

# LIFT-OFF 2

**UPDATED BRIEF GUIDE  
FOR  
FACULTY ADVISORS  
AND STUDENT TEAM LEADERS  
of  
SIMULATION EXPLORATION EXPERIENCE  
SEE 2015**

**10 March 2015**

*Mission: to champion, challenge and  
Create collegiate-level  
Modeling and simulation education*

## LIFT-OFF 2

### PREFACE

**Lift-OFF 2** provides guidance and information specific to the teams participating in Simulation Exploration Experience (SEE 2015). It is expressly for faculty advisors and student team leaders. As with the previous version, does not address the SEE technical issues. The SEE Forum and tag-up meetings address those issues. But it does point to technical resources.

The Internet, some students of Appropriate Communication Theory and Practice have noted, is a wonderful fast-moving stream. They also point to the need for communication that supports reference and reflection. To that end, Lift-OFF 2 is deliberately designed to slow the stream, create a quiet pond for research and to give thought a chance. The contents bring you quickly to information that you need to develop professional skills and confidence in simulation work - meeting employer expectations, managing highly dispersed teamwork, sharing information, tracking and storing work, using time well, building credibility and visibility.

To assist that process, in the text of LIFT-OFF 2 is divided into five sections:

1. The Main Event
2. External Authoritative Support
3. Resources
4. Student Teams
5. Plans in Action

You can easily find what you need to know. Designed to be printed, too, taking only 13 pieces of paper, printed on both sides. Stapled, this creates a handy resource that is quick and easily accessible to the team. It requires no password. In addition, Lift-OFF 2 has, with the bonus of its back cover, the inspirational SEE2015 flagship poster by Upton Ethelbah, an honors graduate and adjunct faculty at the Institute for American Indian Art in Santa Fe, New Mexico, a member of the American Indian Higher Education Consortium, AIHEC, which has supported this enterprise through NASA since 2011.

Priscilla Elfrey,  
Simulation Exploration Experience, Executive Chair  
Kennedy Space Center, Florida. March 2015  
10 March 2015

# LIFT-OFF 2

Rationale: Anticipating the growing worldwide need employers share for college graduates capable of working with complex simulation systems, modeling and simulation (M&S) professionals — from industry, government, professional associations and academia — joined in 2009 to create what is now the Simulation Exploration Experience (SEE). This year, SEE2015 again brings the M&S community together in this fifth consecutive challenge in both advanced technology and team collaboration.

SEE 2015 will take place on April 14 at the Spring Simulation Multiconference of the Society for Modeling and Simulation International (SCS). The teams, both remote and at SpringSim in Alexandria, Virginia, USA, from April 12-15, 2015, will connect, test, and rehearse, beginning on Sunday 12 April. The location will be space within the Westin Alexandria hotel, site of the Conference.

SEE champions and creates collaborative collegiate-level M&S education -- providing a unique opportunity for students to work in a highly dispersed, international inter-university team designing, developing, testing, and executing a simulated lunar mission. Students gain valuable knowledge and skills that increase their employability. They work closely with experts, not only from academia but also from NASA and industry—The AEgis Technologies Group, ForwardSim, Pitch, and VT/M&K, as well as VSEE and other expert advisors, consultants and mentors. Students not only learn technical skills but also become capable and confident simulation professional workers.

*Whatever you can do  
or dream you can--  
- begin it.  
Boldness has  
Genius,  
Power  
and  
Magic in it.*

Goethe

# LIFT-OFF 2 CONTENTS

**Front Matter: Preface, Extended Title Page, Epigraph, and etc. 1-4**

<b>1.</b>	<b>The Main Event</b>	
	a. Mission	5
	b. Goal	6
	c. Purpose	
	d. Desired Outcomes	
<b>2.</b>	<b>External Authoritative Support</b>	<b>7</b>
	a. Faculty Advisor	8
	b. Government & Association	
	c. Industry and Technical Committees	9
	d. Executive Committee	10
<b>3.</b>	<b>Resources</b>	<b>11</b>
	a. Funded and In-kind	
	b. Distributed Observer Network - NASA	
	c. M&S standards	
	d. Industry software and tutorials	
	e. NASA SEE Repository	12
	f. Information	13
	- SEE 2015 Discussion Board	
	- VSEE, tag-up and Team interaction	
	- Other--social media, website, etc.	14
	g. Tutorials, Map & other support	15
<b>4.</b>	<b>Student Teams</b>	<b>16</b>
	a. Participation	
	b. Requirements ^ Roles	17
	c. SEE2014 Teams and leaders	18
<b>5.</b>	<b>Plans in Action</b>	<b>19</b>
	a. Starting Scenario	
	b. SEE2015 Schedule	20
	d. Federated Object Models (FOMs)	21
	f. Deliverables	22
	g. Communication Recap	23
	h. Help	24
	i. Show Time	25

**Back cover: SEE2015 POSTER, Upton Ethelbah, Santa Fe, New Mexico**

# LIFT-OFF 2

## 1. THE MAIN EVENT

The main event is important, the principle point at stake. For a team to learn how to work together, skillfully, intelligently, and in harmony -- that is a main event. Knowing how to make that happen is a challenge that we accept. We have found that few experts teach distributed simulation, a skill that employers seek to meet their work demands. Unfortunately, workforce development—integrating knowledge, capability and confidence — remains STEM’s neglected stepchild, For example, less than 5% of the US STEM budget goes to workforce development. One challenge for simulation is its trans-disciplinary nature, combining science, mathematics, engineering, psychology arts, design, and more. Simulation calls, of course, for the so-called “hard,” measured, simulation skills required for space exploration, national security, hazardous undersea operations, information vulnerability, cryptology, and similar mind-stretching opportunities.

We also need professionals with “tough skills – difficult or impossible to measure: building resilient, dispersed and diverse teams, storytelling, ability to find and identify reliable information, balance stamina and flexibility and establish both credibility and visibility. Some call this “learning to find light reliably in the dark”. Indeed, integrating the demands of both technology and distributed teamwork lies at the core – the reality – of 21st Century complexity.

