National Modeling & Simulation Coalition
National Meeting
Dearborn MI

M&S for the Betterment of Society
Advancing M&S as a national imperative
Welcome!

Richard J. Severinghaus
Chair, Policy Committee

26 September 2017
Modeling, Simulation and Visualization
Revolutionizing Analytics, Manufacturing, Healthcare, and Product Design
(And How to Train the Future MS&V Workforce)
Advanced Manufacturing, circa 1936
The march of technology

From this

“A mechanical analogy computer”

developed in the 17th century, based on work on logarithms by John Napier. Before the electronic calculator, most commonly used calculation tool in science and engineering. Made obsolete around 1974 by the handheld electronic scientific calculator.

Tim Berners-Lee: “People wonder when robots will be sufficiently intelligent to be given access to the rights of a human being; the right to a trial in front of their peers; the right to open a bank account; the right to fund political campaigns. Well, I think that particular transition has taken place. The corporation has all of those rights and it is increasingly operated by artificially intelligent computers.”.

To this

Connect
HOW COMPANIES SUCCEED BY ENGAGING RADICALLY WITH SOCIETY By John Browne
w/ Robin Nuttall and Tommy Stadlen
Public Affairs™, a Member of Perseus Books Group, 2016.
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[Image of mttechnews.com]

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AT THE MICHIGAN MANUFACTURING TECHNOLOGY CENTER...

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- Cybersecurity
- Food Processing
- Research Services
- Technology
- Skill & Leadership Development

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Organization Overview

26 September 2017
What we are

• All volunteer organization, created in 2012

• An affiliate of NTSA, NM&SC operates in consonance with the by-laws, policies, and business practices of the National Defense Industrial Association (NDIA)

• President, NTSA, advises the Coalition, and provides administrative support and staff services, from NTSA/NDIA resources, as needed

• The NM&SC is managed and directed by a Policy Committee
Who we are

Policy Committee

Rick Severinghaus, Chair  
CEO/Director, CRTN Solutions, LLC

Randall Garrett, Ph.D., Vice Chair  
Senior Scientist, SimIS, Inc.

Brig. Gen. Steve Seay, USA (Ret.), Secretary  
Director of Leadership & Career Development Strategies, Univ. of Central Florida

Elizabeth Baron  
Technical Specialist, Virtual Reality & Advanced Visualization, Ford Motor Company

Pamela J. Boyers, Ph.D.  
Associate Vice Chancellor for Clinical Simulation, Univ. of Nebraska Medical Center
Who we are

Policy Committee

Jesse Citizen
   Director, Defense M&S Coordination Office

Rick Darter
   President & CEO, Rave Computer Association, Inc.

Dayna Downing
   Program Manager, Simulation Programs, Children’s Health System, Dallas

Marjorie Zielke, Ph.D., Professor, Univ. of Texas, Dallas
   Director, Center for Modeling and Simulation & Professor of Practice, Univ. of Texas, Dallas
Who we are

Standing committees

Technology/Research & Development

Bob Armstrong, Director, Sentara Center for Simulation & Immersive Learning, & Program Director, National Center for Collaboration in Medical Modeling & Simulation, Eastern Virginia Medical School

Communications, Outreach & Public Affairs

Lisa Bair, Solutions Architect & SAIC Fellow, SAIC

Education & Professional Development (acting)

Richard Severinghaus, CEO & Director, CRTN Solutions, LLC

Industrial Development/Business Practice

Eric Weisel, Ph.D., Director, Research & Development, Old Dominion University, & Director, Virginia Modeling, Analysis, & Simulation Center
Board of Advisors

Tom Mastaglio, Ph.D., Chairman, MYMIC, Inc.
Fred Hartman, Institute for Defense Analyses

NTSA

RADM James Robb, USN (ret), President, NTSA
Linda Brent, Ph.D., CEO ASTA Group, NTSA Congressional Liaison
Patrick Rowe, Director of Membership Services, NTSA
Membership

• All interested stakeholders across M&S domains and disciplines:
  Industry
  Academia
  Government
  Individuals

The Coalition strives to grow and sustain collaboration among regional and national simulation and modeling organizations. NM&SC is not a lobbying organization.
NM&SC Charter

An unincorporated, voluntary non-profit coalition sponsored by & composed of professional societies and government, industrial, & educational organizations having a common interest in the purpose to be served by the Coalition as set forth in its Charter:

• Serve the needs of all components of the M&S community of practice in order to expand the use of M&S and to recognize it as a profession, as an industry, and in the marketplace

• Establish and maintain a forum for dialog across industry, government, academia, and professional societies

• Provide a central channel of communication in order to simplify, expedite, and improve national consideration of the many policies, regulations, problems, opportunities and questions of broad application involved in the M&S enterprise
Continuing Activity

• To represent and speak for the interests of its members in all matters of policy and procedure affecting the M&S collective.

