



GEN John M. Keane

23RD ARMY SCIENCE CONFERENCE FEATURES TRANSFORMATION SCIENCE AND TECHNOLOGY

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Introduction

The 23rd Army Science Conference (ASC), held Dec. 2-5, 2002, in Orlando, FL, was the 2002 capstone event for the science and technology (S&T) community. The conference theme, *Transformational Science & Technology for the Army ... a race for speed and precision*, emphasized the critical role of S&T in enabling Army transformation to the Objective Force.

Inaugurated in 1957 and sponsored by the Assistant Secretary of the Army for Acquisition, Logistics and Technology (ASAALT), this biennial event is the Army's premier professional forum for the S&T community to discuss the latest developments and emerging technologies and their impact on future soldiers. The ASC provides a unique opportunity to exchange and leverage ideas that are relevant to the Army's mission across the scientific and engineering disciplines. In addition, the conference publicly recognizes the

important technical achievements of the scientists and engineers who have distinguished themselves through proven scientific and technical excellence by the work they perform for the Army. This was the first ASC that accepted papers relevant to the Army mission from industry, academia, and other government organizations, all of which competed for the ASC Best Paper Awards.

The ASC traditionally attracts intense interest and support from the Army S&T community. More than 1,250 people attended the conference—nearly triple the 2000 ASC participation—with the largest percentage of increases coming from academia and industry. The overwhelming success of the 2002 ASC is attributed to the expanded conference scope beyond basic research that encompassed all areas of S&T, the inclusion of academic and industrial participation, and a boosted effort to advertise this event.

Keynote Speakers

Among the many highlights of the conference was the first keynote address presented by GEN John M. Keane, Vice Chief of Staff of the Army. Keane praised the dedication and courage of those who unselfishly commit and sacrifice their lives to protecting our Nation. His address stressed the importance of changing the way the Army fights and deploys to revolutionize warfighting in the 21st century.

The next keynote speaker and conference host, ASAALT Claude M. Bolton Jr., discussed the conference's theme of speed and precision relative to transformation. Bolton emphasized the significant progress already made in a wide range of technologies applicable to guns, communications, and reduction of the logistics footprint to enable the sustainment of the Objective Force.



ASAALT Claude M. Bolton Jr.

Other Presentations

With transformation as the central topic, the conference provided additional opportunities to discuss other significant forms of transformation occurring in academia and industry. Dr. Steven B. Sample, President of the University of Southern California, eloquently predicted the roles of universities in our society in the 21st century. The agenda then turned to the topic of organizational change through lessons learned from industry. Daniel P. Burnham, Chairman and CEO of Raytheon, described the challenges he undertook in transforming Raytheon into a highly successful and efficient organization. He accomplished this through vision, leadership, and application of the six-sigma process.

The first day's speeches concluded with Deputy Assistant Secretary for Research and Technology Dr. A. Michael Andrews II outlining major S&T achievements since the start of Army transformation in 1999. These included advances in technologies for unmanned aerial vehicles; robotic vehicles; active protection systems; command, control, and communications on-the-move; networked missiles; and direct-fire

lethality. He also discussed future Army investments in key S&T areas that will enable Army transformation to the Objective Force.

Second Day's Events

The second day included speeches and topical panels devoted to the Future Combat Systems (FCS). Roger A. Krone, Senior Vice President of Boeing, spoke on the evolution of the integrated battlespace, providing an insightful perspective into the future of this important area of Army transformation to the Objective Force. A robotics topical panel chaired by Director of U.S. Army Research Laboratory (ARL) Dr. Robert Whalin and co-chaired by Dr. William Ribich of Foster-Miller followed his speech. The morning session concluded with a command, control, communications, computers, intelligence, surveillance, and reconnaissance topical panel chaired by U.S. Army Communications-Electronics Command (CECOM) Director Robert Doto and co-chaired by GEN Paul F. Gorman (USA, Ret.).

The luncheon speaker, GEN Paul J. Kern, Commanding General, U.S. Army Materiel Command (AMC), emphasized the importance of sci-

entific discoveries in shaping the future of the Objective Force and the urgency of transitioning new knowledge into practical application. He challenged the scientists and engineers in the audience to spend more of their time and creative thinking on understanding the implications and applications of their work for the soldier. Following Kern was LTG John M. Riggs, Director of the Objective Force Task Force, who described the way ahead for FCS and the Army's path to the Objective Force.