SEE addresses this demand and creates a landscape for innovative thought and action. Results rely on understandable mistrust giving way to optimal trust, openness, reasonable risk-taking and inter-dependence on one another, while balancing risk to avoid rigidity or paralysis, and excess caution or unwise and careless risk. SEE students work directly, not only with industry experts, but also with the NASA M&S team. NASA uses SEE as a Space Exploration test-bed for its Distributed Observer Network (DON.3) and to expand options, through the American Indian Higher Education Consortium (AIHEC), to the Tribal Colleges.

This is the fifth year; our teams have moved off the planet, now building a new place, Moon City on Aiken’s Basin on the far side of the Moon. Teams find new ways to surprise us, building a waste management plant, experimenting with laser and magnetic thrust power, adding to the supply depot and the cargo rover. In addition to an Astronaut health monitoring system, and increasingly complex mining operations, they continue an astronomy outpost, a warning system and even use simulation to save the Moon and Earth from dangerous encounters. We see no end in sight.

## SEE MISSION

- **To champion, challenge and create college-level modeling and simulation education.**

## SEE 2015 GOAL

- Create a memorable interactive problem-solving experience with inter-university teams successfully demonstrating job-readiness skills in a distributed team, working on a complex simulated mission.

## SEE PURPOSE

- Provide faculty advisors & students with needed elements: content, software, tools, systems, mentoring as well as technical and project management support to break-down barriers to M&S employability while also increasing community awareness & action to expand M&S college-level education.

## DESIRED OUTCOMES

Success criteria vary but generally complement one another. It is useful to realize that some teams will put more emphasis on certain outcomes and others will have different ideas. It is important to recognize what various participants may hold as desired outcomes.

**Students and faculty** will have an experience almost impossible within a single university especially in terms of highly distributed international teamwork.

**Students** have a unique opportunity to understand that standards matter and interoperability works.

**Students** learn HLA-Evolved (High Level Architecture-Evolved) in a fail-free environment, with expert and peer support, tag-up meetings, special services, lectures, tutoring, and mentoring.

**Students learn** employer expectations first-hand — and can assess their interest and aptitude for an M&S career.

**Members of the Technical team -- government and industry --** gain knowledge and insights into technical problems and potential solutions.

As **employers**, members of the M&S community can meet and get to know potential employees.

**Members of the M&S community --** government, industry, academic and association -- enjoy the opportunity of contributing to the development of the next generation of M&S professionals.

- **Everyone can strengthen professional M&S network, information resources, credibility and visibility.**

## **LIFT-OFF 2**

# **2. EXTERNAL AUTHORITATIVE SUPPORT**

The Simulation Exploration Experience (SEE) partnership -- led by government, with industry, associations and academia -- began at a 2009 M&S workshop of the Simulation Interoperability Standards Organization (SISO). The discussion centered on M&S's criticality as an emerging technology field, but one lacking emerging professionals. None were there. Employers—government and industry — noted the lack of qualified candidates for the work that needed to be done.

A NASA engineer, Edwin (Zack) Crues, proposed enlisting inter-university teams in learning simulation by doing it with NASA systems and tools. The SISO Conference and Executive Committees and industry quickly joined in (The AEGIS Technologies Group, ForwardSim, VT/M&K and Pitch), offering free software licenses, tutoring and mentoring. SISO, the IEEE sponsor for M&S standards, offered free standards and hosted the event in Boston in 2011. Led by NASA, 4 universities (MIT, Univ. of Alabama Huntsville, Genoa, and Bordeaux, all having existing relationships with NASA) participated in a simulated lunar resupply mission and expressed interest in doing it again.

That summer the American Indian Higher Education Consortium (AIHEC) student team at KSC, the Creative Humanics Laboratory (CHL1) performed research -- and again in 2012 -- seeking faculty who taught distributed simulation. They found few. With the 2013 Old Dominion University graduation of the first 4 students to earn a U.S. undergraduate degree in M&S, the NASA team leaders knew the problem was more challenging than they had imagined. The goal to break down barriers to M&S employability became the mission “to champion, challenge and create collegiate-level modeling and simulation education.”

Throughout, It has always been evident that the faculty advisor is the foremost authoritative support for the SEE student team. The faculty advisor knows best what a team can do, how far it can stretch, and how best the SEE framework fits the university program. The simulated mission bears no relationship to an actual mission. It is a simulation with applications designed by each team. The NASA-led Technical team is ready with suggestions, NASA tools and systems, Federated Object Models (FOMs), and advice—the Faculty Advisor and student team decide what the team will do. NASA, industry partners, tutors, mentors; advisors and major simulation associations provide authoritative support.

## SEE 2015 FACULTY ADVISORS

The International Academic Chair is Professor Agostino Bruzzone, Genoa University, whose teams are participating for the fifth year, and hosting 2 teams. Craig Tompkins is Faculty Advisor representing IAIA (jtompkins@iaia.edu).

- Alberta, Yasser Mohammed, Yaly@ualberta.ca
- Bordeaux, Gregory Zicarewicz, [Gregory.zicarewicz@u-bordeaux.fr](mailto:Gregory.zicarewicz@u-bordeaux.fr)
- Brunel, Simon Taylor, Simon.Taylor@brunel.ac.uk
- Calabria 1 Francesco Longo, [Flongo@unical.it](mailto:Flongo@unical.it)
- Calabria 2, Alfredo Garro, [alfredo.garro@unical.it](mailto:alfredo.garro@unical.it) •
- Genoa 1 Agostino Bruzzone agostino@itim.unige.it
- Genoa 2 Dottore Marco Frascio mfrascio@unige.it
- Liverpool, Neil Cameron, Cameron@liv.ac.uk
- Munich Karl Siebold, [siebold@hm.edu](mailto:siebold@hm.edu)
- Nebraska Derrick Nero, [dnero@unomaha.edu](mailto:dnero@unomaha.edu)

## GOVERNMENT

Government support is authorized under the U.S. Office of Management and Budget directive OMB circular A-119, which states that Federal agencies have responsibility to develop and use voluntary consensus standards wherever possible to promote interoperability, lower cost, and improve performance. Congressional laws, Federal Agency policy, procedures and agreements with international organizations, such as NATO, support the practice. SISO is the IEEE sponsor for modeling and simulation standards including HLA-Evolved, that, as used in SEE, is an example of a voluntary consensus standard that NASA uses in its space exploration program.

