

# AI, Simulation & Planning In High Autonomy Systems

March 6 – 8, 2000

Sheraton Tucson Hotel and Suites, Tucson, Arizona

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University of Arizona, USA

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University of California, Berkeley, USA

## MONDAY, MARCH 6, 2000

Registration	7:00 am – 5:00 pm
Authors' Breakfast	7:30 – 8:15 am
<b>Introduction</b>	8:30 – 8:40 am
<b>Keynote:</b> Wayne A. Wymore	8:40 – 9:40 am
<b>Title:</b> Simulation of Hybrid Systems	

### **Bio-Sketch:**

Wayne A. Wymore earned BS and MS degrees at Iowa State University, and the PhD at the University of Wisconsin, Madison, all in mathematics. He is Visiting Professor of Systems Engineering at De Montfort University, Leicester, UK, and Professor of Systems and Industrial Engineering (SIE), Emeritus, at the University of Arizona where he was founder and first chairman of the SIE Department and first Director of the Computing Center. He is charter member #25 of the International Council on Systems Engineering (INCOSE), elected to the first Board of Directors and subsequently reelected, founder and first President of the Southern Arizona Chapter of INCOSE and among the first seven Fellows designated by INCOSE. While managing the SIE Department, teaching and developing courses, researching into the system theoretic foundations of systems engineering and consulting (50 organizations in 13 countries in 21 fields of application), he authored *A Mathematical Theory of systems engineering: The Elements*, 1967, *systems engineering Methodology for Interdisciplinary Teams*, 1976, and *Model-Based systems engineering*, 1993, at an average rate of 11 years per book. *System Functional Analysis and System Design, Phase 2 of Model-Based systems engineering* is forthcoming soon from CRC press.

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**Technical Sessions:** 9:50 – 11:00 am

**Session 1: Modeling & Simulation Theory**      **Chair: B.P. Zeigler**

*Adaptive Designs for Multiresolution, Multiperspective Modeling (MRMPM)*

Paul Davis  
RAND Corporation, USA

*Towards a Modeling Formalism for Conflict Resolution and for Sociocybernetics*

Tuncer Ören  
Marmara Research Center, Turkey

*Simulation of Meaning Generation: Multiscale Coalitions of Autonomous Agents*

Alexander M. Meystel  
Drexel University, USA

**Coffee Break** 11:00 – 11:20 am

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**Technical Sessions** 11:20 – 12:30 pm

**Session 2 – Ontologies (Parallel)** **Chair: E. Gelenbe**

*DEVSIF: A Relational Algebraic DEVS Intermediate Format*

Ki Jung Hong, Tag Gon Kim, KAIST, South Korea

In Sup Kwon, South Korea, Pyungchang Computer & Communication Inc, South Korea

*A Methodology for the Translation of Knowledge Between Heterogeneous Planners*

Sujata Ramachandran, Michael Marefat, USA

The University of Arizona, USA

*Ontology Engineering for Distributed Collaboration in Manufacturing*

Line Pouchard, Oak Ridge National Laboratory, USA

Nenad Ivezic, Craig Schlenoff, NIST, USA

**Session 3 - Simulation Environments (Parallel)** **Chair: Z. Swiatnicki**

*Model-Based Artificial Life Systems: Card Game Player Example*

Jang-Se Lee, Jong-Keun Lee, Sung-Do Chi

Hangkong University, South Korea

*Acquisition of Knowledge Based DEVS Models Using Extended Event Graphs*

C. Frydman, N. Giambiasi, L. Torres

DIAM-IUSPIM, France

*Virtual Simulation Environments*

Christopher Landauer, Kirstie L. Bellman

Aerospace Integration Science Center, USA

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**Luncheon** 12:30 – 1:50 p.m.

**Luncheon Speaker:** Colonel John C. Deal, U.S. Army, Fort Huachuca, Arizona

**Topic:** *Training, Operational Planning, Design and Development in the Virtual Domain*

**Bio-Sketch:** Colonel John C. Deal graduated from the University of Alaska with a BA in Physics. He was commissioned as a Second Lieutenant in the United States Army Signal Corps and entered on active duty in 1973. His professional military training include the Signal Officer Basic and Advance Courses, Airborne, Ranger and Air Assault Courses, the Telecommunications Systems Staff Officer Course, and the Naval Command and Staff College. He served as a Senior Service College Fellow at the University of Pittsburgh in 1993/94 and as a Senior Fellow of the Secretary of Defense Strategic Studies Group in 1996/97. He holds a MSEE from the Naval Postgraduate School, a MA in National Security and Strategic Studies from the Naval War College, and a MA in International Relations from Salve Regina University. Colonel Deal is the Commander of the United States Army Information Systems Engineering Command. Prior to this assignment he served as the Executive Officer, Office of the Director of Information Systems for Command, Control, Communications, and Computers (ODISC4) and Army CIO, Headquarters, Department of the Army.