Third Day's Events

The third day's agenda included speeches, topical panels, and the awards banquet—a key event. First, MG William L. Bond, Deputy for Systems Management and Horizontal Technology Integration, addressed the challenges in achieving survivability for light-combat systems and how this requires a radical change in our approach to survivability. He pointed out that while armor will continue to play a role, there will be greater emphasis on other critical technologies to ensure acceptable levels of survivability. Following Bond was a speech on Objective Force Warrior by Philip Brandler, Director, U.S. Army Natick Soldier Center, and an immersive technology topical panel chaired by Dr. Michael Macedonia, Program Executive Office, Simulation, Training, and Instrumentation (PEO, STRI), and co-chaired by Dr. William Swartout, Technical Director of the Institute for Creative Technologies. The morning session concluded with a nanotechnology topical panel chaired by Dr. John Gassner, Chief Scientist, U.S. Army Soldier and Biological Chemical Command (SBCCOM), Natick Soldier Center, and co-chaired by Dr. Michael Sennett of SBCCOM.

A high point of the day was a luncheon speech by Dr. Ray Kurzweil, Founder and CEO of Kurzweil Technologies, and 1999



Dr. A. Michael Andrews II

recipient of the National Medal of Science and Technology. His primary message was that the future will be filled with extraordinary opportunities to exploit new technologies. He also made some interesting predictions, which are contained in his briefing posted on the ASC Web site at <http://www.asc2002.com>. Dr. Thomas M. Connelly Jr., Senior Vice President and Chief Science and Technology Officer for DuPont, followed with a speech on future manufacturing challenges, especially in the area of nanotechnologies for the soldier. DuPont is one of the Army's key partners in the Institute for Soldier Nanotechnology.

The evening awards banquet was the highlight of the day, honoring Army scientists and engineers with 2001 and 2002 Army Research and Development Achievement Awards. One hundred and forty-nine Department of the Army researchers were recognized for their outstanding scientific and technical accomplishments. The distinguished speaker for the awards banquet was Dr. Richard E. Smalley of Rice University, a Nobel laureate in chemistry, who spoke on the declining interest of America's

youth in the fields of science, math, and technology. He proposed that our Nation focus on the goal of energy sufficiency, much like it focused on the space race during the Cold War, to engage our youth in science, math, and technology.

Best Paper Awards

Dr. A. Michael Andrews II presented the 23rd Army Science Conference Best Paper Awards. The awards honored the authors of technical papers presented at the conference that were judged worthy of special acknowledgement for their outstanding quality.

Three papers were judged by scientific peers as representing the highest quality research presented at the conference. Authors of two of these papers received a bronze medallion, while the author of the paper judged as representing the overall best in Army research received the Paul A. Siple Memorial Award. Awardees are as follows:

- The winner of the 2000 Paul A. Siple Memorial Award was Dr. Eric Wetzel of the U.S. Army Research Laboratory (ARL) for his paper, *Advanced Body Armor Utilizing Shear Thickening Fluids*. Wetzel's co-authors are Y.S. Lee, R.G. Egres Jr., and N.J. Wagner of the Center for Composite Materials and Department of Chemical Engineering, University of Delaware.

- The first bronze medallion was awarded to Dr. William E. Bentley of the University of Maryland Biotechnology Institute for his paper, *Microbial Cell Factories: Cell-to-Cell Communication Plays a Key Role*. His co-authors are Matthew P. DeLisa of the Center for Biosystems Research, University of Maryland Biotechnology Institute, and Dr. James J. Valdes of SBCCOM.

- The second bronze medallion was awarded to Mike Powell of MesoSystems Technology Inc. for his

paper, *Ammonia-based Hydrogen Generation for Fuel Cell Power Supplies*. His co-authors are M.S. Fountain, C.J. Call, and A.S. Chellappa of MesoFuel Inc.

Fifteen papers were selected for recognition, and the authors and titles are as follows:

- Dr. Eric Wetzel, ARL, for his paper, *Advanced Body Armor Utilizing Shear Thickening Fluids*. Wetzel's co-authors are Y.S. Lee, R.G. Egres Jr., and N.J. Wagner of the Center for Composite Materials and Department of Chemical Engineering, University of Delaware.

- Dr. Michael Wraback, ARL, for his paper, *Fundamental Studies of Wide Bandgap Ultraviolet Optoelectronic Materials and Devices for the Objective Force*. Wraback's co-authors are H. Shen, G.A. Garrett, A.V. Sampath, C.J. Collins, S. Rudin, K. Aliberti, F. Semendy, and P.G. Newman.

- Dr. William Anderson, ARL, for his paper, *A Practical Approach to the Theoretical Prediction of Propellant Burning Rate*. Anderson's co-author is Martin S. Miller.

- Dr. Chad Roy of the U.S. Army Medical Research Institute of Infectious Diseases for his paper, *Inhalation as an Alternative Route of Delivery for Medical Countermeasures Against Biological Threat Agents*. Roy's co-authors are J.M. Hartings and M.L. Pitt of the U.S. Army Medical Research Institute and M. Bray of the National Institute of Allergy and Infectious Diseases.