• To initiate constructive concepts, policies, and procedures dedicated to the improvement of cross-discipline and cross-organizational relationships.

• To minimize unnecessary duplication of effort among its member associations, and to foster consistency in communications regarding common issues and policies.
Organizational Affiliations

Established by Memorandum of Agreement:

– Alabama Modeling & Simulation Council (AMSC)

– Association for Computing Machinery, Special Interest Group in Simulation and Modeling (ACM-SIGSIM)

– Simulation Interoperability Standards Organization (SISO)

– Society for Modeling and Simulation International (SCS)
NM&SC Business Meeting

“national advocacy for M&S”
Specific Coalition Activities

• Common M&S Research Agenda
  – Jan 2016 Workshop, sponsored by:
    National Science Foundation
    National Aeronautics and Space Administration
    Air Force Office of Scientific Research
    National Modeling & Simulation Coalition
    National Training & Simulation Association
  – 2017 Special Event at I/ITSEC: Thurs., 30 Nov, 0830-1000

• Education Campaigns, Industry & Congress

• Events
  – NM&SC National Meeting, September, Sep 24-26, 2018, Omaha, NE
  – NTSA sponsored “M&S Expo on the Hill” (July 13, 2017, Rayburn HOB)
  – Policy Committee meeting at I/ITSEC, 27 Nov 2017, 1330-1400
  – NM&SC Policy Committee (PC) elections, Spring 2018

• Advocacy for, and lead proponent for, creation of M&S industry codes within the North American Industrial Classification System (NAICS)
Among the explicit purposes and objectives of NM&SC, two address NM&SC support of the intent expressed in H.R. 487, with specific intention to be available to Congress as requested:

• To receive requests from governmental agencies for information, evaluation, or opinion regarding M&S policies and procedures affecting the Government-industry relationship, and to facilitate and coordinate Coalition replies thereto.

• To cooperate with and, upon request, assist any Government or otherwise instituted modeling and simulation advisory committee concerned with the policies and regulations affecting the modeling and simulation community.
Congressional Liaison

In the 115th Congress, the Congressional Modeling and Simulation Caucus again serves as a group of Members dedicated to highlighting how modeling and simulation technology can be used in the public and private sectors to solve critical problems. Its leadership is comprised of four Co-Chairs:

- Robert C. “Bobby” Scott (D, VA, 3rd Dist.)
- Stephanie Murphy (D, FL, 7th)
- John Rutherford (R, FL, 4th)
- Scott Taylor (R, VA, 2nd)

It is the intent of NM&SC to support the Caucus to the maximum extent possible
House Resolution 487

- In past years the Caucus has supported various legislative initiatives to promote the use of M&S, and in 2007 formally recognized M&S in H.R 487:

“Recognizing the contribution of modeling and simulation technology to the security and prosperity of the United States, and recognizing modeling and simulation as a National Critical Technology”.

The text of this Resolution can be accessed at the following link: https://www.congress.gov/bill/110th-congress/house-resolution/487/text
“Significant potential to drive economic impact and disruption by 2025:

1. Mobile internet
2. Automation of knowledge work (potential for $5-$7T economic impact)
3. IoT @
4. Cloud technology *
5. Advanced robotics ^
6. Autonomous and near-autonomous vehicles ^
7. Next generation genomics #
8. Energy storage
9. 3D printing
10. Advanced materials
11. Advanced oil and gas recovery (potential 100-200% increase in N. American oil production, driven by hydraulic fracturing & horizontal drilling)
12. Renewable energy (potentially 16% solar & wind share of global electricity generation)


@, *, ^, # -- Selected references – see next slide
The Internet of Things and the Importance of Modeling and Simulation

A look at why modeling and simulation capabilities are becoming an indispensable element of the Internet of Things toolbox.

