CONTINUING EDUCATION UNITS: AN I/ITSEC OPPORTUNITY

Continuing Education Units (CEU) were established in 1970 to create a unit of measurement to quantify continuing education and training activities. CEUs apply to technical and educational settings such as I/ITSEC. The primary focus of I/ITSEC is to highlight innovative implementation of simulation and education technologies as tools to achieve cost efficient training and increased military readiness. Therefore, CEUs are offered for all **Tutorials, Paper Sessions,** and the **Professional Development Workshops**. CEUs are being sponsored and maintained by the University of Central Florida, Division of Continuing Education.

WHY SHOULD I EARN CEUs AT I/ITSEC?

• Participation in the Tutorials, Papers and Professional Development Workshops for CEU credit reinforces your commitment to remain current in the evolving technologies relating to training and simulation.

• The CEU transcript indicates your active participation in the technical program of the conference to your employer.

• Previous attendees have indicated that CEUs have assisted them in securing approval to attend the conference.

WHAT SESSIONS ARE CEU–ELIGIBLE?

• All Tutorials, Papers, and Professional Development Workshops are CEU-eligible.

WHO MAY ATTEND THESE EVENTS?

• Tutorials and Professional Development Workshops are open to everyone. The Paper Sessions are limited to registered conference attendees.

• Does attending mean I automatically receive CEU credits? No. You have to let us know, via your registration, that you are interested in the credits. There is no charge for Paid Conference Attendees. However, if you are in an unpaid category (i.e., Exhibitor Personnel) there is a $50 charge, payable during registration. You may also register separately for the CEUs if you missed this step in your conference registration process.

HOW DO I RECEIVE CEUs AT I/ITSEC?

1. Be sure you are appropriately registered (you can confirm when you check in onsite) for CEU credits.

2. Be sure to have your conference badge scanned by a conference volunteer at each session you attend. Attendance is recorded electronically and required for CEU credit.

3. Your CEU transcript will come to you via the University of Central Florida, Division of Continuing Education. Ten contact hours equate to one CEU credit.

Contact Carol Dwyer at cdwyer@NTSA.org or (703) 247-9471 for additional information.

CONTINUOUS LEARNING POINTS (CLPs)

The U.S. Department of Defense (DoD) acquisition workforce members are expected to earn Continuous Learning Points (CLPs) to stay current in leadership and functional acquisition skills that augment the minimum education, training, and experience standards established for certification purposes within their acquisition career fields. It is each acquisition member's responsibility to meet the goal of 40 CLPs each year and to meet the mandatory requirement of 80 CLPs every two years. Acquisition Professional Activities are allowed to count toward CLPs. CLPs are awarded in accordance with DoD-wide guidelines as augmented by Service-specific policies. I/ITSEC provides an excellent opportunity for the DoD acquisition workforce members to earn mandatory CLPs.

ROOM	0830 – 1000	1030 – 1200	1245 – 1415
BEST TUTORIAL NOMINEES			CHAIR: LEE LACY, SOAR TECHNOLOGY, LLC
W300 – THEATRE	A History of Games for Military Training: From Sheep Knuckles to the Metaverse 23T17	Behind the Screams: M&S Anatomy and Decomposition of a Contemporary Ride System Attraction 23T19	Putting the When and Where into Simulations 23T68
TUT 1: YOU CAN FIGHT AUTHORITY – BUT AUTHORITY ALWAYS WINS			CHAIR: STEVE PARRISH, EMS
W307B	Illuminating the ATO Process – Lessons Learned the Hard Way 23T31	Keeping Up With U.S. Export Controls in 2023 23T26	
TUT 2: LVC – TWO OUT OF THREE AIN'T BAD			CHAIR: STEVE MONSON, THE BOEING COMPANY
W305 AB	Introduction to Defense Modeling and Simulation 23T32	Live, Virtual and Constructive (LVC) Interoperability 101 23T38	A Process for Distributed LVC Integration and Execution 23T28
TUT 3: THE EXPERIENCE MATTERS			CHAIR: RAMONA SHIRES, APTIMA, INC.
W306 AB	Machine Learning and the Benefits of Applying it to XR Training Systems 23T45	How to Build at War Time Resilient Online Learning System 23T34	Getting UX – Understanding UX and How to Acquire It 23T67
TUT 4: DISTRIBUTED SIMULATION PROTOCOLS			CHAIR: AARON JUDY, NAWCTSD
W307C	IEEE 1278TM Standard for Distributed Interactive Simulation (DIS): Concepts and Techniques 23T41	Introduction to HLA 4 23T36	Using OMG DDS for Secure Interoperability Between Multiple Distributed LVC Simulators 23T21
TUT 5: MANAGING LEARNING DATA – xAPI ESSENTIALS AND STRATEGIES			CHAIR: ROY SCRUDDER, APPLIED RESEARCH LABS, THE UNIVERSITY OF TEXAS AT AUSTIN
W307D	Modernize Your Training by Migrating Legacy SCORM Content to cmi5 23T29	Implementation Strategies for Creating a Sustainable xAPI Data Strategy 23T54	Creating a Data Strategy and Learning Analytics 23T30
TUT 6: EXTENDED REALITY ON THE MOVE – SEEING IS BELIEVING			CHAIR: TARA KILCULLEN, ZYGOS CONSULTING
W308A	Transportation Systems: A Survey of M&S Applications in Mobility, Sustainability, and Logistics 23T18	Evolution of RF Signal Visualization from Spectrum Analyzers to Augmented Reality 23T33	Driving Proficiency through Mobile, Immersive, Hands-on eXtended Reality (XR) Training 23T47
TUT 7: ACORN TO OAK: STRONG CONCEPT, ACCREDITED EVENT			CHAIR: JOHN DIEM, BUSH COMBAT DEVELOPMENT COMPLEX – TEXAS A&M UNIVERSITY
W308B	Simulation Conceptual Modeling Theory and Application 23T12	Making the Case: Building Strong M&S Verification and Validation Evidence 23T35	Accreditation of Simulation-Based Experiments: Beyond the M&S 23T22
TUT 8: HUMANS NEED NOT APPLY			CHAIR: ROB LECHNER, THE BOEING COMPANY
W308C	Machine Learning: An Introduction for Humans 23T37	Building Trusted AI: An Introduction to Human-AI Trust 23T39	Generative AI Applied to Rapid Development of Simulation and Modeling Assets 23T52
TUT 9: CREATING THE RIGHT ENVIRONMENT			CHAIR: JEFFREY RAVER, SAIC
W308D	Digital Engineering Basic Principles 23T23	Finding Fidelity: When You Need It, When It's Too Much, and How to Optimize Simulations for High Training Effect and Low Cost 23T20	Introduction to Design of Experiments 23T69
TUT 10: INTERSECTION OF LEARNING ENGINEERING AND DATA			CHAIR: SCOTT HOOPER, BOHEMIA INTERACTIVE SIMULATIONS
W307A	Practical Guide to Learning Engineering 23T25	Managing Learning Resources Through Use of Metadata Standards 23T27	

