News from SCS Networks

FROM THE EDITOR'S DESK

Student Chapters are one of the most important parts of the SCS society. The future of modeling and simulation lies in the hands of young students. They are tomorrow's leaders, scientists, engineers, inventors and entrepreneurs. Therefore making little investment into students today will produce both intellectual and financial returns tomorrow. We, the SCS community, understand this and have provided diverse opportunities and support for students.

Starting from this issue, we will publish a serial of student chapters' activities. The first chapter presented in this issue is the student chapter in the University of Central Florida. The following article is written by Rebecca Leis, the president of the chapter and a Ph.D student in UCF. I hope you enjoy it.

This news item is contributed by Yu Zhang.

MODELING AND SIMULATION KNIGHTS
Rich and Colorful Life of the University of Central Florida Student Chapter
Rebecca Leis

Modeling and Simulation Knights (MaSK) is a young student organization at the University of Central Florida (UCF) dedicated to advancing opportunities for students interested in Modeling and Simulation (M&S). The vision of the Modeling and Simulation Knights (MaSK) is to inspire students of all levels to create innovative technology breakthroughs, educate the community about Modeling and Simulation, and cultivate interdisciplinary research by fostering collaboration and providing mentorship, advising, outreach, lab space, and equipment. MaSK is a student chapter of the Society of Modeling and Simulation International (SCS). The present article accounts organization actions completed during the organizations lifetime. Each section is broken up based on MaSK's goals. Plans and future directions of MaSK are also provides, concluding with a summary of expected outcomes. We hope that this article encourages other students to start or grow their own SCS student chapter.

1. Academic/Professional Development Opportunities

Speaker Series. Inviting academic and industry professionals to speak at meetings allows members to be exposed to a vast variety of current research topics and technologies. This particular item of focus provides value for student members because it exposes members to new M&S happenings and allows students to network with M&S specialists.

Conference Attendance. Organizing group conference attendance allows members to experience current M&S accomplishments. The value associated with group conference attendance stems from the comradery between students and the interaction with academic and industry experts. Students are also exposed to conference style presentations and poster sessions. Particular conferences also provide career centers that benefit visiting students. Group organized conference attendance may also present possibilities for student to attend who may otherwise not be able to.

Member Seminars/Presentation Practice. The purpose of member presentations is to allow students to practice formal presentation techniques. This type of practice will include time limits, a session chairperson, and a Q&A session following the presentation. This type of presentation also allows other student to be exposed to various types of M&S research.

Mentorship. MaSK has created a mentorship program in which members can build a one-on-one relationship with industry professionals. This program allows students to network and connect with individuals and companies in the Orlando area. Further, this type of relationship could lead to future Job endeavors. MaSK is currently working toward this effort with the National Center for Simulation (NCS). MaSK has started a pilot program and four initial teams have been formed. Program evaluation will occur at the end of the 2015-2016 academic year.

MaSK Conference. MaSK would like to organize a student run conference in which only students can submit papers. This would be similarly structured to the Embry Riddle Human Factors and Applied Psychology Student Conference. However, instead of focusing on Human Factors, the conference would concentrate on M&S methodology, analysis, and experimentation. The conference may be held using a virtual world platform.

2. Financial Support

Research Grant. A research grant is awarded each year to one outstanding member currently conducting research for publication. The goal for the research grant is promote excellent research within the M&S community. The research grant will be given to benefit current and future work. A final report including a cost breakdown and summary of the final research outcomes must be submitted to the scholarship committee at the end of the academic year. Additionally, if the award is used to procure equipment, the award winner is encouraged to donate the equipment once he/she graduates. The 2014-2015 Scholarship award amount was $250. The planned award amount for the 2015-2016 academic year is $1500.

Merit-based Scholarships. A merit-based scholarship is awarded each year to one outstanding member. The scholarship will be given based on past performance concerning GPA, professor recommendations, research experience, and number of publications. This scholarship will promote skills necessary to succeed in the M&S program and attract potential members with these current skill sets. The 2014-2015 Scholarship award amount was $250. During the 2014-2015 MaSK final committee meeting, two outstanding students showed promise and as a result **the Institute for Simulation and Training** (IST; our main sponsor) awarded us an extra $250 for both students to receive an award. The planned award amount for the 2015-2016 academic year is $1500.

