

2012 Fall Simulation Interoperability Workshop
September 10–14 2012, Orlando FL

SISO Smackdown as M&S Education: 2012 UAHuntsville Student Experience

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Center for Modeling, Simulation, and Analysis



2012 Fall SIW

Presentation outline

- SISO Smackdown
- UAHuntsville student experience
- SISO Smackdown as M&S education

Report on the 2012 SISO Smackdown,
from the perspective of an M&S educator.

SISO Smackdown

SISO Smackdown

- Concept
 - University student teams develop HLA federates
 - Federates interoperate in common federation
 - 2011 and 2012 scenarios: lunar exploration resupply
- Goals
 - Motivate student engagement
 - Increase student employability
 - Support M&S educators
 - Assist M&S employers

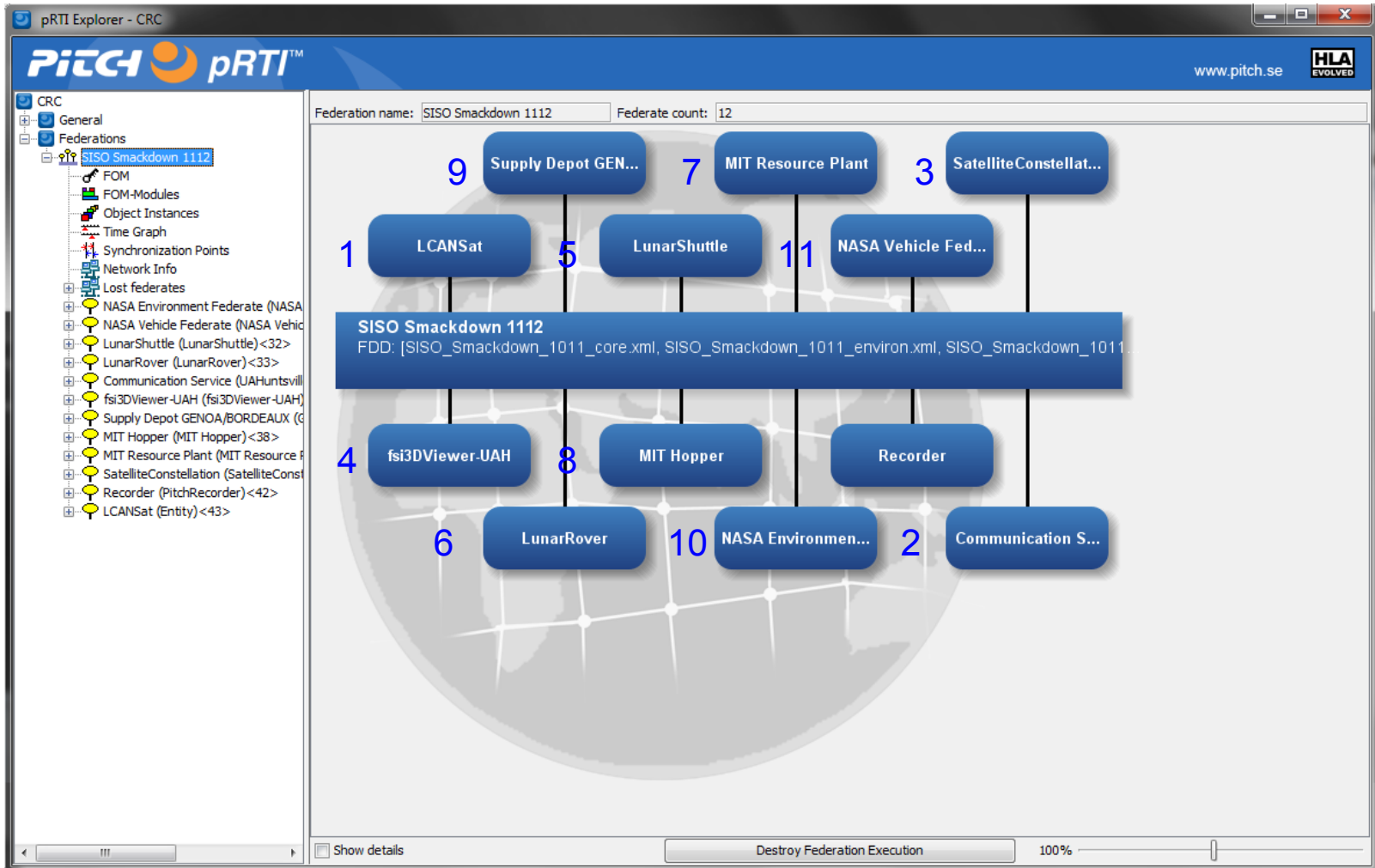