0830 – 1000

BEST TUTORIAL NOMINEES
0830 – 1000 • W300 – THEATRE

A HISTORY OF GAMES FOR MILITARY TRAINING: FROM SHEEP KNUCKLES TO THE METAVERSE
23T17

There is evidence of games being used for business trade, future prediction, and military strategy for at least 5,000 years. In this tutorial we explore the history of games as tools of military strategy, planning, and training from 3,000BC to the present. We reveal the long evolution of the basic components that are necessary to create a complex game. Concepts that first emerged in India and Asia at the end of the last millennia are still embedded in the games that we create today. Finally we explore how the evolution of serious games shows a trajectory for where games in modelling and simulation are headed, including digital twins, global mobile connectivity, virtual and augmented reality, the rise of generalizable artificial intelligence, automatic content generation, and the metaverse.

The tutorial has four major sections:

(1) Ancient games from 3,000BC to 500AD, with a focus on the essential mechanics and the emergence of game pieces and rules.

(2) Modern game design and early computer implementations from 500AD to 1980AD, in which the mathematics of wargames emerged and offered a format that was amenable to programming in the earliest analog computers of the 1940s through 1980s workstations.

(3) Serious games and the recent embrace of the technology by military leaders at all levels from 1980 to the present. In these last forty years computer-based games have been transformed from crude experiments with the technology to a major workhorse for training in all domains and at all echelons.

(4) Finally, we speculate on the possible future impacts of the metaverse, digital twins, AI, and global mobile connectivity.

PRESENTERS
ROGER SMITH, PH.D., Modelbenders, LLC
PETER SMITH, PH.D., UCF

TUT 1: YOU CAN FIGHT AUTHORITY – BUT AUTHORITY ALWAYS WINS
0830 – 1000 • W307A

ILLUMINATING THE ATO PROCESS – LESSONS LEARNED THE HARD WAY
23T31

Authorization to Operate (ATO) — a mythical unicorn for some, a holy grail to most, and a regular occurrence for those who recognize the difference between vulnerable and exploitable. ATO at its core is simply an official declaration made by an authorizing official (AO) to allow a system to operate within their boundary. To achieve ATO, the security posture of the system must be rigorously documented, evaluated and approved. Earning ATO often takes years and generally millions of dollars. ATO is the critical milestone for all systems that seek to become operational in the DoD. In accordance with policy, whenever a new software application or system is being considered for DoD use, the security posture is evaluated from inception through fielding to ensure that ATO can be achieved. Unfortunately, stakeholders often ignore security leading to insurmountable blockers, specifically for those that are transitioning from the commercial sector to DoD use.

It is critical for companies to include security within their early design and architecture. Adversarial threats in a firm's code and tech stack will likely result in ATO being denied and require the firm to rework the entire architecture to remove and replace the offending code - leading to additional development, delays, and money wasted. In this vein, the lack of ATO inclusion can perpetuate the "Valley of Death" for small business and pose a significant roadblock in transitioning from research and development to operations and sustainment. This tutorial aims to encourage all attendees to become familiar with the authorization process before development of a new system / technology begins.

This presentation will discuss: i) what an ATO is, different types of ATOs, and associated security constructs, ii) the roles and responsibilities of everyone that plays a part in the ATO process - from government to industry, iii) where to start with an ATO and all the steps a company needs to take to achieve it, iv) tips and tricks for shortening the time and effort required to achieve ATO through a Certificate to Field or Cyber Impact Analysis, v) lessons learned from a small business who recently achieved ATO, vi) ATO reciprocity and how to make your ATO work across the DoD, and vii) how to maintain your ATO. By the end of this tutorial, attendees will be able to describe the steps needed to achieve an ATO.

PRESENTERS
VICTORIA CLAYPOOLE, PH.D., Dynepic, Inc.
GEORGE MOATS, Dynepic, Inc.
POWELL CRIDER, AETC/A9

TUT 2: LVC – TWO OUT OF THREE AIN'T BAD
0830 – 1000 • W305AB

INTRODUCTION TO DEFENSE MODELING AND SIMULATION
23T32

This tutorial will describe the fundamental technologies, terms and concepts associated with Defense Modeling and Simulation (M&S) as used in the U.S. Department of Defense (DoD) and in the larger Defense community. The tutorial will cover key M&S terms and concepts that describe M&S technology, development, and application. It will include: (a) M&S terminology and concepts; (b) M&S technology, architectures, and interoperability protocols; and (c) The processes for developing valid representations of: DoD warfighting capabilities, threat capabilities, complex systems, and mission environments. The attendee will become familiar with how M&S is used in the DoD for operational purposes - especially training and other areas of direct warfighter support. The tutorial will highlight the role of Verification, Validation and Accreditation (VV&A) in ensuring credible models and simulations meet the needs of their users, the use of M&S standards, and the integration of M&S with DoD Mission Engineering and Digital Engineering in the development and acquisition of DoD warfighting capabilities. The tutorial will describe the characteristics and associated challenges of M&S application within DoD functional areas including Training, Analysis, Acquisition, Test and Evaluation, Planning, Medical, Mission Engineering, Autonomy, Artificial Intelligence, DoD Research and Development/Employment, and Intelligence. The tutorial will also identify accessible M&S information resources; U.S. Government/DoD, International, Academia, and Industry.

