

HISTORY OF THE WINTER SIMULATION CONFERENCE: PERIOD OF GROWTH, CONSOLIDATION, AND INNOVATION (1993-2007)

Russell R. Barton

Department of Supply Chain and Information
Systems
The Pennsylvania State University
210E Business Building
University Park, PA 16802, USA

Jeffrey A. Joines

Department of Textile Engineering, Chemistry
and Science
North Carolina State University
1000 Main Campus Drive
Raleigh, NC 27695, USA

Douglas J. Morrice

Department of Information, Risk and Operations Management
The University of Texas at Austin
2110 Speedway Stop B6500
Austin, TX 78712, USA

ABSTRACT

In this paper, we consider the history of the Winter Simulation Conference (WSC) from 1993–2007, a period characterized by growth, consolidation, and innovation. We examine developments in the WSC program including rapid proliferation of new tracks and mini-tracks to match the interests of WSC attendees. Our essay also considers the impact of technological advancements. With the launch of www.wintersim.org in 1995, the website soon became the main vehicle for dissemination of information to conference participants. Additionally, it enabled the development of the online paper-management system for submission, review, revision, and final delivery to the publisher of all papers in the *Proceedings*. The website also led to significant changes in how the *Proceedings* was published and archived. Lastly, we survey developments in the WSC administration concerning the WSC Board of Directors structure, conference financing, new conference venues (e.g., the decision to take the conference international), and novel collaborations.

1 INTRODUCTION

This paper provides a historical synopsis of the Winter Simulation Conference (WSC) from 1993–2007. It does so from three main perspectives: the program, technological advancements, and the administration. The period was characterized by growth, consolidation, and innovation. The program matured and expanded tremendously throughout this time period. Technological advancements literally changed the way the conference operated with regard to paper and program management, publications, publicity, and engaging conference participants. Behind the scenes, the conference experienced significant changes in its governance structure and financial arrangements with sponsoring societies. Both improved short-term financing of each conference and long-term risk-management for WSC. Fostered by novel collaborations, the decision was made to select an international venue for the conference for the first time in WSC's history.

The rest of the paper is organized in the following manner. Section 2 covers the development of the WSC program over three sub-epochs that reflect the themes that characterize the period from 1993-2007. In Section 3, we discuss technological advancements beginning with the launch of the conference website

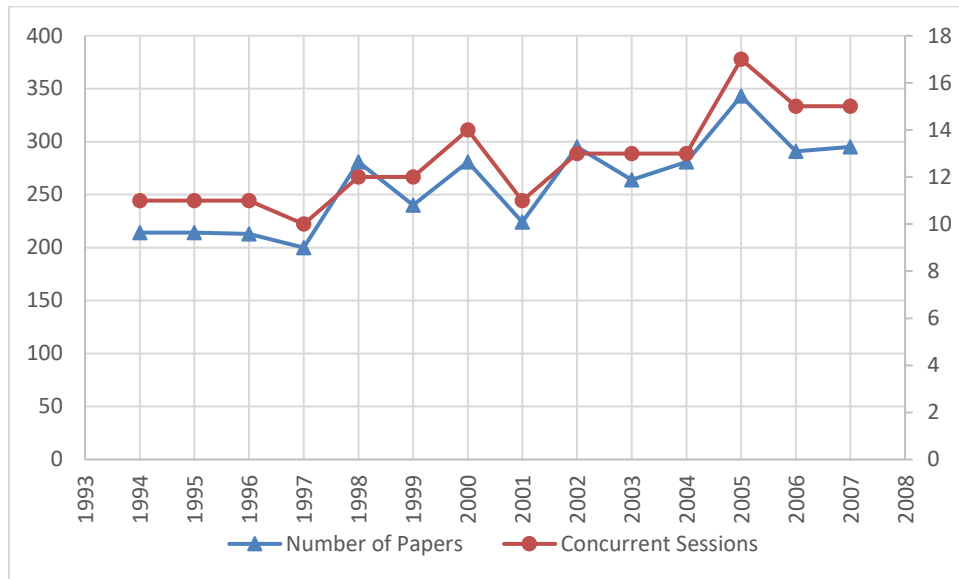
in 1995. Section 4 contains the major developments in the WSC administration over this time frame. Concluding remarks are provided in Section 5.

2 DEVELOPMENTS IN THE WSC PROGRAM

Growth, consolidation, and innovation were evident in changes to the WSC program over the fifteen year period from 1993-2007. Table 1 highlights program changes during that period, with rows corresponding to features, tracks and mini-tracks and columns for each year. An 'x' indicates that the theme was present in that year. It was necessary to take some liberty in identifying the row labels, particularly for the non-traditional categories that appear lower in the table. In a few cases, an x indicates at least two sessions, without formal recognition as a mini-track. A single session on a topic often occurred in a year preceding the first 'x' in the table. The table shows both innovation, in the triangular form, as well as periods of consolidation, when the Conference refocused on its traditional core set of tracks. Figure 1 shows the number of total papers (left axis) and the number of concurrent/parallel sessions (right axis), which shows the growth.

Table 1: WSC program features 1993-2007.