## ASSOCIATIONS

SISO provides free use of its HLA-Evolved standard. SCS has hosted in 2011, 2012 and co-hosted with SISO in 2013. SCS hosted the 2014 event and is hosting in 2015. LIOPHANT and the Modeling and Simulation Team (MAST) regularly support SEE events in Europe.

## INDUSTRY PARTNERS

Industry partners, through individual agreements with each faculty advisor, provide the teams with free software licenses, as well as advice, mentoring and HLA tutorials. William Waite, Chairman/CTO, The Aegis Technologies Group, Inc., is the Industry Chair. VSEE.com supports team communication.

- Aegis Technologies Group  
William Waite, [BWaite@aegistg.com](mailto:BWaite@aegistg.com)
- VSEE.com, Milton Chen, [Milton@vsee.com](mailto:Milton@vsee.com)
- ForwardSim, Jean-Philippe Lebel, [jpl@forwardsim.com](mailto:jpl@forwardsim.com)
- Pitch, Bjorn Moller, [BMoller@Pitch.se](mailto:BMoller@Pitch.se)
- VT-MAK, Ishagato Nandi, [snandi@mak.com](mailto:snandi@mak.com)

## SEE 2015 TECHNICAL COMMITTEE

The Technical Committee not only supports SEE Mission and Goal with systems, including a Virtual Private Network (VPN) and tools, but also supports teams from design through execution, including documentation and team interaction. The Technical Team provides teams with instructions and assistance, enabling the student teams to learn HLA and its standard, employer interests and distributed teamwork. Faculty and industry partners augment the Technical Team, participating in any and all aspects of instruction, testing and other activities related to the SEE mission and goal. .

- Technical Chair, Michael Conroy, [Michael.P.Conroy@nasa.com](mailto:Michael.P.Conroy@nasa.com)
- Chief Technology Officer, Zack Crues, [Edwin.Z.Crues@nasa.gov](mailto:Edwin.Z.Crues@nasa.gov)
- JSC Representative, Daniel Dexter, [daniel.e.dexter@nasa.gov](mailto:daniel.e.dexter@nasa.gov)
- MSFC Representative, Dan O'Neil, [daniel.a.oneil@nasa.gov](mailto:daniel.a.oneil@nasa.gov)
- KSC DON team: Jason Miller, lead, [jason.l.miller@nasa.gov](mailto:jason.l.miller@nasa.gov)
- Social Media & Recognition Program, Katrina Montoya,  
\*\*\* [KMontoya@gmail.com](mailto:KMontoya@gmail.com)

## SEE EXECUTIVE COMMITTEE

The Executive Committee leads strategic implementation, maintaining both an overview of the SEE mission, including goal, purpose, desired outcomes as well as the day-to-day concerns about support, resources, the teams and their needs. This covers, literally, “the big picture and the small details.” Continuous attention goes to enlisting support from potential partners and faculty in order to “champion, challenge and create collegiate-level M&S education” for employers in the public and private sectors. Second is on-going attention to improve the Simulation Exploration Experience. Faculty advisors are ex-officio members of the SEE Executive Committee.

### Committee Members:

- Priscilla Elfrey, Executive Chair, [Priscilla.R.Elfrey@nasa.gov](mailto:Priscilla.R.Elfrey@nasa.gov)
- Richard Severinghaus, Program Coordinator, [Rseveringhaus@aegistg.com](mailto:Rseveringhaus@aegistg.com)
- Stephen Paglialonga, General Manager, [Stephen.F.Paglialonga@nasa.gov](mailto:Stephen.F.Paglialonga@nasa.gov)
- Michael Conroy, Technical Chair, [Michael.P.Conroy@nasa.gov](mailto:Michael.P.Conroy@nasa.gov)
- Agostino Bruzzone, Academic Chair [agostino@itim.unige.it](mailto:agostino@itim.unige.it),
- William Waite, Industry Chair, [bwaite@aegistg.com](mailto:bwaite@aegistg.com)

### Friends and Special Advisors:

- Jon Michael Smith, JMSA Associates; [jsmith46ws@aol.com](mailto:jsmith46ws@aol.com)
- Paul Grogan, MIT, [ptgrogan@mit.edu](mailto:ptgrogan@mit.edu) (graduated team leader)
- Haotian Zhang, U. of Waterloo University, CA  
[socool.king@gmail.com](mailto:socool.king@gmail.com), (graduated team leader)
- Deborah Kobza, CEO, Global Institute for Cyber Security and Research (GICSR), [Dkobza@gicsr.com](mailto:Dkobza@gicsr.com)
- Frank Cantor, Cantomedia, [Frank@me.com](mailto:Frank@me.com)
- Joachim Fuchs, European Space Agency, [Joachim.fuchs@esa.int](mailto:Joachim.fuchs@esa.int)
- Alberto Tremori, NATO, [Alberto.Tremori@cmre.nato.int](mailto:Alberto.Tremori@cmre.nato.int)
- Upton Ethelbah, Unity Design, [Upton@unitydesign.com](mailto:Upton@unitydesign.com)

# LIFT-OFF 2

## 3. RESOURCES

### FUNDED AND IN-KIND

SEE, a frugal enterprise, and uses what the partners already have: expertise, software, standards, systems, tools, content, ideas, enthusiasm and energy. Government and industry professionals serve as mentors and advisors regarding technical, career and project management issues that student teams may encounter. NASA funding for SEE 2015 supports system and Internet connectivity, audio-visual assets, cables, and logistics at the event.

The Executive Chair, Priscilla Elfrey, supports the planning and implementation, website operation and QR card materials, NASA-created resources include this guide, the website design and development, SEE branding, student team recognition program, and SEE systems. Also NASA applies an automated system to detect problems and support FOM correction in advance of the event. Zack Crues is the POC.