PRESENTERS
JOHN DALY, Booz Allen Hamilton
JAMES COOLAHAN, PH.D., Coolahan Associates, LLC

MACHINE LEARNING AND THE BENEFITS OF APPLYING IT TO XR TRAINING SYSTEMS

23T45

According to Defense Secretary Lloyd Austin, the Department of Defense is making artificial intelligence (AI) research a "top priority" by investing approximately $1.5 billion in AI projects over the next five years at the Defense Advanced Research Project Agency (DARPA). Machine learning (ML), a subfield of AI, has quickly become critical in fields such as engineering, learning association, and medicine due to its ability to produce adaptable models that can perform a variety of complex tasks. Recently, ML has been leveraged to produce enormous benefits in extended reality (XR) enabled environments including education and training. However, understanding the vast field of ML and its utilization in training systems can be extremely challenging. Miscomprehension can lead to poor management and development activities that result in more costly and underwhelming training solutions. Grasping ML fundamentals and emerging concepts, and its application to XR will empower managers to make appropriate strategic and costing decisions and allow designers, developers, and engineers to successfully implement effective training systems.

This tutorial will expand on last year's overview of ML technologies to include emerging concepts, methods, software, and hardware, while detailing how these can be integrated into XR education and training environments. The presentation will highlight examples demonstrating ML's use in design, testing, and optimizing XR training systems with a variety of simulation engines and hardware devices. Additionally, this tutorial will evaluate each example's efficacy of incorporating the technology to aide in warfighter training by improving efficiency, reducing costs and training time, and sustainability.

This tutorial is for a wide range of stakeholders from those interested in gaining a basic understanding of ML for administrative level decision making to those who want detailed methods and integrations within XR-enabled training environments to gain specific performance improvements.

PRESENTERS
ADAM KOHL, Iowa State University
ELIOT WINER, PH.D., Iowa State University

IEEE 1278TM STANDARD FOR DISTRIBUTED INTERACTIVE SIMULATION (DIS): CONCEPTS AND TECHNIQUES

23T41

As any gamer will tell you, it is compelling to connect simulations and play with other actual human participants, whether in the next room or on the next continent. Distributed Interactive Simulation (DIS) is an enabling technology that connects military training and engineering simulations for that purpose.

Successful research in the 1980s led to an international effort to standardize a network protocol for linking military training and engineering simulations. DIS was the result, using the IEEE standards process to create a technically sound and widely accepted protocol. IEEE 1278TM-1995 and additions in 1998 were the first full DIS standards that contained the protocol and rules for real-time simulation interoperability of military land, sea, and air platforms, weapon interactions, radar, radio, IFF, laser designators, underwater acoustics, logistics, simulation management functions, and more.

The success of DIS expanded into the Simulation Interoperability Standards Organization (SISO) in 1996. SISO took over the development of the DIS standard and launched a much wider range of simulation standards. The 2000s saw the development of the next round of improvements, resulting in IEEE 1278.1TM-2012. Continuing development within SISO is working toward the next version, referred to as Version 8, expected to be completed in the mid-2020s.

This tutorial explains how DIS achieves real-time high-fidelity interoperability over best-effort networks. The basic concept and some of the technical details will be introduced to give students a foundation for starting and expanding the implementation and use DIS in their simulations. The standards process, history, and future directions of DIS are also presented. Emphasis on DIS Version 8 will review current developments and upcoming improvements to the DIS standard.

PRESENTER
ROBERT MURRAY, SimPhonics

MODERNIZE YOUR TRAINING BY MIGRATING LEGACY SCORM CONTENT TO CMI5

23T29

The learning and training landscape is changing rapidly with newer technologies emerging. While SCORM (Sharable Content Object Reference Model) has been the de facto eLearning industry standard, SCORM has not been extensible enough to support these technologies and does not provide enough guidance on capturing robust learner performance data.

Making the transition from SCORM to the more flexible Experience Application Programming Interface (xAPI) specification is key to supporting the vision and goals for modernizing learning within the Department of Defense while meeting the distributed learning policy (DoDI 1322.26) related to learning analytics and interoperability. SCORM and xAPI can be implemented together, but the divide is wide.

The cmi5 specification was released in 2016 to help bridge the gap and define a set of rules for how online courses are imported, launched, and tracked using an LMS and xAPI. While cmi5 presents a promising solution, adoption across the DoD has been slow, but now there are tools and templates that are freely available from ADL to help migrate legacy content to the improved cmi5 specification.

In 2020, The Advanced Distributed Learning (ADL) Initiative awarded Rustici Software a contract to design and build tools to aid in the adoption of cmi5, including sample cmi5 course templates to aid in converting legacy content and a cmi5 Content Test Suite, known as cmi5 Advanced Testing Application and Player Underpinning Learning Technologies (cmi5 CATAPULT).

This tutorial will help attendees better understand how to utilize cmi5 and the freely available course templates from cmi5 CATAPULT to migrate, create, and test their courseware to ensure they conform to the cmi5 specification. After an introduction to cmi5, where it fits into the Total Learning Architecture

(TLA), and why eLearning standards are a necessary component of modern learning ecosystems, this tutorial will walk attendees through converting legacy SCORM content to cmi5 using the sample course templates and describe the importance of testing in ADL's cmi5 Content Test Suite.

The cmi5 specification plays an important role in the DoD's learning modernization, facilitating progress in migrating from SCORM-based LMS-centric courseware to a distributed learning "ecosystem" that delivers diverse learning opportunities across federated platforms. With the cmi5 Conformance Test Suite and example course templates, there are now ways to validate that content conforms to the cmi5 specification and migrate existing legacy courseware, which will help increase adoption of the specification and move toward the DoD's TLA goals.

PRESENTER
BRIAN MILLER, Rustici Software

TUT 6: EXTENDED REALITY ON THE MOVE – SEEING IS BELIEVING
0830 – 1000 • W308A

TRANSPORTATION SYSTEMS: A SURVEY OF M&S APPLICATIONS IN MOBILITY, SUSTAINABILITY, AND LOGISTICS
23T18

Mobility (of people, goods, services) is an urgent bipartisan concern that impacts all humans on this planet. The vitality and well-being of a nation is reliant upon a well-organized transport system and supporting multimodal (e.g., pedestrians, bicycles, cars, trucks, buses, airplanes, trains, trams) infrastructure. For transportation applications ranging from ground vehicles (i.e., both manual and automated), flight vehicles (e.g., conventional aircraft, and automated drones), maritime vessels, and next-generation mechanisms for human mobility, advanced physics-based models and high-fidelity simulation implementations remain essential for ongoing applications in research, training, and education to advance and evolve our "transportation network of tomorrow.