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## Technical Sessions

2:00 – 3:30 pm

### Session 4 - Agents I (Parallel)

**Chair: A. Uhrmacher**

*Evolutionary Learning in Agent-based Modeling*

Shingo Takahashi

Chiba Institute of Technology, Japan

*Integrating Computable General Equilibrium Models & MultiAgent Systems - Why & How*

Irene Peters, Swiss Federal Inst. for Environmental Science & Technology, Switzerland

Kai-H. Brassel, Technical University of Darmstadt, Germany

*A Generic Distributed Simulation System For Intelligent Agent Design and Evaluation*

John Anderson

University of Manitoba, Canada

*Dynamic Interest Management in the Distributed Simulation of Agent-Based Systems*

Brian Logan, University of Nottingham, United Kingdom

Georgios Theodoropoulos, University of Birmingham, United Kingdom

**Session 5 - Neural Networks (Parallel)**

**Chair: H. Szczerbicka**

*The Time Adaptive Self-Organizing Map With Neighborhood Functions for Bilevel Thresholding*

Hamed Shah-Hosseini, Reza Safabakhsh  
Amirkabir Technical University, Iran

*Neural Networks Application For Medical Image Analysis*

Zbigniew Swiatnicki, Wacław Bejtan  
Military University of Technology, Poland

*Comparison of Neural Network Learning Methods in Application for Objects Recognition in Radar Systems*

Zbigniew Swiatnicki, Military University of Technology, Poland  
Radosław Semkło, Air Force Computer Center, Poland

*Dynamic Neuronal Ensembles: A Complementary Development of Artificial Neural Networks*

Sankait Vahie, i2 Technologies, USA

**Coffee Break**

3:30 – 3:50 pm

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**Technical Sessions**

3:50 – 5:20 pm

**Session 6 - Agents II**

**Chair: S. Takahashi**

*Variable Structure/Agents Model Representation*

Adeline Uhrmacher  
University of Ulm, Germany

*Framework for Modeling/Simulation of Mobile Agent Systems*

Jae-Hyun Kim, Tag Gon Kim  
KAIST, South Korea

*Resources Management System For Distributed Platforms Based On Multi-Agent Systems*

Francisco Hidrobo, Jose Aguilar  
Universidad de los Andes, Venezuela

*Towards Semiotic Agent-Based Models Of Socio-Technical Organizations*  
Cliff Joslyn, Luis M. Rocha  
Los Alamos National Laboratory, USA

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**Special Panel Session**

5:30 – 7:00 pm

**Chair:** Tuncer Ören

**Panelists:** F. Cellier, E. Gelenbe, J. Rozenblit, W. Wymore, B.P. Zeigler

## **TUESDAY, MARCH 7, 2000**

Registration

7:00 am – 5:00 pm

Authors' Breakfast

7:30 – 8:15 am

**Keynote:** Alexander M. Meystel

8:30 – 9:30 am

**Title:** Learning-Planning-Control Continuum

### **Bio-Sketch:**

A. M. Meystel is a Professor of Electrical and Computer Engineering at Drexel University. Since 1995, he is also at the National Institute of Standards and Technology (NIST), Gaithersburg, MD as a Senior scientist, then as a Guest Researcher. He developed a theory of the multiresolutional (multigranular, multiscale) intelligent systems architecture and implemented it as the Planner-Navigator-Pilot for Autonomous Dune Buggy (1984-1987) and robotic spray-casting machine (1987-1990). Now, he participates in the NIST-guided work on a team of unmanned autonomous vehicles. He is an author of more than 300 papers and 17 books including "Autonomous Mobile Robots: Vehicles with Cognitive Control", World Scientific, 1991. He was one of the initiators of the IEEE International Symposium on Intelligent Control, and served as a general and program chair at four out of 14 meetings. He is on the IEEE Technical Committee on Intelligent Control and is the moderator of the internet-based AICS-L list: a discussion group on Architectures for Intelligent Control Systems.

