DATAWorks
Defense and Aerospace Test and Analysis (DATA) Workshop

2020 Webinar Series

DATAWorks 2020

IDA organizers of DATAWorks 2020—originally scheduled for March 31 to April 2— found themselves scrambling for a solution when the planned venue closed to all but essential services in mid-March after the COVID-19 pandemic reached the United States. Instead of cancelling the event outright, organizers quickly pulled together a series of free webinars to run on a virtual platform.

Despite the absence of keynote speakers, poster sessions, and in-person discussions, the test and analysis community was pleased with DATAWorks 2020. Over 100 people attended each session with only a few hitches along the way. The highlights that follow include links to recordings or presentation materials where available. All the recorded DATAWorks 2020 sessions and other materials are available at https://testscience.org/archive/.

Gavin Jones, Sr., of SmartUQ introduced uncertainty quantification (UQ), a systematic process that explains what happens when a system is subjected to uncertain and variable inputs. Uncertainty in engineering analyses arises from measurement inaccuracies, material properties, boundary and initial conditions, and modeling approximations.
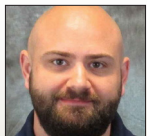
Caleb King and **Ryan Lekivetz** of the JMP Division of the SAS Institute gave a two-part tutorial on power calculations in modeling situations. The first part explores how to use R and JMP Pro to perform power calculations in complex modeling situations drawn from relevant defense

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applications. The second part illustrates how treating unknown effects as random variables in the case of categorical factors induces a distribution on statistical power, which can then be used as a new way to assess experimental designs.

Two presenters from Sandia National Laboratories spoke on machine learning in breakout sessions on April 17. In "Adoption Challenges in Artificial Intelligence and Machine Learning for Analytic Work Environments," **Laura McNamara** explains how innovation diffusion is used to decide whether to adopt an innovation. She applies innovation diffusion to algorithmic technologies, which have similar innovation challenges and need thoughtful, deliberate diffusion strategies. **David Stracuzzi** presented "The Role of Uncertainty Quantification in Machine Learning." His talk clarifies the data-driven uncertainty estimation task and identifies sources of uncertainty in machine learning from recent, application-driven research at Sandia.

Elliot Bartis of IDA presented "A Validation Case Study: The Environment Centric Weapons Analysis Facility," one of three talks presented on test design and validation. He describes the rigorous statistical design of experiments for the U.S. Navy's hardware-in-the-loop simulation at the Environment Centric Weapons Analysis Facility, decisions that put the facility on a path to predict torpedo effectiveness and supplement live operational testing, and metrics used to quantify uncertainty.

Daniel Porter of IDA spoke during one of three breakout sessions on software, human factors, and autonomy. He presented possible solutions to the catch-22 that occurs in simulated testing of fully autonomous systems. When verifying such systems, data is needed to obtain a decision-model, but a decision-model is needed to validly obtain data. (See also: IDA P-10768, *Trustworthy Autonomy: A Roadmap to Assurance, Part 1: System Effectiveness*.)

DATAWorks 2020 closed on May 29 with the mini-tutorial "Taking Down a Turret: Introduction to Cyber Operational Test and Evaluation" by Peter Mancini, Mark Herrera, Kelly Tran, Jason Schlup, and Lee Allison. In this clever and engaging talk, the creators of the Cyber Lab of IDA walked through the steps of using cyber tools like phishing, network scanning, password cracking, pivoting, and creating a mission effect to seize control of a Nerf turret set up to attack "enemy" co-workers.

DATAWorks 2021 is scheduled for April 12–14 at Gaylord National Resort and Convention Center, National Harbor, Maryland. Find out more at https://dataworks.testscience.org/.

Rebecca M. Medlin (rmedlin@ida.org) and **Macy Villalobos** (mvillalobos@ida.org) of the Operational Evaluation Division of IDA's Systems and Analyses Center were instrumental in making sure the work put into the originally planned DATAWorks 2020 event didn't go to waste. IDA and others in the defense test and evaluation community are grateful that they were able to virtually transform this event.