M&S Humanitarian Scholarship. A scholarship humanitarian scholarship will be awarded each year to one outstanding member. This award will be given to a member who demonstrates willingness to support the M&S community through volunteer work and M&S outreach. The goal for this scholarship is to promote members' willingness to volunteer within the M&S community. The 2014-2015 Scholarship award amount was $250. The planned award amount for the 2015-2016 academic year is $1500.

M&S International Student Scholarship. In the upcoming academic year, MaSK also plans to add an additional scholarship to support international students. The planned award amount for the 2015-2016 academic year is $1500.

3. Research Support/Lab Space

Another high priority goal for MaSK is to be able to provide materials and space for students to be able to conduct research. The idea for this space is to set up computer stations equipped with software that would benefit the student members most. Some students are fortunate enough to work in a lab or with a professor that has the resources necessary to complete simulation research; however, some do not and they have to find additional funding beyond tuition and living expenses in order to complete their degree. This lab space can help student members in this type of situation. In addition, MaSK also provides student members with a small library of textbooks in this space. Through IST, MaSK has been able to secure an office. IST will provide MaSK with the lab space, desks, bookshelves, and computers. In addition, IST has provided $250 toward equipment for the lab space. MaSK is responsible for providing the remaining funding for software and the textbooks. MaSK completed a Book Drive in the Spring 2015 semester in order to acquire texts for the lab library at no-cost. Through the Book Drive, MaSK estimates that it acquired over 500 texts. Students have the opportunity to choose a book from our MaSK library and submit a book review to be published on the MaSK blog **(click here for an example)**. Further, IST and collaborated with MaSK to crease an application process for utilizing the lab space for detailed research projects. Specifically, the lab application process allows students to apply to use the MaSK lab space for a specific amount of time to complete Internal Review Board (IRB) approved research.

In special cases, IST is also willing to provide the student (with faculty support) with a dedicated space independent from the MaSK lab space. One student group has already achieved such success. The Precision Motion Tracking Research Lab is now housed at IST directed by two MaSK members under the supervision of Dr. Brian Goldiez.

4. Outreach

One goal of MaSK is to promote M&S to the greater community. This ensures job security and the longevity of the M&S domain. Further, outreach benefits current and future students by providing them with education, networking opportunities, and experience. MaSK is currently working with the **National Center for Simulation (NCS)** to build a network of active volunteer student workers to aid with NCS initiatives such as mentoring to K-12 student interested in M&S and STEM, scholarship fundraising events, etc. NCS is a not-for-profit organization that supports M&S initiatives throughout the community by hosting High School and Graduate Level Scholarships, a web-based job listings specifically for simulation professionals, and a resume repository for students to utilize for future job prospects. NCS runs on the help of volunteers, and as such MaSK hopes to aid NCS in their initiatives by dedicating time and effort toward these goals.

5. Expected Outcomes

Expected outcomes of the items listed above may include increased membership and recognition. Increased membership is an outcome of the value we provide to members. Increased membership drives the success and longevity of the registered student organization and bolsters the UCF M&S graduate programs. This in turn increases the prestige associated with the organization, the graduate programs, and the domain as a whole.

For more information please visit our **Website**, **Facebook**, **Twitter**, and **Pinterest** pages. If you or your company wishes to help support our efforts please email **Mask.Knights@gmail.com** for more information on sponsorship opportunities.

SCS Announces New Editor-in-Chief of SIMULATION Journal: Dr. Mikel D. Petty, Ph.D.

The Society for Modeling and Simulation International, SCS™ has named a new Editor-in-Chief of its journal SIMULATION: Transactions of the Society for Modeling and Simulation International, Dr. Mikel D. Petty, Ph.D. He is succeeding former Editor-in-Chief, Levent Yilmaz.

Dr. Mikel D. Petty is currently the Senior Scientist for Modeling and Simulation at the University of Alabama Huntsville's Information Technology and Systems Center and an Associate Professor of Computer Science.