U. Ethelbaugh

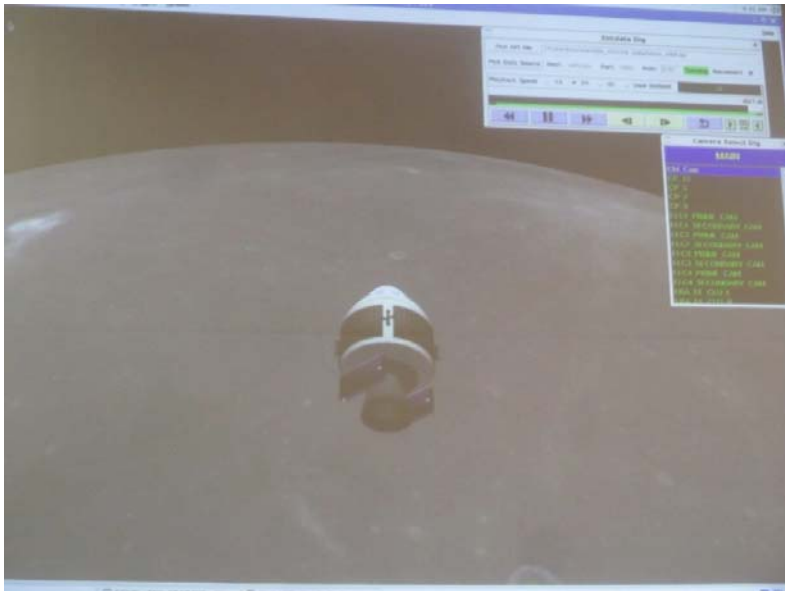
2012 Smackdown Participants

Participants	Federate(s) or contribution(s)	
University of Alabama in Huntsville	Communications satellite federate	1
	Radio communications server federate	2
	Satellite constellation display federate	3
	Surface mission visualization federate	4
Pennsylvania State University	Cargo landing shuttle federate	5
	Cargo transfer rover federate	6
Massachusetts Institute of Technology	Mobile resource utilization plant federate	7
	Scouting hopper federate	8
Technion University (Israel)	Object process modeling application	
Genoa University (Italy)	Asteroid tracking and defense federate	
Pisa University (Italy)		
Sapienza University of Rome (Italy)		Supply depot federate
NASA Johnson Space Center	Environment federate	10
	Spacecraft federate	11

