualization capabilities to enable human understanding and use of the information that can be derived from immense data streams. And, to “do” advanced visualization right, real-time rendering of data is essential, making use of high-end GPUs an imperative. Similarly, because data can be used in so many ways, the post-manufacturing value of data is more than its value in engineering design and manufacturing use, as that data are being used in more varied and innovative ways.

*On the use of “digital twins”:* It is more and more the case that high-end technical companies are creating “digital twins” – digital replicas of real world components, products, environments, etc., to serve commercial purposes. As an example, Greg showed on-screen the creation of vehicle video advertising for tv audiences – videos showing new vehicles on real roadways in real locations, complete with the surrounding environment – all created as VR/AR experience, completely computer generated – and wholly indistinguishable from actual digital video.

(NM&SC note: the video clip, 'Isaac Robot Simulator' (see link above) illustrates the concept ... use of a simulated real-world environment in which to train robots in AI capabilities, at speeds much faster than normal real-world time).

A short video commentary (4:53) by Greg on how his company applies MS&V technologies can be viewed by clicking < [here](#) >.

More information can be obtained by contacting the company, at <http://www.mackevision.com/contact/> .

[ Post meeting note by NM&SC: The M&S products produced by Mackevision really are *products* in the full sense of the term. Many of the VR/AR experiences – “digital experiences”, Greg Melling’s phrase to capture all of AR, VR, etc. – produced by the company are explicitly used as standalone products, used for marketing, advertising, and other purposes. This has implications for the justification that will be an element of NM&SC’s next submission to have M&S industry codes incorporated into the North American Industry Classification System. See NAICS briefing by Lisa Bair, below. ]

## **HEALTHCARE PANEL**

“MS&V Applications in Healthcare Training and Clinical Care”

**Dr. Pamela Boyers**, *University of Nebraska Medical Center*, provided context, and served as panel moderator. Dr. Boyers is Associate Vice Chancellor for iEXCEL (Inter-professional Experiential Center for Enduring Learning), a “cutting-edge training facility in which learners are immersed in simulated and virtual, life-like scenarios.” The goal of this project is to create a transformative model for the education of health professionals by using modeling and simulation to improve human performance and effectiveness. The panel was representative of several sectors of the healthcare industry, and included both for-profit manufacturers and panelists representing university-related medical training and innovative M&S applications. Her slide presentation can be viewed by clicking < [here](#)>.

**James Cooke, MD**, *Executive Director, Clinical Simulation Center, & Associate Professor, Departments of Family Medicine and Learning Health Sciences, Univ. of Michigan*. His remarks focused on describing how universities and hospitals are adopting simulation for training health professionals – in particular the simulation centers and clinical simulation technologies that prepare students and practitioners to provide high quality and safe patient care. The use of simulation drills in hospitals was also discussed; his remarks emphasized the focus on optimizing team performance as well as evaluating the environment to improve systems of care. Additive manufacturing (3d printing), VR and AR applications, and other emerging training tools were featured in his remarks. His slide presentation can be viewed by clicking < [here](#) >.

**Bill Glass, MS**, *Director, Visualization & Technology, iEXCEL, Univ. of Nebraska Medical Center*. He provided a brief history of Virtual and Augmented Reality (noting that ‘nothing is totally new’) and presented images that have been developed at the University of Nebraska Medical Center to teach students and patients, and also used to provide guidance for planning patient care and clinical procedures. His slide presentation can be viewed by clicking< [here](#) > .

**Bill Schmidt**, *Sales Director, Visualization Advocate, AVI-SPL*. His remarks presented a global view of how technology and the integration of technology is advancing (revolutionizing) higher education. This was done through a benchmark comparison of 14 medical teaching organizations that recently upgraded their visualization technology. His slide presentation can be viewed by clicking < [here](#) >.

**Marjorie Zielke, Ph.D.**, *Professor in Practice of Arts & Technology, and Director, Center for Modeling and Simulation, Univ. of Texas, Dallas*. Her remarks addressing ongoing simulation and modeling projects at UT Dallas, with emphasis on the growing impact of computer technologies and simulation on education and skill acquisitions efforts. Her slide presentation can be viewed by clicking< [here](#) > .

## **WORKFORCE DEVELOPMENT PANEL:**

*“M&S-focused curricula and credentialing programs supporting Industry Needs”*

**Richard J. Severinghaus, NM&SC**, provided context, and served as panel moderator, designed to provide both a University & Technical Training Perspective on the challenges facing industry in finding, attracting, and hiring the technical MS&V expertise to carry on industry strategic and business objectives and programs. His slide presentation can be viewed by clicking < [here](#) >.

**Virinder K. Moudgil, Ph.D.**, *President & CEO, Lawrence Technological University (LTU)*

#### *Technical training and certification programs serving manufacturing industries*

LTU was founded in 1932 with the help of Henry and Edsel Ford, who provided space next to their Model T assembly plant. LTU has been preparing leaders for technological careers ever since. Dr. Moudgil provided a comprehensive overview of his university's offerings and programs that support MS&V education and skills acquisition. Of note, LTU requires internships and participation in real-world projects in many of its programs to supplement academic education, in recognition of industry demand for new hires who come aboard already having some level of workplace skills and expertise of relevance to the hiring company's needs. A short video (6:45), in which Dr. Moudgil describes LTU's programs, can be viewed by clicking < [here](#) >. A review of the University's website, <https://www.ltu.edu/>, is well worth the time.