In this 90-minute Tutorial, an apprentice-level overview of vehicle-based Modeling & Simulation (M&S) will be provided, with a focus on diverse applications in transportation systems. A high-level overview of common modeling methods will be presented with a targeted focus on timely and diverse aspects of human mobility, multimodal transportation, sustainability, diverse vehicle (i.e., land/air/sea) dynamics essentials, as well as the global supply chain and logistics. The NTSA-endorsed Certified Modeling & Simulation Professional (CMSP) curriculum will be closely adhered to, and this Tutorial will serve as a broad introduction to many core/fundamental M&S topics and techniques (e.g., Physics-based, Stochastic, Monte Carlo, Continuous simulation, Discrete-events, Human behavior, and Multi-resolution models) that are featured on the certification exam. Numerous modeling methods will be demonstrated by way of practical and media-driven examples and use cases, all of which will be verbally described (for context), mathematically modeled, and demonstrated by way of media-based simulation.

PRESENTER
KEVIN HULME, PH.D., CMSP, The Stephen Still Institute for Sustainable Transportation and Logistics (SSISTL)

TUT 7: ACORN TO OAK: STRONG CONCEPT, ACCREDITED EVENT
0830 – 1000 • W308B

SIMULATION CONCEPTUAL MODELING THEORY AND APPLICATION
23T12

Simulation Conceptual Modeling Simulation conceptual modeling is a critical step in simulation development frequently overlooked in the rush to demonstrate program progress. A simulation conceptual model is an abstraction from either the existing or a notional physical world that serves as a frame of reference for further simulation development by documenting simulation-independent views of important entities and their key actions and interactions. A simulation conceptual model describes what the simulation will represent, the assumptions limiting those representations, and other capabilities needed to satisfy the stakeholder's requirements. It bridges between these requirements and simulation design. It can bound the systems engineering problem and provide valuable artifacts for simulation validation, verification, and accreditation. The emergence of Model Based System Engineering (MBSE) has accentuated the need for well-formed simulation conceptual models. This tutorial will present the theory and application of simulation conceptual modeling as documented during the research done by the NATO MSG 058. In addition, Use Cases that have been drawn from previous conference presentations will be presented to illustrate how conceptual modeling has been performed. Additional work is necessary to mature the state-of-the-art of simulation conceptual modeling before a recommended practices guide could be standardized. This tutorial has been created to continue the maturation of the simulation conceptual modeling best practices. Presenter: Jake Borah is the Co-owner of Borah Enterprises LLC. He is a Senior Operational Research, Modeling and Simulation Analyst supporting the Air Force Operational Test and Evaluation Center, Detachment 2. Jake is a Charter Certified Modeling and Simulation Professional (CMSP). He has frequently supported US and Canadian government sponsored military simulation projects because of his mastery of the M&S technology, and expertise in High Level Architecture federation development. Jake has a BS from the United States Air Force Academy and a Master of Aeronautical Science degree from Embry-Riddle Aeronautical University.

PRESENTER
JAKE BORAH, Borah Enterprises LLC

TUT 8: HUMANS NEED NOT APPLY
0830 – 1000 • W308C

MACHINE LEARNING: AN INTRODUCTION FOR HUMANS
23T37

The modern digital world imposes key constraints and opportunities on how best to sustain a global force. On the one hand, the scale of available digital data and the pace of technological change demand solutions that can adapt quickly to massive amounts of data and rapid development of new capabilities. On the other hand, the increased digitization of information provides opportunities to exploit these enormous amounts of data, if only adequate technology can be employed to exploit the data. One of the best emerging candidates for exploit-

ing this data is the rapidly advancing field of machine learning. The ability to automatically extract lessons and patterns from large amounts of data has the potential to be an essential force multiplier for improving effectiveness and rapid adaptation of training, simulation, and education.

The field of Machine Learning (ML) began in the 1950s, and it became a major, widespread research area in the 1980s. Over the past 10-20 years, innovations in computer hardware, computer languages, computer memory, and new algorithms have kicked off a rapid escalation in the capabilities of ML systems. As a result, the common refrain from stakeholders is "I want my system to learn!" But what does it really mean for a system be able to learn? When is it a good idea and when is it not? What kinds of things are computers good at learning, and where are there still weaknesses? How does this all work, really?

This tutorial abstracts away from the mathematical and computational details to offer a high-level understanding of "How ML Works", as well as its capabilities, strengths, and weaknesses, The tutorial presents the broad categories of learning that current ML approaches address, together with examples that provide an intuitive feel for how each approach is able to work, without delving into the specifics of the complicated math that provides much of the "magic". The tutorial also investigates the "art" behind the science, introducing the work an ML practitioner needs to add to apply these powerful algorithms successfully to new problems.

The tutorial finishes by summarizing some of the types of human learning that are still on the ML frontier, waiting to be understood and conquered, as well as an overview of methods to decide which parts of your problem might be best suited to NON-learning algorithms.

PRESENTER
RANDOLPH JONES, PH.D., CMSP, Soar Technology, LLC

DIGITAL ENGINEERING BASIC PRINCIPLES
23T23

The Digital Engineering Basic Principles tutorial will describe foundational terms and concepts associated with Digital Engineering. The tutorial will provide an overview, of the development and application in the Department of Defense (DoD) of:(a) Digital Engineering terminology and concepts used in the Department of Defense (DoD),(b) Digital Engineering technology, architectures and standards and their role in enabling key functions in the DoD, (c) the processes for developing valid models, simulations, "authoritative source of truth" that captures the current state and history of a system's technical baseline [clarifying words taken from the DoD Digital Engineering Strategy], and the supporting Digital Engineering ecosystem. Attendees will become familiar with Digital Engineering methods emerging in the DoD that support product development activities to include: the development and delivery of training and other areas of direct warfighter support; and DoD acquisition support. This tutorial will identify key policies, procedures, guidance; the need for Verification, Validation and Accreditation (VV&A) in ensuring that models meet the needs of their users; and curation for models to be trusted for use and reuse.