Theme	Simulation ... Beyond Imagination	Your Simulation On-ramp	Surfing the Future	Shortest Route Research ->	Simulation in the 21st Century	Simulation a Bridge to the Future	The New Simulation Millennium	A Simulation Odyssey	Exploring New Frontiers	Driving Innovation	Agent of Change	Mission Critical	New Horizons	Virtual Worlds	
	DC	DC	DC	DC	DC	DC	DC	DC	DC	DC	DC	DC	DC		
v Tracks / Year ->	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07
Introductory Tutorials	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Software/Modelware Tutorials	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Analysis Methodology	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Modeling Methodology	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Manufacturing Apps.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
General Apps.	x	x	x	x	x	x			x	x		x	x	x	x
Military Apps.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Advanced Tutorials	x	x	x	x		x	x	x	x	x	x	x	x	x	x
Poster Session	x	x			x							x	x	x	x
Parallel, Distributed, Agent-Based, Emergent	x	x	x		x			x		x	x	x	x	x	x
State of the Art Reviews		x	x	x	x										
Transportation (& Logistics/Distn.) Apps.				x		x	x	x	x	x	x	x	x	x	x
Health Care						x	x	x			x	x	x	x	x
Future of Simulation						x	x	x	x	x					x
Semiconductor Manufacturing							x	x	x	x	x	x	x	x	x
Construction and Project Mgmt.							x	x	x	x	x	x	x	x	x
Business Process Modeling							x	x	x	x	x	x	x	x	x
Verification, Validation and Accreditation								x							
Web-based Simulation								x	x	x		x	x		
Education								x	x	x	x	x	x	x	x
Computers, Networks, Telecommunications									x		x			x	
Risk Analysis										x	x	x	x	x	x
Simulation-based Scheduling										x	x	x	x	x	x
Biotech												x	x	x	
Homeland Security												x	x	x	x
Case Studies												x	x	x	x
Titans of Simulation												x	x	x	x
Biological/Environmental												x			
Virtual Reality												x	x		x
Six Sigma and Simulation													x		
Ontologies													x		
Intro to Simulation Workshops														x	x
Dynamic Data Driven															x
Simulation Interoperability															x
Clinics															x
Landmark Papers															x
Cross-Fertilization															x



[1] WSC 04: Added 28 case studies, and replaced Software Tutorials with 26 Vendor Sessions à Total of 335 presentations at conference.
 [2] WSC 05: 309 papers, 22 vendor presentations, 2 Titan talks, 36 case studies (presentation only) = 343 Papers / 369 Presentations

Figure 1: Number of Papers and Concurrent Sessions

2.1 1993-1997 Stability and Consolidation

The early part of this period was one of stability. Program Chairs (PCs) during this period were William E. Biles, Andrew F. Seila, David Goldsman, James J. Swain and Barry L. Nelson. Poster sessions began at the start of this period, and continued off and on throughout the fifteen years. There was a single health care applications session and two education sessions in 1994. These would later grow. The 1997 conference introduced a Research to Applications track, where sessions focused on simulation research with impact on practice.

2.2 1998-2002 Growth

This was a period of growth in new tracks and mini-tracks. PCs during this period were Mani Manivannan, Gerald W. Evans, Keebom Kang, Deb Medeiros and John M. Charnes. The 1998 conference introduced CDs for *Proceedings* delivery, which became the default in 2001. Transportation Applications was extended to a track that year, and a Future of Simulation track was introduced that continued fairly regularly throughout the following years. The 1998 conference had a particularly strong applications focus. A Telecommunications mini-track was featured in 2001, along with a session on Emulation in the Future of Simulation track. In the aftermath of 9/11, attendance at the 2001 conference showed the dedication of simulation researchers and practitioners to WSC. The longstanding Risk Analysis track was added in 2002, along with Simulation-Based Scheduling. An increasing diversity of applications is apparent.

2.3 2003-2007 A Period of Exploration and Innovation

This period added many new topics and sessions, some of which were one-time or rarely repeating events. PCs during this period were Douglas J. Morrice, Brett A. Peters, Jeffrey A. Joines, Richard Fujimoto and Russell R. Barton. Early in this period there was a focus on stability, still during the post-9/11 recovery period when there was widespread concern about air travel. In 2004 there was a deliberate effort to increase participation and value for industry sponsors and attendees. Vendor tutorials were incorporated into the regular program and presentation times were expanded. The Case Studies track was added as a non-*Proceedings* paper track to allow practitioners to present real cases and results. The recognition of leaders

in our field through the Titans sessions began in 2004 as well. New tracks on Six Sigma and Ontologies were introduced in 2005, along with pre-conference ‘Introduction to Simulation’ workshops that continued to be successful. The 2006 conference had an increased emphasis on Dynamic Data-Driven Simulation and Simulation Interoperability. The growing number of international participants was becoming apparent. By 2007 nearly 40% of the program participants were from outside the U.S., representing 38 countries. Again, application areas continued to diversify: Emergent Behavior, and Public Systems were new for 2007. Three Cross-Fertilization sessions had researchers from outside the simulation area share opportunities for simulation to make an impact. This feature appeared again in 2016. New Clinic sessions had practitioners present thorny problems, reviewed and commented upon by simulation researchers, with a practitioner response. These were exceedingly difficult to arrange, and were not continued

2.4 Program Growth

Over this fifteen year period, the number of tracks and papers grew, in spite of periodic consolidations. The number of *Proceedings* pages grew from 1429 pages in 1993 to an average of 2,619 over the 2005-2007 conferences.