By Dr. Margaret L. Loper and Alain Louchez, Georgia Institute of Technology, on August 3, 2015


accessed 9 Sep 17.


accessed (Sep 17: https://arxiv.org/pdf/1707.00832.pdf)

Abstract—This paper deals with the problem of properly simulating the Internet of Things (IoT). Simulating an IoT allows evaluating strategies that can be employed to deploy smart services over different kinds of territories. However, the heterogeneity of scenarios seriously complicates this task. This imposes the use of sophisticated modeling and simulation techniques. We discuss novel approaches for the provision of scalable simulation scenarios, that enable the real-time execution of massively populated IoT environments. Attention is given to novel hybrid and multi-level simulation techniques that, when combined with agent-based, adaptive Parallel and Distributed Simulation (PADS) approaches, can provide means to perform highly detailed simulations on demand. To support this claim, we detail a use case concerned with the simulation of vehicular transportation systems.

* ref: http://students.cec.wustl.edu/~azinoujani/ Table 1: “CloudSim Simulators Table 1.png. Depicts the analysis and comparison of the cloud computing simulators based on underlying platform, developing language, software or hardware. Most of these simulators are software based and are developed using Java. “A Survey on Cloud Computing Simulations and Cloud Testing”

“Factory Simulation & the Internet of Things” March 6, 2015

“Factory simulation can be a tremendous aid in helping your business embrace the Internet of Things”

http://www.visualcomponents.com/insights/articles/factory-simulation-internet-things/

accessed 9 September 17.


Published online 20 June 2016

Abstract: Computer simulation of genomic data has become increasingly popular for assessing and validating biological models or for gaining an understanding of specific data sets. Several computational tools for the simulation of next-generation sequencing (NGS) data have been developed in recent years, which could be used to compare existing and new NGS analytical pipelines. Here we review 23 of these tools, highlighting their distinct functionality, requirements and potential applications. We also provide a decision tree for the informed selection of an appropriate NGS simulation tool for the specific question at hand.
Promoting the Profession

Editors:
Andreas Tolk & Tuncer Ören

Authors list

The Profession of Modeling and Simulation
Discipline, Ethics, Education, Vocation, Societies, and Economics

Official website:

Bill Waite: Chairman & CTO, The AEgis Technologies Group, Inc. Founder of SimSummit, and a primary advocate for the establishment of the NM&SC. Proceeds from book sales used for a fund to promote aspiring Modeling & Simulation professionals in early stage career development

(Underlined: attended Inaugural NM&SC Event, February 2012; In italics: in attendance, today’s meeting)
Addressing the Challenges

Editors:
Dr. Richard Fujimoto
Professor, School of Computational Science and Engineering, Georgia Institute of Technology
Dr. Conrad Bock
Computer Scientist, Systems Engineering Group under the Systems Integration Division, Engineering Lab, National Institute of Standards
Dr. Wei Chen
Wilson-Cook Professor in Engineering Design, and the Director of the Integrated Design Automation Laboratory, Northwestern University
Dr. Ernest Page
a Chief Engineer, The MITRE Corporation
Dr. Jitesh H. Panchal
Associate Professor, School of Mechanical Engineering, Purdue University

Research Challenges in Modeling & Simulation for Engineering Complex Systems

Official website:

Developed from the research report of the January 2016 meeting sponsored by NM&SC, NTSA, & others. See slide #19
Other Activities

A partial listing

- M&S Body of Knowledge
- SimSummit Archives
- SimSummit Survey on US DoD M&S Management / Leadership
Not all interns are barely scraping by

By Jena McGregor

Summer is nearing, and workplaces everywhere are awaiting the arrival of this year's interns to help out on extra projects and shoulder the seasonal load. But among certain companies, they're probably doing more than getting coffee and making copies. Or at least, they're being paid that way.

According to a new report by the jobs site Glassdoor, the 25 best-paying companies for internships each pay their median summer worker more than $4,500 a month. That amount, if it was paid over the course of a full year, would be north of $54,000, exceeding the median annual pay for a U.S. worker, according to Glassdoor's own local pay reports ($51,350), and the annual figure calculated from the Bureau of Labor Statistics' latest weekly earnings data for full-time wage and salary workers ($44,486).

Topping the list was Facebook, where the median pay for interns is $8,000 a month, according to Glassdoor. The highest-paying internships in 2017 were at Google and Microsoft.