**Brian Payne, Ph.D.**, *Vice Provost, Academic Affairs, Old Dominion University & Director, HRCyber.*

#### *Academic-Industry Collaboration for Workforce Development*

HRCyber is a NIST-funded project to adapt cyber curricula to better serve Industry needs. For the past 18 months, Dr. Payne has directed a comprehensive cybersecurity workforce development program under this grant. His panel remarks addressed the process and methodologies adopted to coordinate and expand inter-academic institution educational offerings leading to cyber certifications, and the steps taken to integrate student educational and skills acquisition opportunities across K-12, undergraduate, and graduate levels, including the governance steps taken to coordinate high school, community college, and 4-year college/university programs to reduce student time, cost, and course requirements leading to certification. Dr. Payne also briefed the audience on the explicit and sustained involvement of regional industry groups and businesses, involvement that has enabled HRCyber to align streamlined educational and skills acquisition programs to the needs of local and regional businesses. Altogether, he offered the audience a view of one program's coordinated activities to significantly contribute to improving workforce development programs and the rate of new graduates entering the job market with skills needed by industry. More information on the HRCyber project may be found at the Alliance

website <http://securitybehavior.com/hrcyber/> . Dr. Payne's presentation slides can be accessed by clicking < [here](#) >.

**Jeff Segall**, Founder & CEO, InFlow Interactive, LLC

*Modeling & Simulation ('ModSim') teams – data-driven multidisciplinary teams for solving 21<sup>st</sup> century challenges and, changes to educational curricula & instructional designs needed to address national needs*

The race to implement enterprise 'big data' technologies and advanced data-driven models (prescriptive analytics, artificial intelligence, machine learning) presents both **indirect threats and strategic opportunities** to organizations that rely on Modeling & Simulation graduates. Competition for M&S talent will increase as recruiters realize that M&S curricula prerequisites and skillsets (statistics, computer science, modeling, and visualization) increasingly overlap with emergent Data Science programs. The briefing explored how Modeling & Simulation professionals can assume leading roles in **data-driven multidisciplinary teams** – by capitalizing on strengths in sensors, data modeling, simulation, and visualization. 'ModSim Teams' can improve talent retention, and lead the way to a future in which organizations deal effectively with growing tide of information generated from internet-of-things (IoT) sensors, customer-product interactions, and the challenges of leading data-driven multidisciplinary teams.

Jeff's presentation slides can be accessed by clicking < [here](#) >.

**Amy Cell**, Chief Matchmaker, Amy Cell Talent, LLC; Univ. of Michigan, Ross School of Business

*Bridging Gaps Between Education and Industry*

The competition that exists for software, engineering, design and data science talent has never been tougher. However, there are many innovative ways that educational institutions are approaching this challenge. The keys to successfully attacking this problem include strong K-12 STEM programs, college internships, experiential learning opportunities and creative continuing education and job retraining programs. Through collaboration and innovation, this challenge can be addressed.

## **NM&SC ACTIVITIES**

Brief overviews and descriptions of ongoing activities were provided:

**Pamela Boyers, Ph.D.**, NM&SC Policy Committee & 2018 Meeting Chair: *A preview of the 2018 National Meeting – "Healthcare MS&V in the 21<sup>st</sup> Century"*, to be held at the

University of Nebraska Medical Center, Omaha, NE, 24-26 September, 2018. A short video (5:05) about VR/AR medical training at UNMC can be viewed by clicking <[here](#)>.

**Dr. Linda Brent:** provided a brief overview of the activities of the Congressional M&S Caucus of the 115<sup>th</sup> Congress.

**Dr. Randall Garrett:** Practical Application of the National M&S Research Agenda. Dr. Garrett's slide presentation can be accessed by clicking <[here](#)>.

**Ms. Lisa Bair**, SAIC, Chair of Communications, Outreach & Public Affairs (COPA) subcommittee: NAICS Codes for Modeling and Simulation. Provided a summary of progress on the phased action plan developed to submit the next proposal to establish NAICS Industry Codes for M&S. Her slide presentation can be accessed by clicking <[here](#)>.

### **Agenda addition – The Society for Modeling and Simulation International (SCS)**

**Prof. Björn Johansson**, President SCS. He provided brief remarks on the common interests of NM&SC and SCS, an affiliate of NM&SC. Those interests include promoting MS&V research in both academic institutions and across industry, and in providing broader visibility of the growing impact of M&S and its workforce of “simulationists” on industry R&D, product design, and discovery of new knowledge. The SCS website, [www.scs.org](http://www.scs.org), provides more information on the Society.

### **Overview of Michigan MSV&I Activities**

**Mr. Rick Darter.** Rick provided a brief overview of the many MS&V industry and academic activities in the greater Detroit region and across Michigan, emphasizing the growing collaboration among educational institutions, companies, and regional organizations, driven by recognition of the mutual benefits to be had by all by such collaborations. Automation Alley, one of this meeting's sponsors, is one such organization taking proactive steps to ‘speed up’ regional workforce development efforts, and to increase the dialog and mutual understanding of the needs of academia and industry. A brief video overview (3:20) summarizing his views may be accessed by clicking <[here](#)>.

### **Closing Remarks**

The day concluded closing remarks by Rick Severinghaus. His slide presentation can be viewed by clicking <[here](#)>.

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*Addendum on FiVE Lab, Ford Motor Company*

Ms. Baron introduced us to the Ford Immersive Vehicle Environment (FiVE) that provides a truly impressive immersive multi-disciplinary lab for engineers and designers to collaborate across Ford Motor Company design and engineering centers around the globe. The Immersive Cinematic Engineering tool also provides an evaluator of vehicle quality at each stage of design, for example; light, shadows, and reflectivity. The designers iteratively interact with production engineers, marketing staff, and other management and design offices, to provide multi-layer models of the vehicle in each stage. The FiVE environment provides a design space to insure the proportional harmony and appeal to the future buyer, as well as the engineering quality and sustainability of the ultimate product. For global design center collaboration, Ford uses data encryption to link Ford sites across the U.S., Europe, Australia, and China.