3 TECHNOLOGICAL ADVANCEMENTS

Being the preeminent computer simulation conference, WSC also paved the way for many other conferences and organizations in using the world wide web to access and manage the conference and its content. In many cases, the WSC volunteers created these opportunities through their dedicated service.

3.1 Developments in WSC Publications

During this time period, Omnipress Inc. (www.omnipress.com) was the sole producer of the WSC conference *Proceedings* in several forms. The WSC Board of Directors (WSC BoD) solicits three-year proposals for production of conference *Proceedings* and other content (e.g., final program). Through the early 1990s up to 1997, the *Proceedings* was published in a blue hardback book with gold lettering as seen in Figure 2. Because the number of papers as well as the length of papers, the hard bound *Proceedings* was no longer viable and gave way to a two-volume soft copy *Proceedings* starting in 1998 until the demise of the printed *Proceedings* altogether in 2005.

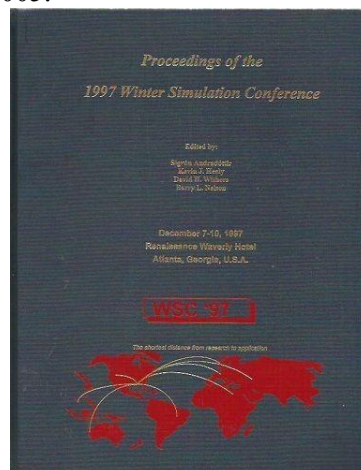


Figure 2: 1997 WSC Hardback Conference *Proceedings*

For the WSC 1997 *Proceedings*, Kevin Healy, who was one of the *Proceedings* Editors (PEs), took on a mammoth project to digitize the *Proceedings*. The PEs decided to collect all the papers in pdf format via

floppy disks, scanned copies, etc. Kevin created the entire program in a CD format and then had the CD *Proceedings* mass produced to be handed out at the conference along with the printed *Proceedings*. This defining moment started the dissemination of the WSC *Proceedings* on different formats (i.e., CD, web, and USB flash drives) and eventually led to the change of the papers from the two-column format, which was better for printed form, to single column in 2009. Starting in 1998, Omnipress Inc. was asked to produce the CD version of the *Proceedings*, which received its separate ISBN owing to the fact that no one else had the time or ability to do what WSC 1997 did. Since WSC was collecting the papers in digital format (i.e., no longer just receiving printed papers), the INFORMS Simulation Society (I-Sim) started to archive the entire *Proceedings* online, which is hosted by Georgia Tech.

One of the major expenses to WSC was the preparation and creation of the *Proceedings* by our publisher. In the late 1990s through the early 2000s, Omnipress Inc. also acted as an editor, making sure that papers conformed to style, were grammatically correct, etc. These increasing costs prompted the WSC BoD to enact new policies on the level of *Proceedings* editing by the publisher and putting more of this function on the PEs, PC, and authors. Also, the cost of producing and delivering the printed *Proceedings* was a very large expense. As a result, the printed *Proceedings* was offered as an add-on expense to participants in 2003 and 2004 and then completely phased out in 2005.

The printed final program has seen its advancements as well. In 1999, the abstracts were added to the program. Since the printed *Proceedings* started to be phased out, additional information was added to the final program including the list of authors, reviewers, maps, etc. Every WSC presentation was required to be coupled with a paper in the *Proceedings*, which was easy for academics but not industrial people. WSC 2004 and 2005 pushed to be more inclusive and wanted presentations from industry that were not coupled with a paper, which required WSC BoD approval. In many cases, companies would not allow employees to publish papers but would allow a presentation, or these individuals were not used to writing papers. As a result, the Industrial Case Studies were born along with Vendor tracks with and without papers. The only constraint was that a session could not contain both presentations with or without papers.

3.2 Development of the WSC Website and Paper Management System

In 1995, WSC launched the conference website at www.wintersim.org. The site was built and maintained by Walpole Software, which was operated by two retired IBM employees (Peter Welch (2013 INFORMS Lifetime Professional Achievement Award winner and Josephine (Winky) van der Hoeven). They served as the webmasters until 2011, updating and redesigning the system many times. In the early days, the site was strictly the main vehicle of dissemination for the Call for Papers, the Author Kit, as well as advertising the conference venue, program committee, etc. In later years, the website also collected the papers as well as distributed the preliminary and final programs. Also, Walpole Software was responsible for creating the online proceeding from 1998 – 2015 hosted by the I-Sim.

In 1998, the PC for WSC 2000 along with the PEs were changed to Keebom Kang (PC), Russell Barton (PE), and Jeffrey A. Joines (PE) owing to an issue with the original PC and PEs. To keep track of papers, tracks, and the program, which had to be completely built by Omnipress including the author index, table of contents, hyperlinks for the CD, etc., a set of MS Excel spreadsheets or an MS Access database was emailed back and forth. This was an arduous task. After agreeing to take on being PEs, Jeffrey A. Joines and Russel Barton did not want to receive final papers vial mail and/or email. Therefore, Jeffrey created the conference management system in 2000 to help with the process of collecting the final papers and managing the papers for the PE's job. The system was written using Microsoft's Active Server Pages (ASP™) using VBscript™ as the server side script, JavaScript as client side script and Microsoft's SQL Server™ as the back end database server. The application was created as a Web Application to make the system have a central database and accessible from anywhere. Figure 3 shows the main page of the final paper management system that was used in 2009.