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**Technical Sessions :**

9:30 – 11:00 am

**Session 1 - DEVS Theory I (Parallel)**

**Chair: D. Hill**

*DEVS Framework for Systems Development: Unified Specification for Logical Analysis, Performance Evaluation & Virtual Prototyping*

Tag G. Kim, KAIST, South Korea

*Generalised Discrete Event Abstractions of Dynamic Systems*

Norbert Giambiasi

Université d'Aix-Marseille III, France

*A Framework For Representing Numerical Multirate Integration Methods*

Fernando J. Barros

Universidade de Coimbra, Portugal

*Time Cell-DEVS: Modeling and Simulation of Cell Spaces*

Gabriel A. Wainer, Universidad de Buenos Aires

Norbert Giambiasi, Université d'Aix-Marseille III, France

**Session 2 – System Design & Networks (Parallel)      Chair: D-K Baik**

*Entity Aspect Analysis and OO Design of Call Agents for NGN*

Sung-Kong Park, Young-Joon Kim, Doo-Kwon Baik

Korea University, South Korea

*Modeling of Communications Networks For the Virtual Radiology Environment Project*

Ralph Martinez, Stelios Agapiou, Dan Bradford, Jay Cook

The University of Arizona, USA

*VHDL-Based Analysis of Network-Centric Systems*

Mohammad A. Mikki, Abdullah Balamash, Salim Hariri

The University of Arizona, USA

**Coffee Break**

11:00 – 11:20 am

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**Technical Sessions :**

11:20 – 12:30 pm

**Session 3 - Military Applications (Parallel)**

**Chair: J. Anderson**

*Rational Agents, Simulation and Military Operations*

John R. Surdu, Udo W. Pooch

Texas A&M University, USA

*Maneuvering Agents Within A Synthetic Battlefield*

Anthony J. Courtemanche

Science Applications International Corporation, USA

*Towards an Integrated C3I Framework For Human Performance Modeling & Analysis*  
Beverly Knapp, John Warner, Army Research Laboratories, USA  
Jerzy W. Rozenblit, The University of Arizona

**Session 4 - Modeling Methodologies/Practices (Parallel)      Chair: R. Sato**

*Decomposition of a Traffic Flow Model For a Parallel Simulation*  
Matthias Schmidt  
GMD-FRIST, Germany

*Experimental Results of Timed Cell-DEVS Quantization*  
Gabriel A. Wainer, Universidad de Buenos Aires  
Bernard P. Zeigler, The University of Arizona, USA

*Enhanced Equal Frequency Partition Method For the Identification of a Water Demand System*  
Antoni Escobet, Rafael M. Huber, Angela Nebot,  
University Polytechnic Catalunya, Spain  
François E. Cellier, The University of Arizona, USA

**Lunch**      12:30 – 1:30 pm

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**Technical Session**      1:30 – 3:20 pm

**Session 5 - OO Modeling, Design, & Applications      Chair: T.G. Kim**

*Multimodeling & Object-Oriented Design Patterns Application to Bio-Control Simulation*  
D. R. C. Hill, M. K. Traore, B. L. Garcia, C. Mazel, A. Campos,  
Université Blaise Pascal, France  
P. Coquillard, Université d’Auvergne, France  
T. Thibault, Université de Buce-Sophia Antipolis, France

*Simulation and Analysis of Legal Processes*  
Maryam A. Purvis, Martin K. Purvis  
University of Otago, New Zealand

*Towards A System Methodology for Object-Oriented Software Analysis*  
Herbert Praehoper

Joahannes Kepler University, Austria

**Coffee Break** 3:20 – 3:40 pm

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**Technical Session** 3:40 – 4:50

**Session 6 - Distributed Simulation** **Chair: F. Barros**

*Simulation-Based Planning and Optimization of Assembly Processes*

Wilfried Sihm, Jörg Pirron, Ruediger Weller, Matthias Brenner

Franunhofer Institute for Manufacturing Engineering and Automation, Germany

*Modeling and Simulation of Supply Chain Management Based on DEVS  
and CORBA Framework*

Doohwan Kim, Heng Cao, Stephen J. Buckley

IBM T.J. Watson Research Center, USA

*Design Considerations for Distributed Real-Time DEVS*

Y.K. Cho, B.P. Zeigler, H.J. Cho, H.S. Sarjoughian, S. Sen

The University of Arizona, USA

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**Conference Banquet** 6:00 – 8:00 pm

## **WEDNESDAY, MARCH 8, 2000**

Registration 7:00 am – 4:00 pm

Authors' Breakfast 7:30 – 8:15 am

**Keynote:** Norman Foo 8:30 – 9:30 am

**Title:** Why Engineering Models Do Not Have A Frame Problem

### **Bio-Sketch:**

Norman Foo graduated B.E. (1965) and ME (1966) in Electrical Engineering, Canterbury University, and M.A. (1970) and PhD (1974) in Computer and Communication Sciences, University of Michigan. He has been assistant and visiting associate professor in SUNY Binghamton and visiting professor in the IBM Systems Research Institute and T.J. Watson Research Laboratories in Hawthorne, New York. From 1975 he was with the

Basser Department of Computer, Sydney University where he eventually held a personal chair as Professor of Knowledge Systems. In 1996 he moved to the Department of Artificial Intelligence, School of Computer Science and Engineering, University of New South Wales.