Prior to joining the University of Alabama in Huntsville, Dr. Petty was Chief Scientist at Old Dominion University's Virginia Modeling, Analysis, and Simulation Center and Assistant Director at the University of Central Florida's Institute for Simulation and Training. He received a Ph.D. in Computer Science from the University of Central Florida in 1997. Dr. Petty has worked in modeling and simulation education since 1990 in areas that include verification and validation methods, simulation interoperability and composability, and human behavior modeling. He has published over 190 research papers and has been awarded over $16 million in research funding. He served on a national Research Council committee on modeling and simulation, is a Certified Modeling and Simulation Professional, and is now Editor-in-Chief of the journal SIMULATION. He has served as dissertation advisor to five graduate Ph.D. students in three different disciplines, including the first two students to receive Ph.D.'s in Modeling and Simulation at Old Dominion University and the first student to receive a Ph.D. in Modeling and Simulation at UAH.

SIMULATION is the monthly refereed transactions of the leading society devoted to advancing the discipline and profession of modeling and simulation. An archival journal in both print and electronic form, it consists of distinct sections--one devoted to theory, the other to applications. Published articles must have a clear relevance to general modeling and simulation issues. In addition to its archival mission, the journal aims to help professionals and researchers, particularly those involved in multidisciplinary projects, apply advances in modeling and simulation theory, methodology and technology to their application areas.

SCS is the world's premier professional society devoted to modeling and simulation (M&S). We serve individuals and organizations in more than 150 countries around the world. Our membership includes individuals from industry, government and academia whose interests span all aspects of M&S. Our Mission is to promote the use of modeling and simulation in ever-expanding application areas through education and providing a forum where the scientific basis for its foundations can be enriched through education and research.

For more information about SCS or SIMULATION, visit **http://scs.org/** or **scs@scs.org**.

Book Review

An Introduction to the Philosophy of Scientific Models: What Simulationists should know!

Andreas Tolk, PhD
SCS Senior Member

Why should anyone in the Society of Modeling and Simulation professionally care about a book published in the *Springer Briefs in Philosophy?* After all, most of us see ourselves as engineers or scientists who contribute to the community by producing simulations or simulation-based studies and results, don't we?

When the title of this book addresses models in support of science, the story may change a little. There is no simulation without a model, be it implicit or explicit. Our discipline is modeling and simulation (M&S), and our objective is to apply them scientifically. When I learned about Axel Gelfert's book "**How to Do Science with Models: A Philosophical Primer**," I became pretty excited, as I only recently started to bring discussion about the epistemology of M&S to our society, including proceeding contributions, book chapters, and even a book with collections of related ideas myself.

I was not disappointed: if you are interested in the philosophical foundation of modeling, this book is really a good start. I was a little bit disappointed that simulation on the first look plays a minor role, but that is done on purpose, as the focus lies on the model, not necessarily on its execution, and there are a wide variety of other models dealt with in the book that are not immediately connected with simulations. However, the simulationists will find more than one section on models where he/she will see the direct applicability to the discussion about the usefulness of simulation as well. Gelfert himself mentions in the first paragraph of the introduction that models "allow scientists to run simulations" and often uses the terms interchangeable.

The book starts with a concise survey of the existing philosophical debate about scientific models: what are scientific models, and how are they applicable in the context of scientific representation? Where is the line between scientific models and theories? The historical trajectory of the debate is of particular interest for the justification of many of best practices that are often simply applied with deeper reflection of why we use models to support certain activities. This primer helps with answering this questions.

The middle part of the booklet enumerates case studies from across the natural sciences: population biology, condensed matter physics, and weather modeling. The various strategies of building models, making trade-offs, and support decisions are discussed in order to identify recurring strategies, just as known in our discipline as well. This discussion will help to strengthen the viewpoint the modeling is not necessarily a domain specific process but is guided by principles of its own. The following section on exploratory uses of scientific models also copes with a challenge well known to the discipline of M&S: how can we establish exploration as a core function alongside the traditional goals of explanation and prediction? How we justifies simulation-based science and engineering being equally important as traditional scientific approaches.

The last section of the primer returns to the deeper discussions on the philosophy of technology. Models are presented to be not only mere tools to describe the "real things" in order to understand them better, models themselves become the object of philosophy, as they contribute new elements of knowledge formerly not available.

In summary, this primer should be on the reading list of every post-graduate and scholar of M&S to appreciate the philosophical foundations that are part of the Discipline of M&S.