This tutorial will describe the characteristics and associated challenges of Digital Engineering use in: Test and Evaluation, Autonomy, Mission Engineering,

DoD Research and Development/Acquisition and Manufacturing. It will also show the key role Digital Engineering has in developing capabilities that support training, maintenance and DoD operations. The tutorial will also identify accessible DoD Digital Engineering information resources and explain the role of the Office of the Under Secretary of Defense for Research and Engineering (OUSD (R&E)) Digital Engineering and Modeling and Simulation Enterprise, which is the focal point of DoD Digital Engineering, Modeling, and Simulation information, practice, technology, and functional use.

As an outcome of this tutorial, the learner should be able to understand Digital Engineering fundamentals that will help them to get started. The learner will further their understanding of key terms and concepts and how they are being applied. The tutorial will also aid learners in driving digital engineer principles and practices into digital transformation initiatives.

PRESENTERS
FRANK SALVATORE, SAIC
DARRYL HOWELL, PCG Solutions
KEITH HENRY, OUSD R&E Digital Engineering Modeling & Simulation

PRACTICAL GUIDE TO LEARNING ENGINEERING
23T25

NOTE: This tutorial recieved the 2022 I/ITSEC Best Tutorial award.

The goal of science is to discover the truth about the world as it is. The goal of engineering is to create scalable solutions to problems using science as one tool in that endeavor. Learning engineering is a process and practice that applies the learning sciences, using human-centered engineering design methodologies and data-informed decision-making, to support learners and their development.

Learning engineering brings together professionals from different fields, including the learning sciences, assessment, learning experience design, software engineering, and data science. Learning engineers design learning experiences, but that's not all they do. They also address the contexts and conditions that lead to great learning. These might include the architecture of physical or virtual learning environments, social structures, and learners' mindsets as well as more obvious targets such as curriculum design, educational technology, and learning analytics.

This tutorial introduces learning engineering, starting with its definition, purpose, and foundations. Next it covers the core components, including the learning engineering process model and the field's primary contributing disciplines: learning sciences, human-centered design, engineering, data collection, data analytics, and ethical design. This initial portion of this tutorial will give attendees a solid understanding of the discipline as well as its definitions, utility, and distinctions from related fields. We will use real-world case studies throughout to illustrate concepts.

Following this, we will outline the steps practitioners can use to form learning engineering teams and to execute applied learning engineering processes. This portion will include tools and recommended practices for uncovering learning challenges, assembling and managing lean-agile learning engineering teams, creating human-centered designs, integrating learning science, moti-

vating learning, implementing learning technology (particularly at scale), instrumenting learning for data, and using learning analytics to continuously improve outcomes.

PRESENTERS
SAE SCHATZ, PH.D., The Knowledge Forge, LLC
JIM GOODELL, Quality Information Partners

1030 – 1200
BEST TUTORIAL NOMINEES
1030 – 1200 • W300 – THEATRE

BEHIND THE SCREAMS: M&S ANATOMY AND DECOMPOSITION OF A CONTEMPORARY RIDE SYSTEM ATTRACTION
23T19

Edwin A. Link is widely regarded as the archetype of modern-day flight simulation. In 1929, his LINK trainer was the first commercially developed simulation aviation trainer that has since been designated as an Historic Mechanical Engineering Landmark. Link's key innovation shaped the landscape for what has become a standardized and widely embraced platform for high-fidelity training. Such systems are now commonplace across multiple foundational disciplines at I/ITSEC, including flight, driving, maritime, and others. A related fact is that the Link trainer was patented primarily as a flight trainer - but co-patented as an amusement device. The Link team instantly recognized that their innovative (and engaging) training system could also be implemented for leisure purposes; a prophetic concept, considering the technological state-of-the-art from that period. Now, almost one hundred years later, a powerful cross-synergy continues to exist between serious-minded M&S training applications and industry-leading simulator-based entertainment experiences – a notion that serves as the overarching impetus for this Tutorial.

In this timely "emerging technologies" presentation, we take a deep dive behind the screams into a recent and revolutionary simulator attraction located at the Walt Disney World Hollywood Studios (Orlando) theme park – Rise of the Resistance. Themed after the Star Wars franchise, Rise of the Resistance is a marquee, technologically groundbreaking multisensory attraction that includes several ride system innovations, motion system components, and industry firsts, including: i) a turntable simulator; ii) trackless planar motion; iii) large-screen immersive 6-DOF platform simulation; and iv) a ride finale that includes a freefall drop segment, never experienced previously on a ride simulator. This Tutorial will describe the end-to-end ride experience (and underlying M&S technologies) and will highlight broader impacts -- dating back to its Link Trainer origins — associated with the state-of-the-art implementation. The Tutorial concludes with a preview of what is to come in the simulator entertainment sector, based upon both I/ITSEC innovative concepts and current patent technologies made publicly available within recent literature.

PRESENTER
KEVIN HULME, PH.D., CMSP, The Stephen Still Institute for Sustainable Transportation and Logistics (SSISTL)

TUT 1: YOU CAN FIGHT AUTHORITY – BUT AUTHORITY ALWAYS WINS
1030 – 1200 • W307B

KEEPING UP WITH U.S. EXPORT CONTROLS IN 2023
23T26

The constantly changing dynamic of global politics have resulted in many changes to U.S. export controls in recent years. New U.S. policies towards Russia and China, as well as other countries, are reflected in changes to the Export Administration Regulations (EAR) and the International Traffic in Arms Regulations (ITAR). In addition, there have been changes to the ITAR to reorganize the structure of the regulations resulting in new definitions and updates. This tutorial will provide an understanding of the EAR and ITAR and the impact of the recent changes on the regulations and the export of controlled goods, technologies and services. There will be particular focus on how the regulations apply to the simulation industry, including controls on software, hardware, services and activities at trade shows such as I/ITSEC. Presenters will discuss examples of simulations products and services, and associated licensing strategies, in the current regulatory environment.

PRESENTER
DARREN RILEY, Riley Trade Law PLLC

TUT 2: LVC – TWO OUT OF THREE AIN'T BAD
1030 – 1200 • W305AB

LIVE, VIRTUAL AND CONSTRUCTIVE (LVC) INTEROPERABILITY 101
23T38

The purpose of this tutorial is to provide managers the necessary insight needed to support intelligent decision making when employing LVC to solve their needs. The tutorial will discuss the various solutions and domains of the technology and how it can potentially support their LVC needs. The tutorial provides a relevant use case as the mechanism to explain the concepts and the solutions required to achieve success. The tutorial will not be an in-depth technology review of LVC interoperability yet will provide sufficient management-level insight into interoperability solutions and standards like Distributed Interactive Simulation (DIS), High Level Architecture (HLA), and the Test and Training Enabling Architecture (TENA) product line.