- Dr. Jeffrey Jorgeson of the U.S. Army Engineer Research and Development Center (ERDC) for his paper, *Improving Response Time and Model Precision for Tactical Dam Breach Analyses with the Tele-engineering Toolkit*. Jorgeson's co-author is Larry Lynch, ERDC.

- Mike Powell of MesoSystems Technology Inc. for his paper,

Ammonia-based Hydrogen Generation for Fuel Cell Power Supplies. His co-authors are M.S. Fountain, C.J. Call, and A.S. Chellappa of MesoFuel Inc.

- Dr. Latha Kant of Telcordia Technology Inc., for his paper, *Fault Localization and Self-healing Mechanisms for FCS Networks*. His co-authors are A.S. Sethi and M. Steinder of Telcordia Technology Inc.

- Dr. Raju Namburu of ARL for his paper, *Computational Electromagnetic Methods for Combat Systems*. His co-authors are Eric Mark and Jerry A. Clarke of ARL.

- Michael Scanlon of ARL for his paper, *An Acoustic Sensor on the Soldier Monitors Physiology, Voice and Other Sounds for Situational Awareness*. His co-author is Latasha I. Solomon of ARL.

- Dr. Bradley Schilling of CECOM's Night Vision and Electronic Sensors Directorate for his paper, *Three-Dimensional Imaging of Obscured Targets by Multiple-Return Laser Radar*. His co-authors are Dallas N. Barr, Glen C. Templeton, Lawrence J. Mizerka, and C. Ward Trussell of CECOM's Night Vision and Electronic Sensors Directorate.

- Dr. William E. Bentley of the University of Maryland Biotechnology Institute for his paper, *Microbial Cell Factories: Cell-to-Cell Communication Plays a Key Role*. His co-authors are Matthew P. DeLisa of the Center for Biosystems Research, University of Maryland Biotechnology Institute, and Dr. James J. Valdes of SBCCOM.

- Dr. Jeff Wolfenstine of ARL for his paper, *Nano-scale Anodes for Use in Li-ION Batteries*. His co-authors are D. Foster, J. Read, and W.K. Behl of ARL.

- Jennifer Fowlkes of the University of Central Florida Institute for Simulation and Training for her paper, *Optimizing Haptics Percep-*

tions for Advanced Army Training Systems: Impacts on Performance. Her co-authors are Paula J. Durlach and Julie Drexler from the U.S. Army Research Institute for the Behavioral and Social Sciences, Jason Daly and Roberto Alberdeston from the University of Central Florida, and Chris Metevier of PEO, STRI.

- Martial Hebert of Carnegie Mellon University for his paper, *Evaluation and Comparison of Terrain Classification Techniques from LADAR Data for Autonomous Navigation*. His co-authors are Nicolas Vandapel, Stefan Keller, and Raghavendra Rao Donamukkala of the Robotics Institute at Carnegie Mellon University.

- Dr. John Baras of the University of Maryland Electrical and Computer Engineering Department for his paper, *On-Line Detection of Distributed Attacks from Space-Time Network Flow Patterns*. His co-authors are A.A. Cardenas and V. Ramezani of the University of Maryland.

Final Day's Agenda

The fourth and final day was devoted to three important topical panels: biotechnology, advanced computing, and combating terrorism. The biotechnology panel was chaired by Dr. Robert Campbell of the U.S. Army Research Office and co-chaired by Dr. Michael Ladisch of Purdue University. This panel was followed by the advanced computing panel, which was chaired by Dr. N. Rahdakrishnan of ARL and Dr. Vipin Kumar of the University of Minnesota. The conference ended with the combating terrorism panel chaired by LTG William Tangney (USA, Ret.) and co-chaired by Robert Touhy of Hicks and Associates Inc.

Other conference activities involved academic, government, and industry participation in 15 parallel technical sessions; 75 technical

paper oral presentations; and 300 poster presentations. Attendees viewed major technology displays at the conference, including the S&T Objective Force display that focused on transformational technologies and the high-performance computing display that showcased the latest computational tools and techniques essential to advancing Army transformation to the Objective Force.

Conclusion

Conference attendees unanimously agreed that the 2002 conference was the best ever. Army senior leadership, industry, and academia participation affirmed the critical role of S&T in Army transformation. The special efforts of the Army's S&T community and the support provided by AMC, ARL, the Army Corps of Engineers, the Army Medical Research Institute of Infectious Diseases, and the Army Space and Missile Defense Command were essential to making this an extraordinary event.

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