For the first four years, the paper management system was a two server system. Working with Walpole software, Jeffrey helped create the system that allowed authors to upload their final papers along with all

the paper information to the www.wintersim.org site. PCs and PEs would have to click a link periodically that would cause the paper management system to FTP and download all the papers along with the information associated with the paper (e.g., authors, title, abstract, etc.) to the paper management database system. All of the information was then updated in the database system. The initial system dealt only with the final submission phase. The PC would assign papers to a session that would be linked to a track. The order of the papers within the session as well as the session order within a track was also specified. The tracks were placed into rooms (i.e., one track to one room) within the hotel. As seen in Figure 3, the system would automatically upload (i.e., FTP) the papers by track, renaming them into the Omnipress ID name (i.e., 001.doc). The system would upload only the papers one track at a time and only if the PE had checked that the paper had been reviewed, etc.

WSC 2005 Database Menu

COORDINATOR FUNCTIONS

Tracks, Session, and Paper Organization	
Contributed Submissions	View Contributed Paper Info
Invited Submissions	View Invited Paper Info
Final Accepted Submissions	View Final Paper Info
Track Information	View Track Information
Session Information	View Session Information
Order Final Submissions	Sequencing of Final Submission Order
View Track Layout	View Track and Session Layout
Final Program Review	Check for author time conflicts in the final program
Export Data	Comma-delimited for import into spreadsheet, database
Communications Center	
Administrative Letters	Create and Manage all Letters/Messages
Send Out Letter	Send Specific letters to Authors
Check Omnipress PDF	Send out letter to check Omnipress PDF
Author Registration	Update Author Registration
Reviewer Functions	
Reviewer Login	Login page for Reviewers
Reviewer Information	Access/update Reviewer Information
Reviewer Send Letter	Send Specific Letters to Reviewers
Author Functions	
Contributed Submission Form	Links to Call for Submissions submit form
Invited Submission Form	Links to Call for Submissions submit form
Presentation Submission Form	Links to Call for Presentations submit form
Final Submission Form	Links to Final Submissions submit form
Author Center - Final	Links to Final Author Update login form
Author Center - Contributed	Links to Contributed Author Update login form
Author Center - Invited	Links to Invited Author Update login form
Editor Functions	
Generate Reports	Generate Actual Reports for Final Program, TOC, Author Index.
Generate Prelim/Final Program	Generate preliminar/final program for the web
Generate Referee List	Generate List of Referee's for the proceedings.
Export Email	Generate List of Email and Organization by Com and EDU.
Generate Information	Generate Reports with Omnipress IDS
Send papers to omnipress	Send Word Docs and PS files to omnipress
Conference Setup Options	
Conference User Information	Add/Edit Conference Database userbase
Modify Conference Information	Jeff Joines must do this
Password Change	Change your password for conference submission system
Modify Conference Options	Edit Which Options to Collect

Figure 3: Conference Management System Main Page

In addition to providing a centralized database solution that allowed several people to work on the conference program and papers at the same time, the paper management system saved WSC thousands of dollars in *Proceedings* production costs. Working with Omnipress, the system automatically created XML documents that represented the table of contents with links, the author index, the final program, etc. Omnipress was able to load these files directly into their systems without the need for creation. Also, the system would create the *Proceedings* archive for Walpole software for the I-Sim site, saving them time.

Starting in 2004, the two server system was eliminated. The main system would allow papers and all information to be submitted as well as automatically created the PDF files from word documents, which made it easier for the reviewers. After ordering the final submission, it was difficult to see how the tracks and sessions were laid out in the program. In 2005, the Program at a Glance was developed to assist the PC in developing the program as well as displaying the preliminary program for the www.wintersim.org. An example of a layout is provided in Figure 4. This page dynamically created the layout in pure HTML tables based on the session times, track room assignments, etc. It was very useful in visualizing the program as it was being developed and would highlight session in red if any conflicts existed. To make his/her job easier as PC in 2005, other portions of the system would look for author conflicts (i.e., an author on more than one paper presenting at the same exact time).

This will display a grid by Room Assignment and time. To develop the program, it may be necessary give temporary room assignments of letters of the alphabet. Click on the items to include in the grid.

Session IDs Session Titles
 Track IDs Track Headings Headings

Tracks	Opening Session	Poster Session	PhD Colloquium Titans of Simulation	Introductory Tutorials	Advanced Tutorials	Logistics, Transportation, and Distribution	Analysis Methodology A	Risk Analysis Analysis Methodology B Construction Engineering and Project Management	Ontologies in Simulation Tribute to Jack Kleijnen Virtual Reality/3D Visualization Semiconductor Manufacturing	Modeling Methodology A	Modeling Methodology B
Room/Time	International Center/South	Grand Foyer	Salon I & II	Salon I	Salon II	Salon III	Salon VI	Orange Blossom	Narcissus	Salon VII	Salon VIII
Sunday 6:00-00 PM- 8:00-00 PM		Poster Session (Presentation Only)									
Monday 8:30-00 AM- 10:00-00 AM	Keynote Address										
Monday 10:30-00 AM- 12:00-00 PM				Agent-based Modeling	Optimization of Logistics Simulations	Maritime Simulation	Rare-Event Simulation	Credit Risk Analysis	Ontologies in Simulation	DEVS and Multi-formalism modeling	Estimation in Simulation Experiments
Monday 12:30-00 PM- 1:30-00 PM			Titan Talk: Jack P.C. Kleijnen								
Monday 1:30-00 PM- 3:00-00 PM				Introduction to Simulation	Random Number Generation	Air Transportation Simulation	Simulation Optimization Selection Procedures I	Simulation Methodology for Credit Risk Models	Metamodels	Plenary: Simulation and OR for Combined Practical Optimization	Rare Events Simulation I
Monday 3:30-00 PM- 5:00-00 PM				Model Validation and Verification	Input Modeling	Warehousing and Material Handling	Simulation Optimization Selection Procedures II	Risk Analysis Methodology	Output Analysis	Modeling for Simulation	Rare Events Simulation II