PRESENTERS
KURT LESSMANN, Trideum Corporation
DAMON CURRY, Pitch Technologies US

TUT 3: THE EXPERIENCE MATTERS
1030 – 1200 • W306AB

HOW TO BUILD AT WAR TIME RESILIENT ONLINE LEARNING SYSTEM
23T34

The war in Ukraine shows us the importance of maintaining the ability to educate and train (new) military personnel in time of war. The Armed Forces of Ukraine (UA) have a robust online system that is a vital part of their educational system. For more than 10 years the Norwegian Defence University Col-

lege (NDUC) and NATO Defence Education Enhancement Program (DEEP) have worked together with the National Defence University of Ukraine named after Ivan Chernyakhovskyi (NDUU) to establish a resilient UA online learning system.

The efficiency of the UKR ADL system was proven during annual evaluation visits (2020 and 2021) conducted online during the COVID lockdown. Of importance is to stress the UKR input as far as the development of the NATO DEEP Strategy for Distance Learning Support is concerned. So, it means that this system has already been proven under pandemic conditions and now in the time of war.

From September 2013 to February 2023, total 145 ADL-focused NATO DEEP events were conducted, involving 1800+ Ukrainian participants. Such formats were introduced as postgraduate studies ""e-Teacher and e-Instructor within a new learning environment caused by COVID-19"", e-Instructor Certification Program, and dedicated projects: Computer Adaptive Language Testing - CALT, translation of the NATO and Norwegian ADL courses into Ukrainian, involving SMEs from UKR (i.e. Cyber Defence Awareness - CDA), and translation of the book ""Modernizing Learning"" into Ukrainian.

This tutorial will tell the story on how NDUC, NATO DEEP and NDUU for several years have planned and executed the project of establishing this vital capability for Ukraine. Furthermore, the tutorial will cover the strategy applied to reach these goals, courses and training needed to get a resilient online learning system and the technical solution and security aspects. How the online learning system is used in war to enhance military capability and how Ukraine has cooperated with international partners will be outlined during the presentation. The online system will also be presented and at the end NDUC, NATO DEEP and NDUC will cover lessons learned and recommendations from a long-time cooperation process, also introducing innovative solutions, based on XR/AI technologies.

PRESENTERS
GEIR ISAKSEN, Norwegian Defense University College/ ADL office
MAKSYM TYSCHENKO, National Defense University of Ukraine
SERHII SALKUTSAN, Ukrainian Armed Forces
PIOTR GAWLICZEK, University of Warmia and Mazury

TUT 4: DISTRIBUTED SIMULATION PROTOCOLS
1030 – 1200 • W307C

INTRODUCTION TO HLA 4
23T36

The High-Level Architecture (HLA) is the leading international standard for simulation interoperability. It originated in the defense communities but is increasingly used in other domains. This tutorial gives an introduction to the HLA standard in general and the new HLA 4 version in particular. It describes the requirements for interoperability, flexibility, composability and reuse and how HLA meets them. It also describes the new features of the most recent version: HLA 4, such as security, scalability and cloud deployment. Finally, it provides some recent experiences of the use of HLA in NATO M&S groups as well as an overview of recent evolution of Federation Object Models for military platform simulation, space simulation, cyber simulation and air traffic control simulation.

This tutorial is intended for all audiences; however, some familiarity with basic principles of distributed computing is recommended.

PRESENTERS
BJORN MOLLER, Pitch Technologies
KATHERINE MORSE, PH.D., CMSP, The Johns Hopkins University Applied Physics Laboratory

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TUT 5: MANAGING LEARNING DATA – xAPI ESSENTIALS AND STRATEGIES
1030 – 1200 • W307D

IMPLEMENTATION STRATEGIES FOR CREATING A SUSTAINABLE xAPI DATA STRATEGY
23T54

The xAPI specification is due to be approved as a standard under the Institute of Electrical and Electronics Engineers (IEEE) Learning Technology Standards Committee (LTSC) in 2023. Department of Defense (DoD) Instruction 1322.26 recommends the Experience Application Programming Interface (xAPI) data specification as the primary method for encoding and exchanging interoperable learner performance data across the DoD enterprise. xAPI statements are a form of JavaScript Object Notation (JSON), a common data format used across industry and government.

While xAPI can encode data about formal learning experiences, it also can support informal learning, such as on-the-job training, self-directed learning in work environments, or even student engagement in virtual classrooms. But because xAPI enables such broad data interoperability it presents a complex challenge in the design phase and in implementation. The creation of an xAPI data strategy helps establish the business rules for how xAPI is used across organizations to collect and interpret learner data from different digital learning systems.

This tutorial will focus on the tools, technologies, and processes for implementing xAPI to meet organization-wide objectives. While some attention will necessarily be placed on the instrumentation of learning activities with xAPI, the primary focus of this tutorial is lessons-learned on how to implement best practices so that learner data is Visible, Accessible, Understandable, Linked, Trustworthy, Interoperable, and Secure (VAULTIS).

Each organization within the DoD has its own unique challenges when implementing xAPI. Attendees of this tutorial will work through different use-cases to illustrate the value of an xAPI data strategy. Attendees will walk away with actionable knowledge about how to use xAPI profiles to continuously improve organizational insights into the wide range of digital learning systems.

PRESENTERS
FLORIAN TOLK, Advanced Distributed Learning Initiative
ELIZABETH BRADLEY, Liz Bradley Art & Design

EVOLUTION OF RF SIGNAL VISUALIZATION FROM SPECTRUM ANALYZERS TO AUGMENTED REALITY
23T33

We are surrounded by invisible radio frequency signals created by human technology like radio, cellular, and satellite. Traditionally, we see these signals through spectrum analyzers. However, the capabilities of existing analysis tools are being outpaced by the rapid modernization of wireless networks and topologies like 5G, IoT, Bluetooth, LoRa, etc. RF is inherently multidimensional, but conventional analyzers display signals in 2D slices, limiting real-world applicability to highly technical users. Emerging technology that combines Augmented Reality displays and AI/ML algorithms is capable of spatializing RF data into its natural 3D location for easier understanding and communication.