Axel Gelfert. *How to Do Science with Models: A Philosophical Primer.* Springer, 2016, 135 pages, accessible via **http://www.springer.com/gp/book/9783319279527**
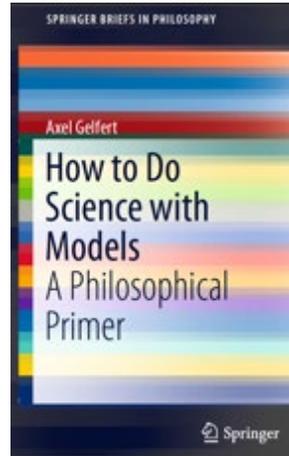
Upcoming Conferences

SYMPOSIUM ON SIMULATION FOR ARCHITECTURE AND URBAN DESIGN (SIMAUD) 2016

May 16-18, 2016
University College London
London, UK

We are pleased to welcome you to the 7th annual Symposium on Simulation for Architecture and Urban Design (SimAUD). This venue brings together the brightest researchers and practitioners in the fields of architecture, urban design, urban planning, building science, visualization and simulation. We are very excited about this year's event since it marks SimAUD's inaugural event in Europe.

In past years, attendees have included researchers, engineers, architects, software developers, managers, educators, and business professionals. Past SimAUD symposia have attracted exceptionally high-quality submissions (papers, notes, works in progress, datasets, and videos) on a diverse range of topics. More information is available on the Symposium **website**. SimAUD is run collaboratively with **ACM/SIGSIM** and is sponsored by The Society for Modeling and Simulation International.

Organization Committee:
- General Chair: **Ramtin Attar**, Autodesk Research
- Program Chair: **Angelos Chronis**, Foster + Partners
- Scientific Committee Chairs: **Sean Hanna**, UCL Bartlett and **Michela Turrin**, TU Delft

Areas of Interest

The following symposia are organized under SpringSim'16:
- Simulation-Based Design Tools and Methods
- Building Comfort and Energy Performance
- Simulation of Occupant Behavior
- Simulation of Building Control
- Urban-Scale Modeling
- Multidisciplinary Design Optimization
- Design Agency & Multi-Agent Systems
- Simulation Performance and Scalability
- Intelligent Buildings & Building Lifecycle Management
- Sensor Networks & Building Performance Monitoring
- Interactive Environments
- Responsive Facades
- Robotic Fabrication in Design
- Physics-Based Simulation in Design
- Visualization of Simulation Data

ASIASIM/AUTUMNSIM 2016

October 8-11, 2016
China National Convention Center; Beijing, China

The 2016 International Simulation Multi-Conference is a joint conference of the 16th Asia Simulation Conference and the 2016 Autumn Simulation Multi-Conference (AsiaSim / SCS AutumnSim 2016). The Asia Simulation Conference (AsiaSim) is an annual international conference started in 1999. In 2011, the Federation of Asian Simulation Societies (ASIASIM) was set up and the AsiaSim became an annual conference of ASIASIM. The SCS Autumn Simulation Multi-Conference (SCS AutumnSim) is one of the premier conferences of the Society for Modeling & Simulation International (SCS), which provides a unique opportunity to learn about emerging M&S applications in many thriving fields. The 2016 International Simulation Multi-Conference focuses on the theory, methodology, tool and application for M&S of complex systems and will provide a forum for the latest R&D results in academia and industry. Together with the conference, the International Simulation Expo 2016 will be held.

Important Dates:

Deadline for Submission of workshop/special track (session) proposals: Feb 29, 2016

Deadline for Submission of Full Papers: Mar 30, 2016

Notification of Acceptance: May 30, 2016

Deadline for Submission of Final Manuscripts: Jun 30, 2016

For more information, visit **http://www.asia-scs-sim2016.org/conference/**

WINTER SIMULATION CONFERENCE (WSC) 2016

Co-Sponsored by SCS
December 11-14, 2016
Crystal Gateway Marriott
Arlington, Virginia, USA
www.wintersim.org

Call for Papers, Presentations & Posters
Simulating Complex Service Systems

The Winter Simulation Conference (WSC) is the premier international forum for disseminating recent advances in the field of dynamic systems modeling and simulation. In addition to a technical program of unsurpassed scope and quality, WSC provides the central meeting place for simulation practitioners, researchers and vendors. Research in modeling and simulation is propelled by fostering cross fertilization between various disciplines. The theme for WSC 2016 is Simulating Complex Service Systems. This theme emphasizes the increasingly complex engineered and human systems in highly connected environments, the availability of data to help us model such systems, technological advances which continue to push the limits of computation, and conceptual and mathematical advances which help us to make sense of complex systems. These forces help to enable more informed decisions.