Figure 4: Example of Final Track Layout

As stated, the paper management system coordinated the entire process of receiving contributed papers, reviewing these papers, getting invited paper information, receiving the final papers as well as tracking author registration and generating XML documents that were directly used by Omnipress to print the final program, table of contents, author directory, etc. The system continued in operation for 10 years until 2010. It greatly reduced the amount of time PCs, PEs, Track Coordinators, etc. needed to produce the *Proceedings*.

4 DEVELOPMENTS IN WSC ADMINISTRATION

During the 1990s and into the early 2000s, the governance and financing of the conference did not change much. The WSC BoD was composed of representatives from the following sponsoring societies: American Statistical Association (ASA), Association for Computing Machinery/Special Interests Group on Simulation (ACM/SIGSIM), Operations Research Society of America (ORSA), which became the Institute for Operations Research and the Management Sciences (INFORMS), The Institute of Management Sciences/College on Simulation (TIMS/CS), which also became the Institute for Operations Research and the Management Sciences/College on Simulation (INFORMS/CS), Institute of Electrical and Electronic Engineers/Computing Society (IEEE/CS), Institute of Electrical and Electronic Engineers/Systems, Man, and Cybernetics Society (IEEE/SMCS), Institute of Industrial Engineers (IIE), which recently became IISE (S for Systems), the National Institute of Standards and Technology (NIST), and The Society for Computer Simulation, International (SCS) (Evans et al. 1993, Tew et al. 1994, Alexopoulos et al. 1995, Charnes et al. 1996, Andradóttir et al. 1997, Medeiros et al. 1998, Farrington et al. 1999, Joines et al. 2000, Peters et al. 2001, Yücesan et al. 2002, Sanchez et al. 2003). All sponsoring societies, except NIST, provided seed money at the beginning of each conference cycle (usually at the beginning of each calendar year) to fund expenses until attendee registrations and other sources of revenue (e.g., vendor sponsorships) came in later in the year. NIST provided technical input to the conference as well as in-kind support for the distribution of conference materials. While conference committees targeted break-even budgets, the seed monies were returned to the societies along with any surplus or net of losses at the end of each cycle.

On the one hand, this approach to financing the conferences was simple and clean because WSC was never a separate legal entity or “owned” by a single society. However, it did create short-term budgeting problems and longer-term risk-management problems. For example, in some years conference committees ran short on seed money to pay the bills before revenues started flowing in and there was no formal mechanism in place to go back and get more seed money from the societies. It was especially acute in years when revenues came in later or lower than anticipated, or both.

Due to the risk associated with obtaining hotel space appropriate for the conference, the WSC BoD developed a practice of signing hotel contracts well in advance of each conference. This practice not only provided more certainty, but it often resulted in more favorable hotel contracts for the conference. It also dovetailed nicely with the planning for each conference, which began with the selection of the PC usually six years in advance of each conference. The PC was expected to secure a hotel contact, typically within a year of his/her appointment. Hence, at any given time, WSC or, more accurately, the sponsoring societies, were responsible for multiple hotel contracts, resulting in a longer-term risk-management issue. The latter did not seem particularly problematic until September 11th, 2001 occurred.

Figure 5 illustrates the conference attendance from 1993 – 2007 (WSC Archive/Info 2017). The general trend over the entire period is almost flat. However, the first conference post-9/11 had the lowest attendance over the entire period. This was particularly striking because pre-9/11, attendance appeared to be on an upward trend. Additionally, the 2001 conference was held at the Crystal Gateway Marriott, Arlington, VA, and peak attendance years were generally associated with conferences in the Washington, DC area (e.g., 1998 and 2007). In light of the 9/11 tragedy, serious consideration was given to cancelling the 2001 conference. However, in the end, the WSC BoD decided otherwise. The 2001 and subsequent two conferences struggled financially, threatening the long-term viability of the conference. Two things emerged from the crisis. The WSC BoD embarked on a long-term risk-management strategy that not only affected the financing of the conference, but also its governance structure. Additionally, the WSC Foundation was established.