This tutorial will provide an overview of the evolution of RF visualization tools from flat interfaces to immersive ones that can be used to discover and map RF signals and networks. The audience will gain a broad understanding of the emergence of immersive interfaces and how they can be applied successfully to spatial data visualization. Building upon proven UI/UX principles, we will walk participants through challenges with the design and development process, theory behind decisions, and usability issues to overcome in actual deployments. Resulting best practices will be shared openly. Finally, the audience will learn about future applications of these tools and forecasted innovations as the underlying technology matures.

PRESENTERS
JAD MEOUCHY, BadVR
SUZANNE BORDERS, BadVR

MAKING THE CASE: BUILDING STRONG M&S VERIFICATION AND VALIDATION EVIDENCE
23T35

The processes of Verification, Validation, and Accreditation are foundational elements that underlie assessments of M&S credibility. Verification and Validation (V&V) activities serve to build an evidentiary chain of information upon which M&S Users can assess the viability of an M&S for a particular application. Information derived from the V&V processes is used to shape the understanding of how and where an M&S should be used and under what the constraints.

While V&V is founded on basic software engineering principles, implementation is often constrained by resources, whether these resources be time, money, personnel, or information. This tutorial will address the key steps that can be taken to build strong V&V evidence while accounting for resource impacts. The tutorial will incorporate lessons learned derived from multiple VV&A applications.

Topics to be covered by this tutorial will include:

• Requirements traceability that provides the link between requirements and V&V testing

• Identifying verification test strategies (e.g., leveraging information, supplemental test activities)

• Building and applying validation referent data (what the simulation results will be compared to)

• Defining the simulation measures and metrics to use as the basis of comparison (the aspects of the results that will be compared to the referent)

• Selecting validation methods to apply when performing the results/referent comparison

• Documentation templates and tools that provide efficiency of process to the V&V effort

The tutorial will enhance the learning experience by incorporating lessons learned derived from the many VV&A applications with which the authors have been involved.

PRESENTERS
SIMONE YOUNGBLOOD, The Johns Hopkins University Applied Physics Laboratory
KATHERINE RUBEN, The Johns Hopkins University Applied Physics Laboratory

BUILDING TRUSTED AI: AN INTRODUCTION TO HUMAN–AI TRUST
23T39

Artificial Intelligence (AI) is transforming how humans do everything from getting to work to diagnosing illnesses to creating art. In all these applications, AI occupies a gray area between a tool (like a calculator) and a partner (like a colleague). AI is more than a tool because AI systems have goals, dynamically plan actions to achieve those goals, and adapt to the situation based on experience. However, humans can't build the relationships with an AI system that they do with a trusted colleague. AI's undeniable value in high-stakes, life-or-death decisions coupled with AI's status as more than a tool but not yet a partner raises fascinating questions about how and how much humans should trust AI systems. These questions are especially critical for the training and simulation community, given its leading role in the deployment of AI.

This tutorial will review the science of trust across both the social and physical sciences and describe the three key aspects of AI trust: trustworthy, trustable, and trusted. Prominent theories and models of trust will be discussed and consideration of those applied throughout the human-AI lifecycle will be explored. Approaches to assessing AI trustworthiness will be explained including their relation to the DoD's existing VV&A process. The technical requirements the AI system must meet to be capable of gaining a human's trust will be detailed, including explainability, transparency, natural interaction and building common ground. Subjective and objective (behavioral and physiological) trust measurement approaches will be explained. All of this will surmount to a final discussion of human-AI trust calibration and the future of human-AI trust centered on the realm of the possible for standards (e.g. TRL equivalent for trust of a system, trustworthiness index for AI operational fielding decision). The tutorial addresses

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researchers, developers, and evaluators who create or use artificial intelligence. No technical knowledge is required.

PRESENTERS
MICHAEL VAN LENT, Soar Technology, LLC
JEREMIAH FOLSOM-KOVARIK, Soar Technology, LLC
DYLAN SCHMORROW, Soar Technology, LLC
DENISE NICHOLSON, CMSP, Soar Technology, LLC
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TUT 9: CREATING THE RIGHT ENVIRONMENT
1030 – 1200 • W308D

FINDING FIDELITY: WHEN YOU NEED IT, WHEN IT'S TOO MUCH, AND HOW TO OPTIMIZE SIMULATIONS FOR HIGH TRAINING EFFECT AND LOW COST
23T20

This tutorial serves as a comprehensive introduction to the concept of fidelity in serious games, simulations, and other forms of interactive training technology. The appropriate use of fidelity has a critical impact on the utility and training effectiveness of a training simulation. When misused, inappropriate fidelity goals result in simulations that are too expensive, too awkward, and too distracting to use that are poorly received by trainees. Smart use of fidelity results in enjoyable, challenging and efficacious training experiences with a measurable impact and great repeat play value.

In this tutorial, the popular impression that fidelity is a primary goal and indicative of quality training is challenged. First, the costs and benefits of fidelity are reviewed and the perils of excessive fidelity are explained with numerous graphical live-play examples. Real-world examples are taken from AI-based Virtual Human Avatars, Virtual Reality Simulations, Virtual Patients and Combat Simulations.

The tutorial then introduces a four step process to matching fidelity goals to learning for a wide range of training applications that cover the full gamut of militarily relevant training. Examples include surgical skills, behavioral interventions, and fire control systems. The tutorial then discusses alternatives to fidelity that improve training experience flow while enhancing user perception of fidelity though exploration of Interaction, Responsiveness and Abstraction. The concept of Bending Fidelity to meet training requirements is also introduced with a live example with Conversational Avatars and another using Tactical Triage. Finally, a comprehensive case study for fidelity is shared and walked through as a capstone activity to creating meaningful experiences and making fidelity judgment calls.

At the end of the tutorial, participants will be presented with sufficient examples to build a solid familiarity with best fidelity practices and how they fit with technology-based training experience. For some, this tutorial will help participants become more astute consumers and evaluators of training simulations. For others, this tutorial will help participants who desire to create new training content as they navigate fidelity judgment calls critical to technology development and effective learning outcomes.

PRESENTER
THOMAS TALBOT, M.D., University of Southern California

TUT 10: INTERSECTION OF LEARNING ENGINEERING AND DATA
1030 – 1200 • W307A

MANAGING LEARNING RESOURCES THROUGH USE OF METADATA STANDARDS
23T27

Improving Human Performance Outcomes depends on the provisioning of learning resources to the individual at the appropriate opportunity. When scaled to an entire workforce, logistical challenges may arise and optimization methods should be deployed. In order to have technology, including artificial intelligence, act as the intermediary for opportunity and optimization, the appropriate amount of data, particularly metadata, about Learning Resources and their corresponding events is required.