LOCATION

WSC 2016 will be held in Arlington (Washington DC), Virginia, at the Crystal Gateway Marriott and Convention Center. The hotel and convention center are located near the Pentagon and across the Potomac River from Washington, DC. The hotel is also connected to the Crystal City Shoppes and has easy access to all Washington, DC sights via the Metro system.

KEYNOTE & TITAN SPEAKERS

Keynote speaker Scott E. Page is Director of the Center for the Study of Complex Systems and the Leonid Hurwicz Collegiate Professor of Complex Systems, Political Science, and Economics at the University of Michigan in Ann Arbor. His online course Model Thinking has attracted more than one half a million participants. He has been awarded a Guggenheim Fellowship and a fellowship at the Center for Advanced Studies in the Behavioral Sciences. Prof. Page is an elected fellow of the American Academy of Arts and Sciences.

Titan of Simulation Edward H. Kaplan is the William N. and Marie A. Beach Professor of Operations Research, Professor of Public Health, and Professor of Engineering at Yale University. Prof Kaplan was elected to the National Academy of Engineering and the Institute of Medicine (now the National Academy of Medicine). His research in HIV prevention and counterterrorism has been recognized with the Edelman Award, Lanchester Prize, CDCs Charles C. Shepard Science Award, INFORMS President's Award, three Koopman Prizes, and numerous other awards.

Titan of Simulation Susan M. Sanchez is a Professor of Operations Research at the Naval Postgraduate School (NPS) in Monterey, California, and holds a joint appointment in the Graduate School of Business & Public Policy. She established and serves as Co-director of NPS's Simulation Experiments & Efficient Designs (SEED) Center for Data Farming. Over the last decade, the SEED Center has done research for the US Armed Forces and many leading defense organizations in the US and allied countries.

In addition, MASM Keynote will be Robert C. Leachman and the Military Track will feature Military Keynote Todd Combs. Robert C. Leachman is Professor of Industrial Engineering and Operations Research at the University of California at Berkeley. His work with semiconductor companies has won the 1995 Franz Edelman Award Competition of INFORMS and he was runner up in the 2001 Franz Edelman Award Competition. Todd Combs is the Director of the Global Security Services Division at Argonne National Laboratory. His research has spanned energy systems analysis for DOE sponsors, and the use of modeling and simulation to national and homeland security issues for the DoD and Homeland Security sponsors.

PROGRAM

WSC 2016 features a comprehensive program ranging from introductory tutorials to state-of-the-art research and practice. Planned tracks are:

- Cross-Fertilization
- Analysis Methodology
- Simulation Optimization
- Modeling Methodology
- Agent-Based Simulation

- Hybrid Simulation
- Social and Behavioral Simulation
- Defense and Security
- Modeling and Analysis of Semiconductor Manufacturing (MASM)
- Healthcare Applications
- Logistics, SCM and Transportation
- Manufacturing Applications
- Networks and Communications
- Project Management and Construction
- Environmental and Sustainability Applications
- General Applications
- Introductory Tutorials
- Advanced Tutorials
- Simulation Education
- Case Studies
- PhD Colloquium
- Poster Sessions
- Vendor Tutorials

The PhD Colloquium, Poster Session, Vendor and Case Studies tracks provide background on established and new methods, tools and application domains.

WSC 2016 continues to incorporate the MASM (Modeling and Analysis for Semiconductor Manufacturing) Conference, the leading modeling and analysis conference for global semiconductor manufacturing and supply chain operations.

PAPER DEADLINES AND REQUIREMENTS

All contributed paper submissions will be peer reviewed. Accepted papers will be published in the CD-ROM version of the conference proceedings. All papers must be presented for the paper to be fully published, copyrighted and disseminated. Instructions, information, submission forms and procedures are available on the WSC website, www.wintersim.org

Each accepted paper must have a unique registration and a corresponding presentation at the conference by one of the paper's authors. Board approval is required if any single registration is attached to more than one paper.