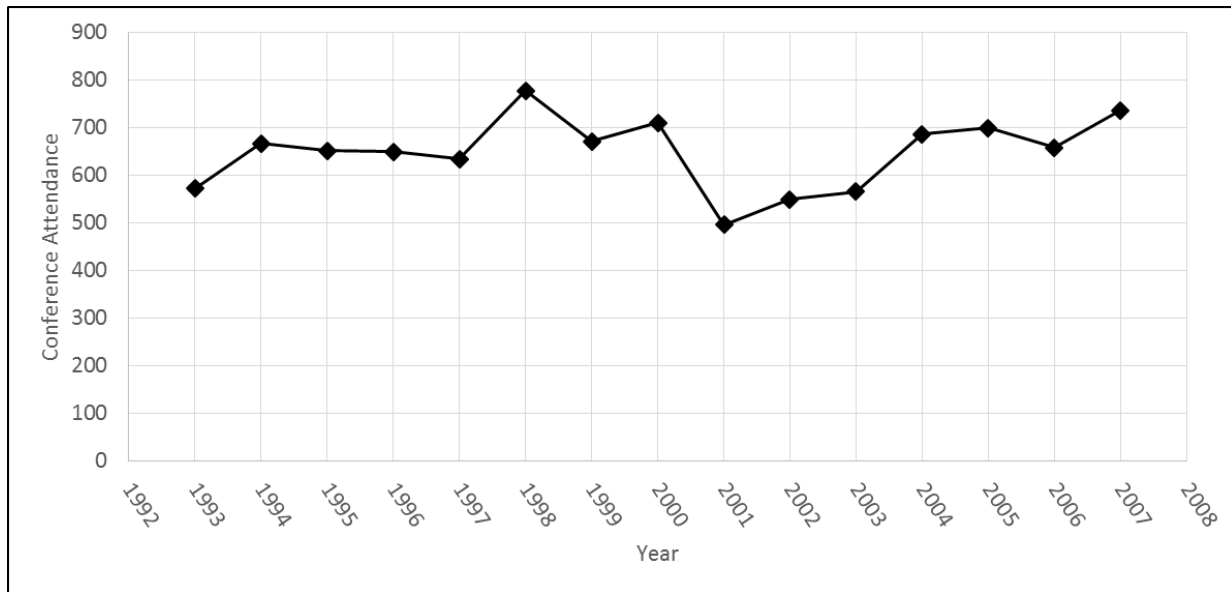


Figure 5: Conference Attendance from 1993-2007.

4.1 A Long-Term Risk-Management Strategy for WSC

Having multiple hotel contracts for several years into the future represented a sizable financial commitment for the conference. To mitigate the risk, the WSC BoD set a target to hold a certain percentage of this financial commitment in a reserve fund that was built up over multiple years from conference surpluses, starting in 2003. However, soon after the full reserve was achieved, a problem arose. Through an IRS audit of INFORMS, the conference management organization holding the reserve funds, it was discovered that since WSC was not a distinct legal entity with IRS reporting requirements, which had become more stringent post-9/11, it could not maintain the reserve. Hence the WSC BoD was faced with a number of options. First, possible abandon the reserve and return to the status quo. This was never seriously considered since the long-term risk needed to be managed. A second option was to become a distinct legal entity. Incorporating as a 501(c)(3) non-profit organization was given serious consideration by the WSC BoD. The downside of this option was the significant costs associated with establishing and maintaining such an entity.

Out of all these discussions, there emerged a surprisingly elegant solution to the problem. WSC had always prided itself on being a conference that brought together multiple sponsoring societies interested in simulation. These societies provided the conference governance structure through representatives on the board, and financial support, but neither of these things had ever been legally formalized. While the WSC BoD did have a set of bylaws that set forth policies for the organization and operation of the conference, the set of bylaws was not a legal document. The solution came in the form of a Joint Sponsorship Agreement (JSA). The JSA allowed WSC to maintain its unique governance structure with multiple sponsoring societies, but it clearly spelled out the benefits and responsibilities of being a sponsoring society. Of equal importance, it was signed by officials of each sponsoring society in full recognition of the financial obligations associated with the conference. As a result, each society became responsible for risk-management as a co-sponsor for the conference. Furthermore, they could do so in a lawful fashion since they were legal entities, eliminating the aforementioned IRS problems. The JSA also established an annual reporting mechanism so that each co-sponsor could maintain an on-going level of transparency into the financial obligations of the conference.

The development of the JSA was not without its challenges. While some of the original societies elected to remain full financial sponsors of the conference (ACM, IIE, INFORMS, and SCS), others did not (ASA

and IEEE). Fortunately, neither of the societies in the latter group elected to stop supporting the conference altogether. Rather, they became technical sponsors, a status that had been granted to NIST through a modification of the bylaws in 2002. Board representatives from the technical sponsoring societies were valued for their technical input. However, since they had no financial stake in the conference, they could not vote on issues pertaining to the finances of the conferences (e.g., the approval of hotel contracts).

4.2 WSC Foundation

Another strategy that emerged to safeguard the long-term viability of the conference was the establishment of the WSC Foundation. This initiative, led by James R. Wilson, began in early 2003 and was first designated the “WSC Patrons’ Fund.” Its purpose and essence were captured by the following statement regarding the “Patrons of WSC” in the “About the Conference” section of the *2003 Proceedings* (Sanchez et al. 2003):

“To safeguard the long-term financial stability of the Winter Simulation Conference, in 2003 the Board of Directors undertook a fund-raising effort that is without precedent in the thirty-six-year history of the conference. Participants in this groundbreaking effort are designated “Patrons of WSC,” with provision for both anonymous donations and recognition for the following levels of support as specified by each individual contributor: Patron, any amount; Silver Patron, \$125 – \$249; Gold Patron, \$250 – \$499; and Sustaining Patron, \$500 or more. Given below is a list of all Patrons of WSC as of October 13, 2003. Several people explicitly asked for a level of recognition that was “lower” than their level of giving. Everyone in the international simulation community is deeply indebted to the individuals listed below for their unwavering support of WSC in times of great uncertainty.”