**DISTRIBUTED OBSERVER NETWORK – NASA.** NASA designed and developed DON.3 for its space exploration program to support collaboration and to share simulations across multiple locations. DON.3 is available to Faculty Advisors, enabling the student team to visualize the abstract HLA simulation, making it more accessible. Teams can observe and learn from the 2014 data capture, monitor and explore ambiguities and uncertainties. HLA's abstract nature can lead to unexpected errors. DON makes detection and correction easier. By creating files specific to DON.3, with information provided by the SEE Technical Committee, the student teams are able to observe their simulation models more effectively and develop them more effectively. Michael Conroy is the point of contact for DON.3.

**M&S STANDARDS.** SISO provides free standards. Standards are available, generally, through university libraries on the authority of the faculty. If there is a problem, Richard Severinghaus is the POC.

**INDUSTRY SOFTWARE & TUTORIALS.** Industry partners, The AEgis Technologies Group, ForwardSim, Pitch and VT/MäK support SEE, providing teams with software licensing, through the Faculty Advisor. The SEE website ([www.exploresim.com](http://www.exploresim.com)) provides links and information. Industry partners can provide advice and answer questions about HLA and their software. Industry partner Pitch periodically provides on-line HLA tutorials to help student teams. Dan Dexter is the NASA POC, and coordinator for industry licensure assistance.

## NASA SEE REPOSITORY

The Repository, a GitLab site, serves as the configuration manager for software and documentation items; it contains information and tools specific to the models and mission. It holds current as well as historical materials. Current projects in the site include: SEE2015, DON3 (download only) and (soon) the HLA Starter Kit. It is a team resource for files from 2011-2014, including Federated Object Models (FOMs) with source code.

The Technical Chair, Michael Conroy, will add other materials as appropriate. Teams will post versions of their FOMs, including the final version before the event and its source code, plus any 3-D models that the team creates. The Repository will also host team Deliverables (synopsis, abstract, one pager – see below). If a decision is made changing what teams are to post on the Discussion board or store in the Repository, the Executive Team will update and release any changes on the Discussion Board.

### REPOSITORY CONTENTS:

- **NASA Environment Federate.** NASA selected the Aiken's Basin Lunar simulated environment (developed at its Jet Propulsion Laboratory), in part, because it is approved for Export Control, which enables NASA to use it, especially, with international participants. It also gives the teams a huge canvas for experimentation. For information on NASA Federates, contact Zack Crues.
- **FILES OF 3-D MODELS,** such as the Regolith Hauler, the Shuttle Lander, Astronaut Tim, Cargo Rover and Hopper, are available for teams to further develop. Contact Stephen Paglialonga. Teams may use the JSC automated service to review and address FOM issues. Contact Zack Crues or Dan Daxter.
- **NASA FEDERATION AGREEMENT.** This document provides an overview of the entire event with student team obligations (agreements) described. For information, contact Daniel O'Neil, NASA, MSFC representative.
- **SEE HLA STARTER KIT.** THE University of Calabria, working with JSC, developed an "SEE HLA Starter Kit" to support development of SEE Federates. It provides teams with descriptions and guidelines for its use, and the Java Software Kit Framework (SKF), including documentation as well as SKF-created reference examples. The SEE Repository will link to the SEE HLA Starter Kit which can be downloaded also from the website [www.exploresim.com](http://www.exploresim.com). For other website and information, contact Alfredo Garro, [alfredo.garro@unical.it](mailto:alfredo.garro@unical.it)

## **INFORMATION**

Recognizing Information as an invaluable resource, the SEE Executive and Technical Committees employ a variety of messages and media tools:

### **THE SEE 2015 DISCUSSION BOARD**

The principle tool for communication and team interactivity is the 2015 Discussion Board that NASA provides. Michael Conroy is the Administrator of SEE 2015 Discussion Board. Priscilla Elfrey is consultant and advisor to faculty. Stephen Paglialonga is the POC for student questions. The Discussion Board provides forums for student teams to post weekly status, FOMs, source code, and models as well as raise issues, ask questions, and offer ideas and answers to one another. The Technical and Executive committees monitor the Discussion board. Rick Severinghaus assesses appropriate action.

### **VSEE**

**VSEE.com** supports audio-visual communication for dispersed SEE team meetings, interaction among teams and other communication. Stephen Paglialonga is the POC for instructions and use.

### **TAG-UP MEETINGS**

SEE uses **VSEE.com** for tag-up meetings and test sessions. These take place Wednesdays at 10 am U.S. Eastern time. The tag-up enables teams to report progress since the last meeting, plans and note any problems or issues. It focuses on technical questions of direct benefit to all teams. Stephen Paglialonga maintains records of Tag-up meetings in terms of attendance and issues.

### **TEAM INTERACTION AND TESTING**

The purpose of the Tag-up meeting is – simply -- to elicit progress and problems. It is not to solve the problem. Richard Severinghaus will monitor and coordinate follow-up on issues and concerns through the Executive and Technical Committees as appropriate. It is important that each team has the resources to partner in SEE, being able to build a little, test, build a little more, and retest time after time. The schedule calls for element testing and, later, integrated testing. All testing requires that FOMs and source code are stored in the Repository. No one expects them to be perfect, but we do need them to be there. Should there be a problem, contact Michael Conroy.

## TUTORIALS, LECTURES, RELATED ASSISTANCE

- Edwin (Zack) Crues's VSEE lecture, an overview of the *SISO/SCS Simulation Environment Federate*, with assistance in its use, so that teams can concentrate on their models and HLA. Included: how to obtain and build on the Environment, important execution principles, federation time management control, the physical time standard, and including key planetary reference frames, including position and orientation.

Bjorn Moller, Pitch, provides teams with an HLA tutorial that is available for download from the website, [www.exploresim.com](http://www.exploresim.com) He will present an advanced HLA tutorial as well this year.

- In January, Jason Miller, lead programmer for DON, gave a presentation on working with the Distributed Observer Network. It is available on the website.
- Alfredo Garro gave a tutorial on the HLA Starter KIT which is also available on the website.

Other tutorials are in planning, for information, please contact, Technical Chair, Michael Conroy or SEE2015 General Manager, Stephen Paglialonga.