Micron ranked third, paying interns $7,000 a month, followed by Adobe, $6,800; Oracle, $6,500; Amazon, $6,400; IBM, $6,400; and ExxonMobil, $6,350.

### Intern salaries

<table>
<thead>
<tr>
<th>Company</th>
<th>median mo. Pay#</th>
<th>Annualized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facebook</td>
<td>$8,000</td>
<td>$96,000</td>
</tr>
<tr>
<td>Microsoft</td>
<td>$7,100</td>
<td>$85,200</td>
</tr>
<tr>
<td>ExxonMobil</td>
<td>$6,507</td>
<td>$78,084</td>
</tr>
<tr>
<td>Salesforce</td>
<td>$6,450</td>
<td>$77,400</td>
</tr>
<tr>
<td>Amazon</td>
<td>$6,400</td>
<td>$76,800</td>
</tr>
<tr>
<td>Apple</td>
<td>$6,400</td>
<td>$76,800</td>
</tr>
<tr>
<td>Bloomberg</td>
<td>$6,400</td>
<td>$76,800</td>
</tr>
<tr>
<td>Yelp</td>
<td>$6,400</td>
<td>$76,800</td>
</tr>
<tr>
<td>Yahoo</td>
<td>$6,080</td>
<td>$72,960</td>
</tr>
<tr>
<td>Vmware</td>
<td>$6,080</td>
<td>$72,960</td>
</tr>
<tr>
<td>Google</td>
<td>$6,000</td>
<td>$72,000</td>
</tr>
<tr>
<td>NVIDIA</td>
<td>$5,770</td>
<td>$69,240</td>
</tr>
<tr>
<td>Intuit</td>
<td>$5,440</td>
<td>$65,280</td>
</tr>
<tr>
<td>Juniper Networks</td>
<td>$5,440</td>
<td>$65,280</td>
</tr>
<tr>
<td>Workday</td>
<td>$5,440</td>
<td>$65,280</td>
</tr>
<tr>
<td>BlackRock</td>
<td>$5,440</td>
<td>$65,280</td>
</tr>
<tr>
<td>Adobe</td>
<td>$5,120</td>
<td>$61,440</td>
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<tr>
<td>MathWorks</td>
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<td>$61,440</td>
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<tr>
<td>Qualcomm</td>
<td>$5,040</td>
<td>$60,480</td>
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<tr>
<td>Capital One</td>
<td>$5,000</td>
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<tr>
<td>Chevron</td>
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<td>$60,000</td>
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<tr>
<td>Accenture</td>
<td>$4,960</td>
<td>$59,520</td>
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<tr>
<td>Deutsche Bank</td>
<td>$4,640</td>
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<tr>
<td>AIG</td>
<td>$4,616</td>
<td>$55,392</td>
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<tr>
<td>Bank of America</td>
<td>$4,570</td>
<td>$54,840</td>
</tr>
<tr>
<td>Capital One</td>
<td>$5,000</td>
<td>$60,000</td>
</tr>
</tbody>
</table>

# companies w/ at least 25 self-reports

**Median: $3,433/mo.** “… reflects the 178 companies that meet the requirements for the analysis, and therefore it is not nationally representative.”

Scott Dobroski, Glassdoor’s community expert: "They've no longer just come in for babysitting. The Internship is designed for you to get experience."

Source: Glassdoor
Washington Post, May 7, 2017
Business section.

“Not all interns are barely scraping by”

Jena McGregor
Today’s Agenda

Keynote Address – **Kevin Williams & Bill Veenhuis**
“See your life’s work realized with Artificial Intelligence (AI)”

Panel: A Focus on Healthcare Simulation and Modeling
“MS&V Applications in Healthcare Training and Clinical Care”

Keynote Address - **Mr. Greg Melling**
"Digital Product Experience from Design to Marketing"

Panel: MS&V Workforce Development - a University & Technical Training Perspective.
“M&S-focused curricula and credentialing programs supporting Industry Needs”

Briefings
- **2018 National Meeting**
- **Congressional M&S Caucus support**
- **Overview: Research Challenges in M&S for Engineering Complex Systems**
- **NM&SC development of NAICS Industry codes submission**
- **Michigan MSV&I Activities**

**Closing Remarks**
**Reception**