Due to the remarkable support and generosity of the WSC community, the WSC Patrons’ Fund initially received over \$36,000 in donations from more than 90 donors.

Soon after the establishment of the fund, an independent Board of Trustees (BoT) was formed to manage it. The BoT established bylaws, under the leadership of Robert G. Sargent, in which the organization was named the “WSC Foundation.” These bylaws also spelled out the BoT governance structure, fund-management guidelines, and the role of WSC Foundation in providing support to the conference. The latter was specified in the form of loans or grants to the conference to “ensure the *continuance* of the Winter Simulation Conference” or “to *enhance* a WSC or a set of Winter Simulation Conferences” (WSC Foundation Bylaws 2004).

4.3 Other Important Administrative Developments

Besides financial and governance issues, the WSC BoD had a number of other important accomplishments in the period from 1993-2007. While the first non-US WSC was held in Berlin in 2012, the decision to take the conference global was made six years earlier. This was a big step for WSC since all prior conferences had been held in the United States. The key to its success was the high level of international participation the conference had enjoyed for many years. Additionally, WSC BoD established a partnership with the German simulation society Arbeitsgemeinschaft Simulation (ASIM). Through the hard work of Markus Rabe, Oliver Rose, and others, ASIM agreed to host its conference jointly with WSC, Berlin, thus ensuring strong attendance from ASIM members. This partnership eventually led to ASIM’s becoming a technical sponsor of WSC (WSC Archive/Info 2017).

WSC has also enjoyed partnerships with other groups and organizations over the years. For many years, construction industry academics and practitioners led by Simaan M. AbouRizk sponsored a track at WSC. In 2007, under the leadership of John Fowler, a decision was made by the WSC BoD to include the International Conference on Modeling and Analysis of Semiconductor Manufacturing (MASM) as part of WSC. Thus, MASM has been included in WSC every year since 2008, attracting semiconductor manufacturing researchers and practitioners from all over the world to the conference.

Representatives from the sponsoring societies serve as volunteers on the WSC BoD for a minimum term of eight years. Every representative becomes a liaison to one conference committee and supports the committee over the six-year cycle. Representatives also serve in all the board officer positions before rotating off this board. It is not an exaggeration to say that these volunteers devote hundreds of hours of their time to manage WSC. To recognize exceptional service to the conference, the WSC BoD established the Board of Directors Award in 2003 (WSC History 2015). Soon after in 2005 it was renamed the J. R. Wilson Award, in honor of its first recipient James R. Wilson, who exemplifies distinguished service to WSC.

5 CONCLUDING REMARKS

The growth, consolidation, and innovation experienced by WSC from 1993-2007 represented a real maturing of the conference. While maintaining a commitment to core topics, program committees continued to innovate as new research and applications areas of simulation emerged. Conference leadership embraced new technologies, always with an eye for enhancing the conference. The governance and financing structures born of this era greatly enhanced the long-term viability of WSC. Through all the opportunities and challenges, WSC emerged stronger than ever, setting the stage for even greater achievements in the “Modern Era” (2008–present).

ACKNOWLEDGMENTS

The authors would like to thank Barry Nelson, Ernie Page, Robert Sargent, James Wilson, and all the PCs from the 1993-2007 conferences for providing valuable input and historical documentation for this essay.

REFERENCES

- Alexopoulos, C., K. Kang, W. R. Liledgon, and D. Goldsman. 1995. “About the Conference”. In *Proceedings of the 1995 Winter Simulation Conference*, edited by C. Alexopoulos, K. Kang, W. R. Liledgon, and D. Goldsman, xxiii–xxx. Piscataway, New Jersey: Institute of Electrical and Electronics Engineers, Inc.
- Andradóttir, S., K. J. Healy, D. H. Withers, and B. L. Nelson. 1997. “About the Conference”. In *Proceedings of the 1997 Winter Simulation Conference*, edited by S. Andradóttir, K. J. Healy, D. H. Withers, and B. L. Nelson, xxi–xxx. Piscataway, New Jersey: Institute of Electrical and Electronics Engineers, Inc.
- Charnes, J. M., D. J. Morrice, D. T. Brunner, and J. J. Swain. 1996. “About the Conference”. In *Proceedings of the 1996 Winter Simulation Conference*, edited by J. M. Charnes, D. J. Morrice, D. T. Brunner, and J. J. Swain, xxiii–xxxi. Piscataway, New Jersey: Institute of Electrical and Electronics Engineers, Inc.
- Evans, G. W., M. Mollaghasemi, E. C. Russell, and W. E. Biles. 1993. “About the Conference”. In *Proceedings of the 1993 Winter Simulation Conference*, edited by G. W. Evans, M. Mollaghasemi, E. C. Russell, and W. E. Biles, xxi–xxix. Piscataway, New Jersey: Institute of Electrical and Electronics Engineers, Inc.
- Farrington, P. A., H. Black Nembhard, D. T. Sturrock, and G. W. Evans. 1999. “About the Conference”. In *Proceedings of the 1999 Winter Simulation Conference*, edited by P. A. Farrington, H. Black Nembhard, D. T. Sturrock, and G. W. Evans, xxvi–xxxvi. Piscataway, New Jersey: Institute of Electrical and Electronics Engineers, Inc.
- Joines, J. A., R. R. Barton, K. Kang, and P. A. Fishwick. 2000. “About the Conference”. In *Proceedings of the 2000 Winter Simulation Conference*, edited by J. A. Joines, R. R. Barton, K. Kang, and P. A. Fishwick, xxx–xl. Piscataway, New Jersey: Institute of Electrical and Electronics Engineers, Inc.

