Highlights from DATAWorks 2019

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DATAWorks 2019 attracted a sold-out crowd of professionals from academic, government, and industry organizations for three days of communication, collaboration, and education. IDA helped organize DATAWorks—the Defense and Aerospace Test and Analysis Workshop—in collaboration with the Office of the Director of Operational Test and Evaluation in the Office of the Secretary of Defense, NASA, and the Section on Statistics in Defense and National Security (SDNS) of the American Statistical Association (ASA). Attendees included leadership and practitioners who provided keynote addresses, short courses and tutorials, panel discussions, breakout sessions, and poster presentations. Highlights follow.

https://youtu.be/x8ppqJsWtS0

Peter Parker, Team Lead, Advanced Measurement Systems, NASA); **Laura Freeman**, Associate Director, Information Systems Lab, Hume Center for National Security and Technology, Virginia Tech
Leveraging Statistical Engineering for Emerging Challenges

"[L]isten analytically to [leadership] about the problems they have, not the problems you think they should be solving."

"Solving complex challenges in defense, aerospace, and national security requires sustainable solutions based on data-driven methods combined with domain knowledge."

https://youtu.be/HtFJzua3xXM

Greg Zacharias, Chief Scientist for the Director of Operational Test and Evaluation in the Office of the Secretary of Defense
Emerging Technologies: Test and Evaluation Implications

"We need sequential [test and evaluation] throughout the development cycle at the very earliest concept."

Wendy Martinez, Director, Mathematical Statistics Research Center, Bureau of Labor Statistics, and ASA President-Elect
ASA Defense and National Security Task Force

Martinez sought real-time responses from attendees to survey questions about their areas of work and their ideas about the future of the ASA.

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T. Charles Clancy, Bradley Distinguished Professor in Cybersecurity at Virginia Tech

Advances in Artificial Intelligence and the Impact on Test and Evaluation (T&E)

Clancy spoke about promising advances in artificial intelligence (AI), highlighting lingering challenges and exploring how AI algorithms can be used to improve test and evaluation from concept through operation and maintenance.

https://youtu.be/WOyEuINqCKA

Andrew Flack, John Haman, and **Kevin Kirshenbaum**, IDA
Reproducible Research

Kirshenbaum explained why it is important to make the results of your research reproducible and how to prepare for reproducibility at the start of a new project. Haman discussed ways to use open source software such as Git and RStudio to perform analyses so that results are reproducible. Flack explored ways to achieve agile reporting in a way that minimizes opportunity for error, is easy to re-run when data changes, and matches your organization's format.

V. Bram Lillard and Rebecca M. Medlin, IDA
Bayesian Component Reliability Estimation: An F-35 Case Study

"A powerful feature of Bayesian analyses is the ability to combine…multiple sources of data and variability in an informed way to perform statistical inference. This feature is particularly valuable in assessing system reliability where testing is limited and only a small number of failures…are observed."

Heather Wojton, IDA
Developing Valid & Reliable Scales: An Intro to the Mind Reader's Toolbox

"Scaling is the process by which numbers are assigned to represent the quantities of psychological attributes. To appreciate the concept of scaling, you must understand: the meaning of numerals, how numerals can be used to represent psychological attributes, and problems associated with trying to connect numerals and psychological attributes."

Daniel Porter, IDA
Demystifying the Black Box: A Test Strategy for Autonomy

"The fundamental challenge of testing autonomy and AI is generalizing to unobserved situations. Testing should aim to develop a model of system decision-making and confirm the underlying capabilities."

Other topics presented by IDA researchers at DATAWorks 2019 include a simple, computational game engine for rapidly exploring hypotheses in Battle Management Command and Control by **Shelley Cazares**, satellite affordability in low Earth orbit by **Matthew Avery**, and a "boot camp" on statistics by **Kelly Avery**.

DATAWorks 2019 was held in Springfield, Virginia, on April 9–11. For more information, including biographies and presentations of these and other presenters, go to https://dataworks.testscience.org/.