- Paul Grogan, MIT Post-doctoral researcher, led the MIT team and is an expert on starting and leading a team. He is currently working in Chicago. Faculty Advisors interested in this invaluable resource should ask for his help.
- Dannie Cutts, Principle Member of AEgis Technologies Group, will give a tutorial-presentation on "Why Standards Matter. Contact Michael Conroy.

## CONTACT LISTS

- *E-MAIL*. Email remains a valuable tool, especially for teams working across multiple time zones. Stephen Paglialonga maintains the SEE email spreadsheet contact lists.

## EMPLOYMENT ASSISTANCE.

Students who wish to have resumes posted on the SEE website or seek contacts within M&S employment community contact Richard Severinghaus or Priscilla Elfrey.

## **SUPPORTIVE MAPPING APPROACH & SOCIAL MEDIA**

### **AIKEN'S BASIN TEAM LOCATIONS**

- *NEW!* NASA is working with a map depicting team locations on Aiken's Basin as a reference for the Distributed Observer Network, to aid placement of student team models. The Technical Chair will provide more information as this supportive technique is developed. Roughly, it divides the area where the teams are working into 4 sectors on the lunar surface. The intent is to enable teams to better understand opportunities for interaction as well as aiding the technical team integrate more than a dozen federates from 10 teams in 8 universities in 6 countries. The map is in 4 sectors. Contact Priscilla Elfrey for more information.

Sector 1 is The Lunar Operations and Control Center (LOC or LOCC) for astronauts, laboratories, communication hubs, and other facilities, including Cargo Rover garage. The other 3 sectors fan out from the LOC (Left to right in DON). It houses the Astronaut Monitoring System and lunar control centers for L2 and others.

Sector 2: Communication and Transportation includes: Launch facilities, spacecraft, and communication tower.

Sector 3: the Supply Depot, opposite the LO&C, contains operations and services. Directly opposite Sector 1, LO&C, is the Supply Depot. Further out is the site for the Waste Management facility.

Sector 4, Resources and Commerce, fanning to the right of the LO&C, is the site of current Mining Operations.

### **SOCIAL MEDIA**

The SEE Website, [www.exploresim.com](http://www.exploresim.com), contains information of value to teams. It includes the HLA tutorial and SEE HLA Starter Kit. The **Simulation Exploration Experience** FaceBook page allows teams to share pictures, progress and plans. It is a source for announcements. Faculty Advisors may submit articles and pictures to Stephen Paglialonga for posting.

### ***UNIVERSITY and RELATED WEBSITES***

Faculty advisors and student teams are free to add a website link for [www.exploresim.com](http://www.exploresim.com) to appropriate university websites and other media. Please, also, notify Stephen Paglialonga about any articles regarding SEE teams or individual students for posting on the SEE website.

# LIFT-OFF2

## 4. STUDENT TEAMS

SEE students learn-by-doing. They acquire skills in gaming and simulation required of new professionals. The SEE framework complements faculty flexibility whether classroom, independent research, multi-departmental or even, inter-university projects. Combining theory and practice, the students build employability skills through this attractive, useful, understandable, frugal, and exciting educational experience. For information, contact Priscilla Elfrey.

### TEAM PARTICIPATION

We aim to make SEE free and accessible to participating students, so that lack of money is never a deterrent. We have no funds for travel but, as a distributed simulation, SEE is designed for remote participation as well as attendance at the event. Teams have 3 methods they may adopt to participate:

- **At the event.** For teams that will be participating in Virginia for SEE2015, Stephen Paglialonga will provide up-to-date information. Generally, 6 - week notification is preferable. Teams need to plan for working on Sunday, gathering by 12 Noon Eastern U.S. time, ready to connect and test their systems. This testing will include remote teams.
- **Remotely.** Teams operating remotely – from their university – take part in Technical Interchange Meetings, Federation & scenario testing, in execution of the event, and in the Recognition Ceremony—all using VSEE and the Internet. The University of Nebraska, for example, participates remotely and maintains a vibrant SEE team. A faculty advisor, attending the SpringSim, may represent a university's remote team, supporting system connection and testing with the NASA and Industry teams. It is a choice of the faculty advisor. Teams do also participate without faculty representation.
- **As a Participant-Observer.** Participant-Observer teams are made up of M&S faculty researchers whose students may not be ready to learn HLA but who wish to familiarize themselves with SEE. We arrange custom opportunities for investigation with methods designed to challenge different aspects of the Simulation Exploration Experience. The Technical Committee is open to faculty suggestions.
- Separate from the SEE event, a faculty advisor may organize a team to do related research in, for example, Scenario Development or HLA visualization (as Technion Institute, Israel, did in 2012), or in branding and design interface (as the Institute for American Indian Art and other tribal colleges have done).

## REQUIREMENTS

To participate in the SEE event, remotely or at SpringSim2015, requires a minimum team of one faculty advisor and one student. It requires readiness to learn HLA-Evolved, use of the Standard and knowledge also of one or more of: C++, JAVA or Matlab. Teams may join as a class, independent researchers, a departmental project or inter-departmental or inter-university undertaking. That is a faculty advisor decision. Some faculty advisors assign 20-25% of the class grade to the SEE activity. That is an individual university or institute requirement in which SEE has no involvement.

**Note: Students do provide their own laptop computers. During testing, each team will require a second computer for VSEE communication. Faculty advisors and team leaders with questions about this, please consult with Stephen Paglialonga.**

## ROLES

The student team leader is POC with the SEE 2015 Technical Team. Stephen Paglialonga, the SEE2015 General Manager, is the POC for contact information and schedule. He maintains the list of participants. All members of the Executive and Technical teams are available to all members of the student team for any issues or problems. In addition to achieving technical success, the student team leader (as project manager or product owner) must also be the student team

- Chief storyteller
- Chief problem solver
- Chief consensus builder
- Chief team builder
- Chief resource manager

These are all important employability attributes. Some team leaders may be able to delegate some, but not all, of these tasks. A team of one faces special challenges that also include design, programming, standards and testing.

With larger teams, experience suggests that team members, as much as possible, select what roles and responsibilities they will assume. People do find a way to do what they want to do, anyhow. When people work from strength and preference, it may be easier to have them pick up some of the necessary but less preferred jobs. Both the faculty advisor and the SEE Executive

Committee and other teams may be able to help make this manageable.