- Medeiros, D. J., E. F. Watson, J. S. Carson, and M. S. Manivannan. 1998. "About the Conference". In *Proceedings of the 1998 Winter Simulation Conference*, edited by D. J. Medeiros, E. F. Watson, J. S. Carson, and M. S. Manivannan, xxiv–xxxiii. Piscataway, New Jersey: Institute of Electrical and Electronics Engineers, Inc.
- Peters, B. A., J. S. Smith, D. J. Medeiros, and M. W. Rohrer. 2001. "About the Conference". In *Proceedings of the 2001 Winter Simulation Conference*, edited by B. A. Peters, J. S. Smith, D. J. Medeiros, and M. W. Rohrer, xxiv–xxxiii. Piscataway, New Jersey: Institute of Electrical and Electronics Engineers, Inc.
- Sanchez, P. J., S. Chick, D. J. Morrice, and D. Ferrin. 2003. "About the Conference". In *Proceedings of the 2003 Winter Simulation Conference*, edited by P. J. Sanchez, S. Chick, D. J. Morrice, and D. Ferrin, xxviii–xlii. Piscataway, New Jersey: Institute of Electrical and Electronics Engineers, Inc.
- Tew, J. D., S. Manivannan, D. A. Sadowski, and A. F. Seila. 1994. "About the Conference". In *Proceedings of the 1994 Winter Simulation Conference*, edited by J. D. Tew, S. Manivannan, D. A. Sadowski, and A. F. Seila, xxi–xxxi. Piscataway, New Jersey: Institute of Electrical and Electronics Engineers, Inc.
- Yücesan, E., C.-H. Chen, J. M. Charnes, and J. L. Snowdon. 2002. "About the Conference". In *Proceedings of the 2002 Winter Simulation Conference*, edited by E. Yücesan, C.-H. Chen, J. M. Charnes, and J. L. Snowdon, xxx–xl. Piscataway, New Jersey: Institute of Electrical and Electronics Engineers, Inc.
- WSC Archive/Info (Winter Simulation Conference Archive/Info). 2017. "Winter Simulation Conference." <http://meetings2.informs.org/wordpress/wsc2017/past-conferences/>.
- WSC Foundation Bylaws (Winter Simulation Conference Bylaws). 2004. "WSC Foundation Bylaws." <http://connect.informs.org/wscfoundation/bylaws>.
- WSC History (Winter Simulation Conference History). 2015. "The Winter Simulation Conference: The Premier Forum on Simulation Practice and Theory." <http://wintersim.org/2015/images/WSCHistory.pdf>.

AUTHOR BIOGRAPHIES

RUSSELL R BARTON is professor of supply chain and information systems and professor of industrial engineering at the Pennsylvania State University. He currently serves as senior associate dean for research and faculty in the Smeal College of Business. He received a B.S. degree in electrical engineering from Princeton University and M.S. and Ph.D. degrees in operations research from Cornell University. He serves as the I-Sim representative on the INFORMS Subdivisions Council and chairs the QSR Advisory Board. He is a senior member of IIE and IEEE and a Certified Analytics Professional®. His research interests include applications of statistical and simulation methods to system design and to product design, manufacturing and delivery. His email address is rbarton@psu.edu.

JEFFREY A. JOINES is a Professor and the Department Head in the Textile Engineering, Chemistry, and Science department. He received a B.S. in Electrical Engineering and B.S. in Industrial Engineering in 1990, a M.S. in Industrial Engineering in 1993, and Ph.D. in Industrial Engineering in 1996 all from NC State University. He received the 1997 Pritsker Doctoral Dissertation Award for the best dissertation from the Institute of Industrial Engineers. His expertise is in supply chain optimization utilizing computer simulation where he has published numerous papers and given dozens of international conference presentations. He was the Co-PE for the 2000 Winter Simulation Conference, the PC for the 2005 WSC and currently sits on the WSC Board representing IEEE-SMC. He teaches undergraduate and graduate classes in computer information systems, computer based modeling in Excel and VBA, simulation and Lean Six-Sigma. His passion lies with helping students reach their fullest potential and is heavily involved in utilizing technology in the classroom and how it impacts problem solving. He was awarded the 2006 Alumni NC State University Outstanding Teaching Award, the 2009 Gertrude Cox Teaching Award for

Innovative Excellence in Teaching and Learning with Technology for Large Transformative Projects, the 2012 Alumni Distinguished Undergraduate Professor. His email address is jeffjoines@ncsu.edu.

DOUGLAS J. MORRICE is a Professor of Supply Chain and Operations Management at The University of Texas at Austin. He is also a Senior Research Fellow in the University of Texas Supply Chain Management Center of Excellence. He has an ORIE Ph.D. from Cornell University. His research interests include simulation design, modeling, and analysis, healthcare delivery management, and supply chain risk-management. Dr. Morrice was Co-Editor of the *Proceedings* of the 1996 Winter Simulation Conference, and 2003 Winter Simulation Conference PC. He served as a representative for the INFORMS Simulation Society on the Winter Simulation Conference Board of Directors from 2004-2012. His email address is douglas.morrice@mcombs.utexas.edu.