Contributed Paper Deadlines

April 1, 2016: Electronically submit contributed papers not previously published or presented. Each submission must be use the Word or LaTeX templates on the Authors Kit. The page size in the proceedings is 8.5 by 11 inches (21.6 cm by 27.9 cm). Papers should be at most 12 pages (including an abstract of not more than 150 words), except for introductory tutorials, advanced tutorials, and panel sessions, for which the limit is 15 pages. Submission implies that an author will attend WSC 2016 and present the paper, and all clearance required for publication of the paper will be obtained by July 15, 2016. Use of the authors' templates in one of the following formats is required: Microsoft Word or LaTeX. Submissions must be made through the WSC website, www.wintersim.org.

June 1, 2016: Contributors will be notified whether their paper has been accepted.

July 1, 2016: Authors electronically submit corrected papers to the Proceedings Editor.

July 15, 2016: Authors electronically provide a final manuscript meeting all technical and format requirements to the Proceedings Editor.

Invited Paper Deadlines

May 1, 2016: Submit full papers. Electronically submit contributed papers not previously published or presented. Each submission must be use the Word or LaTeX templates on the Authors Kit. The page size in the proceedings is 8.5 by 11 inches (21.6 cm by 27.9 cm). Papers should be at most 12 pages (including an abstract of not more than 150 words), except for introductory tutorials, advanced tutorials, and panel sessions, for which the limit is 15 pages. Submission implies that an author will attend WSC 2016 and present the paper, and all clearance required for publication of the paper will be obtained by July 15, 2016. Use of the authors' templates in one of the following formats is required: Microsoft Word or LaTeX. Submissions must be made through the WSC website, www.wintersim.org.

June 1, 2016: Contributors will be notified whether their paper has been accepted.

July 1, 2016: Authors electronically submit corrected papers to the Proceedings Editor.

July 15, 2016: Authors electronically provide a final manuscript meeting all technical and format requirements to the Proceedings Editor.

Poster Session or Ph.D. Colloquium Deadlines: (One or the other, submission to both Poster Session and the PhD Colloquium is not allowed this year)

August 15, 2016: Deadline to electronically submit 2-page extended abstracts for presentations in the Poster Session and Ph.D. Student Colloquium and case study track. Submissions must be made through the WSC website, www.wintersim.org. Extended abstracts are used for designing the tracks, but are not peer reviewed parts of the proceedings.

September 19, 2016: Notification of acceptance to authors (including details about submitting slides, and formats of the posters).

October 3, 2016: Final extended abstracts due.

October 24, 2016: Slides for the presentation is due (see guidelines in the track information)

December 11, 2016: Bring your poster to the WSC 2016. The Poster Madness Session and PhD Colloquium both run on Sunday December 11, so participation in both is not possible.

Case Study Deadlines

August 15, 2016: Deadline to electronically submit 2-page extended abstracts for presentations in the Poster Session and Ph.D. Student Colloquium and case study track. Submissions must be made through the WSC website, www.wintersim.org. Extended abstracts are used for designing the tracks, but are not peer reviewed parts of the published proceedings.

September 19, 2016: Notification of acceptance to authors (including details about submitting slides, and formats of the posters).

October 3, 2016: Final extended abstracts due.

WSC 2016 is sponsored by ACM/SIGSIM, ASA (Technical Co-Sponsor), ASIM Technical Co-Sponsor, IEEE/SMC (Technical Co-Sponsor), IIE, INFORMS-SIM, NIST (Technical Co-Sponsor) and SCS.

News and Development

DUNE 2.4.1 RELEASED

From: Markus Blatt

We are pleased to announce the release of Dune, the "distributed and unified numerics environment", version 2.4.1, the first point release in the 2.4 release series of the Dune core modules, dune-common, dune-istl, dune-geometry, dune-grid and dune-localfunctions. This release mostly contains bug fixes for problems in the original 2.4.0 release, but also a number of backported features from the master development branch. For a list of the fixed bugs, new features and known issues take a look at the release notes [2]. You can download the tarballs from our download page [1] or checkout the v2.4.1 tag of the modules via git.