## SEE2015 STUDENT TEAMS AND LEADERS

One of the challenges and rewards of SEE is that a team leader not only builds a team at the home university or institute, but also integrates that team with other student teams plus the Executive and Technical committees. Activities this spring include:

- **Alberta, Canada** Constructing a Waste Management Facility (Sector 3)  
Muaz Fagiar [fagiar@ualberta.ca](mailto:fagiar@ualberta.ca)
- **Bordeaux, France** Managing the Supply Depot (sector 3),  
Filip Bujas [bujasf@gmail.com](mailto:bujasf@gmail.com)
- **Brunel, United Kingdom** Mining Operations (sector 4)  
[nauman.chaudhry@brunel.ac.uk](mailto:nauman.chaudhry@brunel.ac.uk)
- **Calabria, 1 Italy** Special Visualization projects Francisco Spadafora,  
Francisco. [spadafora@gmail.com](mailto:spadafora@gmail.com)
- **Calabria 2, Italy**, Communication tower, Astronaut (Sector 2), Astronaut  
(Sector 1), Alberto. [Falcon@dimes.unica.itl](mailto:Falcon@dimes.unica.itl)
- **Genoa 1, Italy** Asteroid Protection Control System (Sector 1).  
[lucianodato@hotmail.it](mailto:lucianodato@hotmail.it)
- **Genoa 2, Italy** Astronaut Health Monitoring System (Sector 1) Marco  
SSguanci, [marcosguanci@yahoo.it](mailto:marcosguanci@yahoo.it) [lucianodato@hotmail.it](mailto:lucianodato@hotmail.it)
- **Liverpool, United Kingdom--** Autonomous surveying vehicle (Sector 1  
& model physically above surface), Chris Dadswell,  
[sgcdadsw@liverpool.ac.uk](mailto:sgcdadsw@liverpool.ac.uk)
- **Munich, Germany --** L2 Outpost (Sector 1 lunar operations).  
Outpost: Involving docking, asteroid encounter & evacuation involving  
spacecraft. Florian Troeltsch [Flo.Troeltsch@gmx.de](mailto:Flo.Troeltsch@gmx.de)
- **Nebraska, USA--** Mobile Advanced Vehicle with Laser-Induced Thrust  
for Exploration (MAVLITE) system. orbiter, launch pad (Sector 2) & cargo  
rover(Sector 1). James Taylor, [jtaylor@unbraska.edu](mailto:jtaylor@unbraska.edu)

# LIFT-OFF 2

## 5. PLANS IN ACTION

“Plans are worthless, planning is essential  
Dwight D. Eisenhower

On April 12, it begins to come together. People meet, some face-to-face and some electronically. Teams connect systems and test ambitious plans. Every year, students gather around one another: troubleshooting different solutions, facing reality and, yes, collaborating. Not everything works. They try out long-distance suggestions. Everybody learns and not just about technology. Every year, they worry. Every year, they enjoy each other’s success. Every year, the technical chair calls them to station. He calls the role. They respond, connect, and begin. Every year, like magic, it works.

### NARRATION/ SCENARIO

What drives the scenario is what each can do with what they have learned. And builds on elements whose location, at start of simulation, is noted below: Everyone has to be somewhere.

- A. The story begins 50,000 miles from the Moon, taking us to several activities above the lunar surface:
  - a. An L2 outpost, 32,000 miles from the Moon, 2 space ships
  - b. Autonomous surveying vehicle above lunar surface
- B. Sector 1-- Moon City Lunar operations and Control (LO&C)
  - a. Astronaut Health Monitoring System
  - b. Cargo Rover garage
  - c. L2 Lunar operation
  - d. Astronaut
  - e. Asteroid protection system lunar operations
- C. Moon City/ Sector2 –Transportation Communication
  - a. . MAVLITE) system operation including launch pad & orbiter.
  - b. Communication/ warning Tower and operations
- D. Moon City, Sector 3/ Services
  - a. Supply Depot (opposite LO&C)
  - b. Waste Management Facility Site

- E. Moon City/ Sector 4—Resources and Commerce
  - a. Mining Operations

## **SEE2015 SCHEDULE**

A major factor driving plans for SEE is the schedule. The SEE community held several meetings, including VSEE tag-ups, from May through October. Although SEE is increasingly a year-round activity, the schedule ramps up suddenly in January as teams get organized and the tag-up meetings take place every week.

- November 12 Tag-up
- November 26 Tag-up
  
- December 2-5 SEE2014 at I/ITSEC
- December 11 Tag-up
- December 12 LIFT-OFF guide distribution
  
- January 7 Executive and Technical Core Team Overview
- January 14 Tag-up
- January 21 Tag-up, VPN poll
- January 28 Tag-up
  
- February 2 Deliverables: Synopsis & Federate Decision
- February 4 Tag-up (RTI Poll)
- February 10 Distribution of Integrated Synopsis Scenario Narrative version 1 (ISSN, v1)
- February 11 tag-up, element testing
- February 18 tag-up, element testing
- February 25 Tag- up, integrated testing with ISSN, v1
  
- March 3 Deliverable: Abstract for SCS & FOM status
- March 5 Tag-up/ integrated testing
- March 11 FOM final in Repository
- March 12 Tag-up, testing
- March 19 Tag-up, integrated testing
- **March 25 Deliverable, one-page paper due**
- March 26 Tag-Integrated testing with Narrative ISSN, v2
  
- April 2 Tag-up/ testing based on ISSN, v2
- April 9 Tag-up/testing based on ISSN, v2
- April 12 SpringSim event start, SEE details to follow

The Executive and Technical teams arrange tutorials and lectures. These are optional. Tag-up meetings and testing are not. If scheduling is a

problem, student team leaders should contact Stephen Paglialonga.

## **FOMS (FEDERATED OBJECT MODELS)**

The Federated Object Model with its accompanying source code is the basis of each team's participation in SEE2015. Supporting development, testing and execution, team priorities include accurate and timely attention to FOM schedule, deliverables and testing (as well as taking advantage of tutorials, mentors, the SEE HLA Starter Kit, the SEE 2015 Discussion Board and VSEE).