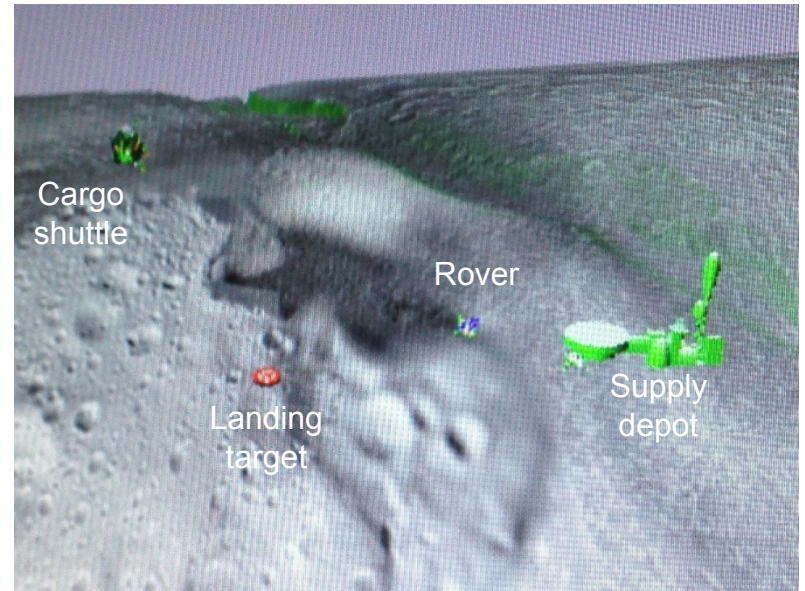
2012 Smackdown Federation



2012 Smackdown Execution



A. Bruzzone



UAHuntsville Student Experience

2012 UAHuntsville Team

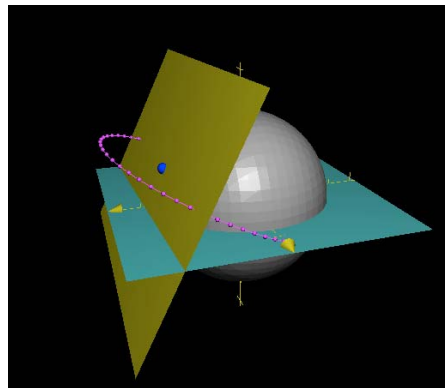


Back: D. Bulgatz, B. Norris, D. O'Neil, D. Heater, B. Schricker
Front: S. Govindaiah, C. Fordyce, S. Muratet, M. Petty (Faculty Advisor)

2012 UAHuntsville Federates

- Lunar communications server federate
 - Provide radio comm services to other federates
 - Radio objects with TX and RX interactions
- Communications satellite federate
 - Generate four satellite entities
 - Determine LOS status to entities
 - Includes orbital propagator and radio

D. C. Bulgatz, D. L. Heater, D. A. O'Neil, B. C. Norris, B. C. Schricker, and M. D. Petty, "Design and Implementation of Lunar Communications Satellite and Server Federates for the 2012 SISO Smackdown Federation", *Proceedings of the Fall 2012 Simulation Interoperability Workshop*, Orlando FL, September 10-14 2012.



Orbital propagator

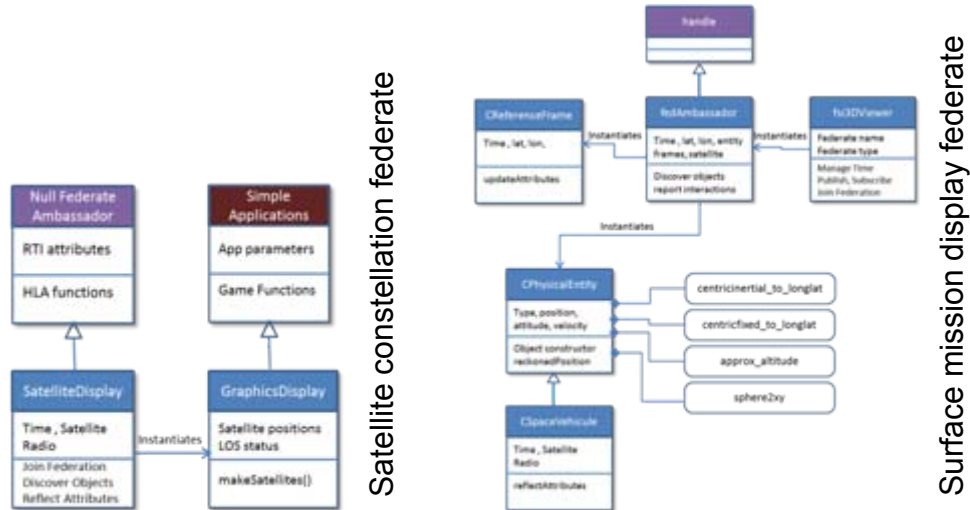


Satellite federate architecture

2012 UAHuntsville Federates

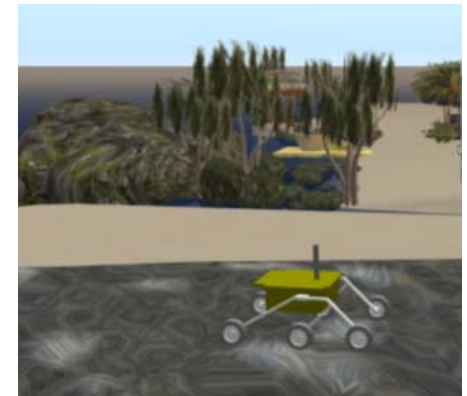
- Satellite constellation display federate
 - Show positions of orbiting comm satellites
 - Display satellites' LOS status
- Surface mission visualization federate
 - Visualize terrain and entities
 - VRML-based, enhanced ForwardSim code