DUNE is a software framework for the numerical solution of partial differential equations with grid-based methods. Using generic programming techniques it strives for both: high flexibility (efficiency of the programmer) and high performance (efficiency of the program). DUNE provides, among other things, a large variety of local mesh refinement techniques, a scalable parallel programming model, an ample collection of finite element methods and parallel linear solvers.

DUNE is free software licensed under the GPL (version 2) with a so called "runtime exception" (see license [3]). This license is similar to the one under which the libstdc++ libraries are distributed. Thus it is possible to use DUNE even in proprietary software.

[1] http://www.dune-project.org/releasenotes/releasenotes-2.4.html

[2] http://www.dune-project.org/download.html

[3] http://www.dune-project.org/license.html

Call for Papers

SIMULATION: TRANSACTIONS OF THE SOCIETY FOR MODELING AND SIMULATION INTERNATIONAL

Modeling & Simulation with Data Science

Introduction

As modeling & simulations always have been the beneficiary of data, the coming of data science opens new opportunities to improve all aspects in the theory and the applications of modeling and simulation. Here, the data science is difference from the casual idiom of "big data" since the science has a disciplined approach in handling, modeling and analyzing data with the rigorous manner. This scientific rigor opens the new opportunities in formulating problems in modeling and simulation with data, and this scientific rigor asks the modeling and simulation field to improve its current practice on handling the input, the output, and the parameter data for models.

The theoretic aspects of modeling simulation include the input modeling, the modeling methodology, and the output analysis from a large perspective. These stages of modeling and simulation typically used data in identifying the input distribution, calibrating models with grounded parameters, and data-farming on the massive simulation results with many executions from large virtual experimental designs. However, as the science and the engineering on data introduces new theories and technologies, modeling and simulation would adopts the new methodologies from machine learning, statistical data-mining, massive data visualization, parallel and distributed computing with Yarn and Hadoop, large scale data-management, etc. Just like the theoretic aspects, it is possible to expand the applications of modeling and simulation in terms of the diversity of domains and the depth of utilization. The data science enables modelers to utilize real world parameters in their simulations as well as to validate the models with historic data, so the models can be closer to the real world with the support of the large-scale data. Additionally, the collection of large-scale data from various domains, which were not well-known to the simulation community, let the community apply the modeling and simulation to such domains, i.e. astrophysics domains and biomedical domains.

Noticing these new opportunities in adopting the benefits of the data science, this special issue is devoted to present new ideas, theories, technologies, and case studies, which are enabled by the merge of modeling and simulation; and theories and technologies leading the modeling and simulation community to embrace the potentials of the data science. All manuscripts submitted to this special issue show the rigorous handling, modeling and analysis of data in the modeling and simulation field, and it would be preferable to handle a large-scale data because it is more challenging to keep the rigor as the data size grow.

Topics of interests include the following, but are not limited to the below. Also, contributions are encouraged to exhibit their innovation in multiple aspects of the below.

- **Theories**

  - Innovations on input modeling: input modeling with data science, input modeling for replicated parallel and distributed simulation, data dimensionality reduction, data transfer between domains.

  - Innovations on modeling methodologies: multi-scale, multi-resolution and multi-fidelity modeling and simulation for and with data science, verification and validation with data science, data-driven modeling and prediction-based modeling and simulation including machine learning techniques.

  - Innovations on output analysis: data analytics, distributed storage for large scale data, analytic processing on large scale data, simulation visualizations with large scale data.

- **Applications**

  - Any domain with data science applications: Economics, social media, transportation, biomedical, health care, military, astrophysics, climate, etc.

Submissions should be original work with scientific contributions, and can neither have been published nor be under concurrent review of another journal or conference. All submitted papers should be written in English and follow the format standards of the Journal. Each paper will be subjected to the Journal's usual peer review process. Once a manuscript has been accepted for publication, it will undergo language copyediting, typesetting, and reference validation in order to provide the highest publication quality possible.

Due Dates

Submission deadline: April 30, 2016
First author notification: July 30, 2016
Revised version: September 30, 2016
Final notification: October 30, 2016

Guest Editor

Il-Chul Moon
Department of Industrial and Systems Engineering
KAIST
Republic of Korea
icmoon@kaist.ac.kr