Norman's research has ranged in the past from algorithm analysis, abstract datatypes, complexity theory, and modelling and simulation to his present interests in logic programming, knowledge representation, artificial intelligence logics, and cognitive science. He has graduated 16 doctoral and 3 masters students. In 1998 the Australian Research Council gave him a five-year Special Investigator Award.

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**Technical Sessions**

9:30 – 11:00 am

**Session 1 - DEVS Theory II (Parallel)****Chair: G. Wainer***DEVS-Based Modeling and Simulation of Intelligent Transportation Systems*

Sung-Do Chi, Jong-Keun Lee  
Hangkong University, South Korea

*Representation of Dynamic Structure Discrete Event Models: A Systems Theory Approach*

Fernando J. Barros, Universidade de Coimbra, Portugal

*Traffic Control Specifications Using Discrete Events Cellular Models*

Gabriel A. Wainer, Alejandra Davidson  
Universidad de Buenos Aires

*FEOS-DECM: A High Level Event Oriented Formalism for the Specification of Control Systems*

Norbert Giambiasi, Université d'Aix-Marseille III, France  
Jean-Luc Paillet, Université d'Aix-Marseille I, France

**Session 2 - Enterprise Manufacturing (Parallel)****Chair: N. Giambiasi***A Framework For Modeling, Designing And Simulation of Management Systems - A Generic Standard Approach*

Andreas Gehrmann, TUV Rheinland Japan LTD System Certification Dept., Japan  
Syohhei Ishizu, Aoyama Gakuin University, Japan

*Modeling and Simulation of Business-Logistics With Business Process Equation*  
Ryo Sato  
University of Tsukuba, Japan

*Hierarchical Animation Environment*  
Tae Ho Cho, Mi Ra Yi  
Sungkyunkwan University, South Korea

*DEVS-Based Business Planning Tool For Manufacturing Systems*  
Iyer Subramanian, Bernard Zeigler, Hyup Cho, The University of Arizona, USA  
Jerry Couretas, Terra Sun, LLC, USA

**Coffee Break** 11:00 – 11:20 am

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**Technical Sessions** 11:20 – 12:30 pm

**Session 3 - Machine Learning (Parallel)** **Chair: P. Davis**

*Discrete Event Simulation Using Goal Oriented Learning Agents*  
Erol Gelenbe, Esin Seref, Zhiguang Xu  
University of Central Florida, USA

*Flexible and Fast Convergent Learning Agent*  
Michael M. Marefat, Miguel A. Soto Santibanez  
The University of Arizona, USA

*How to Execute a Tutoring Process*  
A. Martens, A. Uhrmacher  
University of Ulm, Germany

**Session 4 - Hybrid M&S (Parallel)** **Chair: S. Ishizu**

*Model Based Design*  
Jerzy W. Rozenblit  
The University of Arizona, USA

*Automatic Derivation of Meaningful Experiments for Hybrid Systems*  
Angelo E. M. Ciarlini, Pontifca Universidad Catolica do R.J., Brazil  
Thom Frühwirth, University of Munich, Germany

*Automated Validation of System Requirements For Embedded Systems Design*  
Yarisa Jaroch, Steven Cuning, Jerzy W. Rozenblit  
The University of Arizona, USA

**Lunch** 12:20 – 1:30 pm

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**Technical Session** 2:00 – 3:30 pm

**Session 5 – DEVS/HLA Distributed Simulation** **Chair: C. Joslyn**

*Discrete Event Modeling and Simulation Of Multi-Robot Systems*  
S. Akhavan, M. Jamshidi  
The University of New Mexico, USA

*Analysis of the Behavior of Quantization: A Renewal Theory Approach*  
Bernard P. Zeigler, Hyup J. Cho, J. G. Kim  
The University of Arizona, USA

*Modeling and Simulating Distributed Object Computing Systems: A Case Study of a DEVS/HLA System*  
Daryl R. Hild, MITRE Corporation, USA  
Hessam S. Sarjoughian, The University of Arizona, USA

*Dynamic Maps*  
Maria Vaconcelos, Tropical Research Institute, Portugal  
Antonio Gonçalves, Technical University of Lisbon, Portugal  
Fernando Barros, University of Coimbra, Portugal

**Coffee Break** 3:30 – 3:50 pm

**Concluding Remarks/Wrap-Up:** 3:50 – 4:20 pm