C. L. Fordyce, S. Govindaiah, S. P. Muratet, D. A. O'Neil, B. C. Schricker, and M. D. Petty, "Three Dimensional Computer Graphics Federates for the 2012 SISO Smackdown Federation", *Proceedings of the Fall 2012 Simulation Interoperability Workshop*, Orlando FL, September 10-14 2012.



Second Life Replay

- Smackdown execution recorded using logger
- Replayed in Second Life at 2012 AlaSim
- Preparation for replay
 - Acquire and scale “real estate” for playback
 - Convert and upload terrain and visual models
 - Develop playback script
 - Prevent Second Life “griefers” from disrupting testing





2012 UAHuntsville Student Experience

- Quotes from course evaluation
 - “... wonderful course, ...making me aware of modeling and simulation and related new technologies”
 - “... opportunity to expand our knowledge and experiences”
 - “great hands-on experience”
- Instructor’s observations
 - Smackdown event strong motivator
 - Students worked harder, more professionally, than conventional course
 - Team effectiveness improved over semester



SISO Smackdown as M&S Education

M&S graduate degrees at UAHuntsville

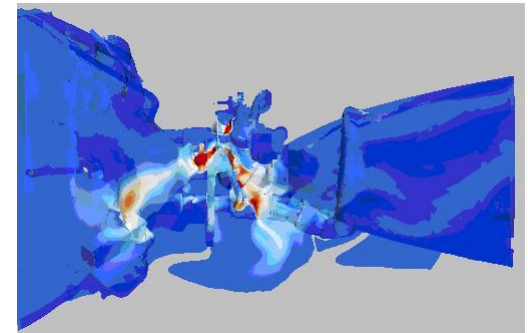
- Essentials
 - M.S. and Ph.D. in Modeling and Simulation
 - Approved 2010, underway Fall 2010
 - One of three universities in U.S. to offer M&S Ph.D.
- Details
 - M.S. 30 hours (thesis) or 36 hours (non-thesis)
 - Ph.D. 72 hours (dissertation)
 - Accessible to students with diverse academic backgrounds
 - Interdisciplinary core and elective courses: MOD, CS, ISEEM, ...



VT MÄK VR-Forces



U. S. Army VTC



SISO Smackdown as an M&S course

- “Collaborative Construction of Virtual Environments”
 - Regular semester course
 - Increased participation (credit) and motivation (grade)
- Topics
 - Distributed simulation concepts
 - HLA federate development and federation integration
 - Team development of simulation software
 - Multi-developer systems integration
- Course structure
 - 2012: Advanced graduate → student organized
 - 2013: Entry graduate → instructor organized
- Lessons learned
 - Incremental year-to-year elaboration of Smackdown scenario
 - Early specification of scenario objects and interactions
 - Early start of integration testing

Acknowledgements

- SISO Smackdown partners
 - AEgis Technologies
 - ForwardSim
 - National Aeronautics and Space Administration
 - Pitch Technologies
 - Simulation Interoperability Standards Organization
 - VT MÄK
- UAHuntsville course guest speakers
 - R. Adams, NASA Marshall Space Flight Center
 - Z. Crues, NASA Johnson Space Flight Center
 - D. Dexter, NASA Johnson Space Flight Center
 - S. Hughes, NASA Goddard Space Flight Center
 - B. Möller, Pitch Technologies
 - T. Stanzione, VT MÄK
 - D. Teare, NASA Marshall Space Flight Center
 - D. Verrett, ForwardSim
 - D. Wood, VT MÄK

End notes

- More information
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- Questions?