- **Tag-up meetings and status.** Participating in tag-up meetings, using VSEE, allows student teams to share information on what everyone is doing. This, of course, supports interactivity. Stephen Paglialonga facilitates these meetings and follows up on participation. Teams should be prepared to briefly (no more than 2 minutes) describe what they have accomplished in the past week and what they plan for the next. They may report issues and problems but not expect a solution at the tag-up meeting itself. The goal is to keep the meeting to no more than 20-30 minutes. Teams must also post Status of their FOM development on the SEE Discussion Board.
- **FOM Decision.** The initial FOM decision tells the Executive Committee whether the team will build on existing federates from previous years or create its own FOM. This information, plus the synopsis, due on that date, will start the scenario narrative process (ISSNv1). Priscilla Elfrey is the POC.
- Teams should post FOM and source code to the Repository by **February 25**, to include interactivity planned with other teams. The schedule will begin testing team elements in February and start integration testing on <date TBD>. The schedule will be posted on the SEE 2015 Discussion Board.
- **NEW for SEE2015. NASA is adding an automated service to review student team FOMs as of March 11. This process will spot potential problems and enable students to make corrections before final testing. Michael Conroy will provide guidance to individual teams.**

## **MANAGING THE PROJECT**

Above all, SEE is a collaborative event. Team interactivity mirrors the collaboration process necessary in any complex enterprise: a space mission, an expansive communication system, a start-up factory, a feature film, or a team exploring a controversial theory about something that completely baffles everyone. The process involves establishing trust, creating an environment for problem solving, appropriate risk-taking and being open to inter-dependence.

This is interesting when crossing time zones and oceans. It is complicated by the need to be ready for “show time” on April 14.

## **DELIVERABLES**

The deliverables are 3 short MS WORD documents that support SEE generally and the SEE2015 scenario development in particular. All Deliverables will be submitted to the Repository as a WORD document and a copy emailed to Executive Chair, Priscilla Elfrey, who is the contact for related questions.

**On-the-job, deadlines matter.**

**They are important in SEE.**

What teams provide in the synopsis and in the One-pager forms the basis of the scenario which will be in each team’s own words.

- **SYNOPSIS.** Each team describes in 50 words or less who the team represents, exactly what model or models it is building, and how and with whom it is working. This was due by **January 26**. Teams that began after January 15 should confer with the Technical Chair for assistance.
- **NEW: SCS ABSTRACT.** The theme of the abstract, no more than 1000 words, is (shorter better) **from experience. Due February 27**. The SEE Executive Committee will incorporate abstracts into the **SCS** Poster Session and Student Colloquium as student team Works-In-Progress.

**“Challenges & opportunities in developing distributed simulation of complex systems & real time applications among highly dispersed teams”**

- **SEE 2015 ONE-PAGER.** Each team leader will submit a one-page paper, no more than 450 words or one page--, 12-font, single column, due no later than **March 26** to identify the team and the material for the scenario narration. **This description enables** Executive Committee to tell the story of the simulation in the words of the student teams. The paper is a test of following directions and shall include, in order:
  - University Team name,
  - Team member names and name of faculty advisor,
  - 50 words Synopsis (updated if necessary),
  - How the team worked and with whom
  - What results they achieved

## **COMMUNICATION RECAP**

LIFT-OFF 2 uses a basic communication pattern to address technical issues and opportunities related to

1. Mission and Goals
2. Authoritative support
3. Resources
4. Team
5. Plans

By establishing a consistent message, team leaders and members strengthen management of their SEE project, prevent problems, reinforce team cohesiveness and build skill in communication. The SEE Community is itself, highly dispersed. That requires asynchronous, continual, careful communication. Different time zones, in particular, prompt special attention to what and how we communicate -- being certain that each person has needed, timely information and knows what to do about it. Attention to sharing information and using time well are characteristics of healthy team communication and effectiveness. It is also important, however, that SEE teams track their work and store it accessibly and safe. Keeping everyone informed is simply smart business. If people do not know what you are doing, they think you are not doing much. It is human nature, so it is important that we keep one another informed of what we are doing and, especially, let others know if we need any help.

The SEE Executive and Technical teams have **developed** and expanded Tag-up VSEE Meetings and intend in both the SEE DISCUSSION BOARD and RESPOSITORY to enable teams to report and act on issues and problems. These will be flagged by the Executive Program Coordinator, Richard Severinghaus, and assigned for follow-up as appropriate to industry, NASA, and other members of the M&S community. SEE tests our ability to adapt to change at a moment's notice. It is another employability skill that teams can grow. Student teams acquire skills in

### **Learning HLA**

**Finding out how important standards are**

**Working as a highly dispersed team**

**Assessing information**

**Building a professional network, credibility, & visibility**

## Telling the story

### HELP

With something as complex as highly distributed technical teamwork, things can go wrong very quickly. Even if the Faculty Advisor is out of touch help is available. It is useful not to panic, to take a deep breath, and to give thought a chance, plan, and take action. Fast. Structuring the problem solving process starts by defining it clearly. What happened, when, where, who is involved, how serious is it? **Post your problem statement** on the SEE Discussion Board. **Ask for help.** Most problems will have been solved before. The resources below include people who do problem solving for fun. Email addresses can be found under Authoritative support, Section 2.

- **Priscilla Elfrey**, overall SEE mission, goals, outcome, support (including faculty advisors) deliverables, scenario, decisions. M&S expertise in partnering, problem solving, leadership, strategic planning & implementation.
- **Richard Severinghaus**, SEE Program Coordinator for technical and team issues, industry and association relations including SCS Program team issues, M&S expert team problem solving, leadership, and standards.
- **Stephen Paglialonga, General Manager of SEE2015**, POC for student teams, logistics, information, & event. Tag-up facilitator. POC for hotel student teams, power & connectivity requirements and arrangements with hotel for power, physical set-up, and connectivity.
- **Michael Conroy**: Technical issues, testing, FOMs, Distributed Observer Network (DON.3), Repository, SEE Discussion, DON & M&S expert, SEE event execution and any related troubleshooting.
- **Zack Crues**, Chief Technical Advisor, HLA & systems, NASA servers, tool M&S expert, testing.
- **Dan O'Neil**, MSFC Rep, NASA Federate Agreement, HLA expert. Experience as team member, 2013 Technical chair, and 2014 team advisor.
- **Dan Dexter**, JSC rep, software license, M&S, HLA expert.
- **Agostino Bruzzone**, M&S expert and senior faculty advisor, leader for reprise, international interactivity.

- **Bill Waite**, Industry leader, HLA, M&S expert and executive.

## CRISES PASS

## SHOW TIME

### EVERYTHING WILL GET DONE

**On Sunday, April 12**, whether in Virginia, Edmonton, Liverpool or elsewhere, SEE participants will gather to, in some cases, meet face-to-face, but everywhere to connect computers, test software, find and fix bugs and get ready to test. All the SEE support, resources and effort lead to this moment. Inevitably, travel strains hardware. No one expects everything to go without a hitch.

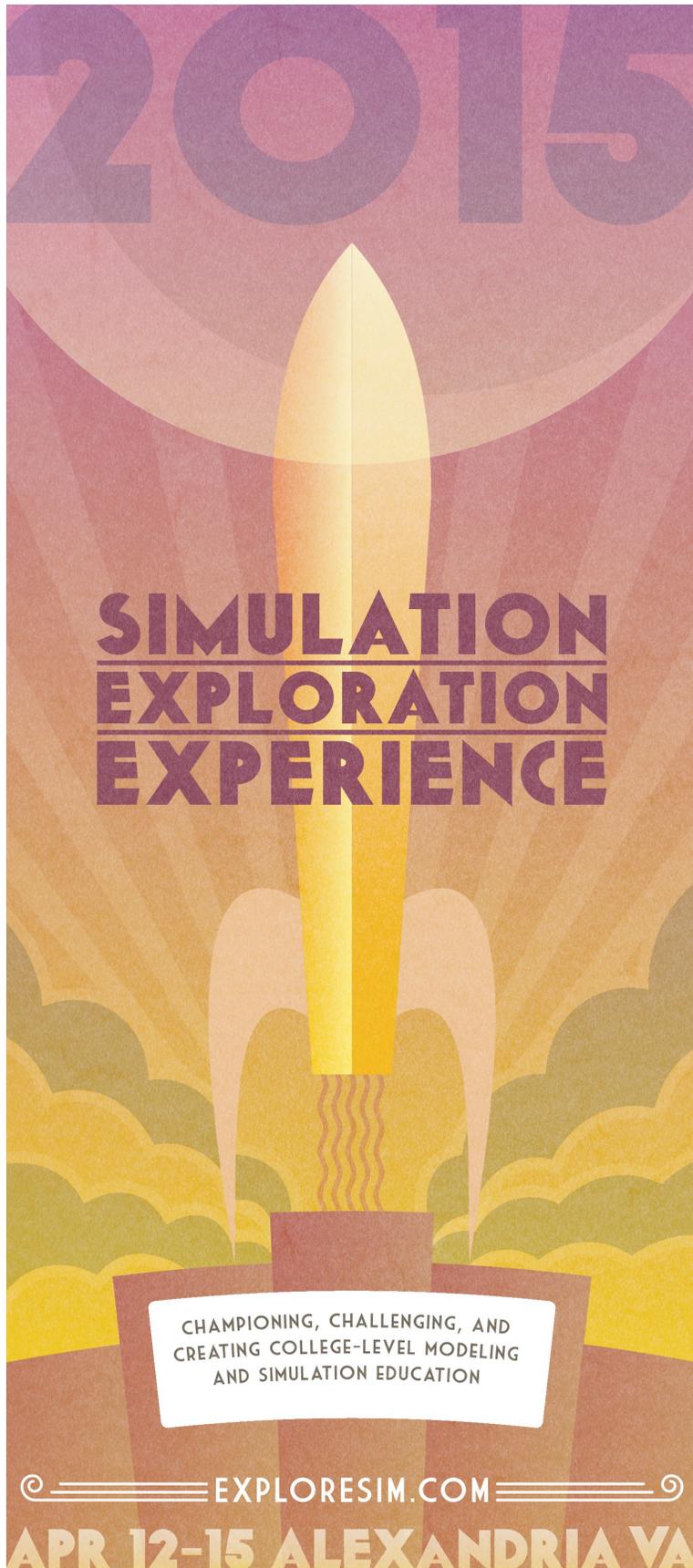
We have a room dedicated to our use. It will be available at Noon. When we have more information, we will inform teams and leave information at the Registration Desk. Stephen Paglialonga remains the POC for remote teams and those participating in Alexandria. When we know more, faculty advisors and teams will know more.

**Monday April 13, testing** will, based on past experience, go from day into the evening. Mike Conroy will announce the schedule and post it on the Tech Forum. That night, in Alexandria, thanks to the Technical Chair, there will be pizza, because we will test longer and have a technical run-through. The best we can do is virtual pizza for everyone else.

**Tuesday April 14, (time and place for the SEE event TBD).** Stephen Paglialonga will notify student teams when he has information from SCS. Rick Severinghaus will officiate as Master of Ceremony. Michael Conroy will lead the teams in the simulated mission. After event execution, Stephen Paglialonga will lead Recognition Program to honor team accomplishments, and thank all the partners. This year, the NASA team will honor the American Indian Consortium for Higher Education, sponsors of the Creative Humanics Laboratory team (CHL) for its skilled support since 2011.

Everyone involved in SEE — student, faculty, industry, association and government — shares both opportunity and responsibility to act upon, change and shape the project's environment in order, in the words of Walt Disney, "to keep improving the show." Teams will continue to monitor concerns and opportunity, gather and transmit information via email, Technical Forum, FaceBook, website and VSEE. Each one can impact the outcome. This means keeping an eye on the main event, our mission, and goal. We offer no big prizes. We do recognize and applaud achievement: academic, teamwork,

technical, creativity, and interactivity, project management. The real prize -- which is what we all make of it: the **Simulation Exploration Experience**.



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