When Courseware Based Training (CBT) became popular in the late 1990s metadata was used, usually unsuccessfully, to create repositories of Learning Resources that were intended to be shared across Communities of Practice (COP). Recent efforts in metadata standards, coupled with the advancement of AI, have re-vitalized COPs to attempt to define and enable use cases for learning-based metadata.

This tutorial will describe the learning ecosystem that can be created by metadata and how current standards can be leveraged for success. Specific use cases that can be met through the use of metadata will be described and solutions presented. These use cases include, but are not limited to search, discovery, application within learning, optimization of both learners and the resources themselves, and lifecycle management of learning resources. The landscape of available metadata standards, and particularly how they can be combined, will be described in great detail and attendees will have the opportunity to model such solutions in accordance with these standards. These standards are centered around the LRMI vocabulary from the Learning Resource Metadata Innovation (LRMI) workgroup of Dublin Core Metadata Initiative and IEEE Learning Metadata Terms (P2881) efforts but will include other metadata standards and are applicable beyond. The benefits of using Resource Description Framework (RDF) best practices will be described and realized in the tutorial and accompanying learner-created metadata graph.

P2881 is an effort created by those familiar with legacy metadata standards used in the Shareable Content Object Reference Model (SCORM) and how those failed in application. P2881 attempts to define a small core model applicable to all types of Learning Resources that is applicable to solving particular use cases and leaving the further definition of types, such as "courses", to respective COPs. A core component of P2881 is the distinction between Learning Resources and Learning Events. Learning Resources are defined by LRMI and have been thoroughly defined and accepted the standards community. Learning Events are instantiations or opportunities of Learning Resources that are bound by time, materials, and human capital.

PRESENTERS
ANDY JOHNSON, Advanced Distributed Learning Initiative (SETA Contractor)
PHIL BARKER, Cetis LLP

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BEST TUTORIAL NOMINEES
1245 – 1415 • W300 – THEATRE

PUTTING THE WHEN AND WHERE INTO SIMULATIONS
23T68

All simulations take place somewhere on terrain or in the sea or atmosphere, amidst natural and man-made structures. The action takes place at a particular time of day and season of the year. These descriptors of the when and where of a simulation are not simply visual effects, but in a constructive or virtual world they provide a real context for the behaviors of humans, vehicles, sensors, communications and weapons. This tutorial is intended to introduce the simulation user and developer to the fine art of creating the environmental playground for a simulation. The tutorial will cover the land (but sparingly as there is another tutorial on land), atmosphere and the ocean, citing sources for data and the problems that typically exist in the original source data as well as those that inevitably result from combining information from a variety of diverse sources. The difference between geo-specific and geo-typical will be discussed and why one is chosen over the other. The issues of correlation will be illustrated within a single domain (just land features), across different simulations, and across domains (correlating land, sea, and air). The tutorial illustrates how the environment and its changes affect simulated entities – vehicles and sensors in particular. Finally, the tutorial shows how a dynamic environment can be developed and provided to the simulation. As part of the discussion, the tutorial will direct attention to the DoD-provided sources for creating a reasonably correlated virtual environment and the emerging international standards for representing environmental data. The effects of the environment span not only the domains of land, sea, and air, but electromagnetics, space and cyber by way of communications effects.

PRESENTER
S.K. "SUE" NUMRICH, PH.D., CMSP, IDA

TUT 2: LVC – TWO OUT OF THREE AIN'T BAD
1245 – 1415 • W305AB

A PROCESS FOR DISTRIBUTED LVC INTEGRATION AND EXECUTION
23T28

Integration and execution of large distributed Live, Virtual, Constructive (LVC) events consume substantial time and resources. While the underlying distributed LVC technologies are mature, the processes for integrating events are not. The IEEE Std 1730-2010 Distributed Simulation Engineering and Execution Process (DSEEP) standard defines a process model for developing an event. DSEEP defines a set of seven steps divided into activities. The process model provides representative inputs and outputs for each activity. However, the user still must instantiate the process and develop artifact templates. The development of a robust process based on DSEEP is a substantial effort.

The goal of the process is to produce a verified distributed LVC environment to conduct the event. While distributed LVC environments can be created without using a process, not using a process adds risks to the event. The first risk is that the integration fails, and it may be difficult to discover the reason. The sec-

ond risk is that the unverified environment produces invalid results that might not be apparent until the results are used.

An instantiation of DSEEP was developed based on the authors' integration and execution of many distributed LVC events. This implementation has nine steps, divided into 27 activities. This process adds two additional steps to the process. One of the steps adds a tabletop wargaming step to work through the requirements. The second additional step develops a digital twin of the target system. A detailed set of processes, templates, and guidance on how to perform the selected activities is provided. The process covers the integration of simulations and tactical systems to meet the objectives of the LVC event.

The tutorial will provide an overview of the complete process. Selected steps are described in more detail. This will provide the detailed inputs, tasks, outputs, and examples for each activity in the step. The process includes issues related to distributed LVC environments using multiple distributed simulation architectures, live entities, and cyber.

The process described in this tutorial was developed to support distributed LVC Test and Evaluation. However, the process applies to research and development, training, and experimentation. This tutorial is beneficial for anyone involved in the integration and execution of large distributed events. The tutorial is particularly beneficial for engineers tasked with planning and executing distributed events. The tutorial does not require knowledge of the DSEEP standard.

PRESENTERS
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KENNETH LeSUEUR, PH.D., Trideum Corporation
BRETT BOREN, U.S. Army Redstone Test Center
MICHAEL O'CONNOR, CMSP, Trideum Corporation
TILGHMAN TURNER, ATEC Redstone Test Center

TUT 3: THE EXPERIENCE MATTERS
1245 – 1415 • W306AB

GETTING UX – UNDERSTANDING UX AND HOW TO ACQUIRE IT
23T67

As data and technology become increasingly intertwined in everything we do, User Experience (UX) design - the intentional creation of an experience that offers utility and value to the end user - is even more critical to mission success for our warfighters. In the military, poorly designed experiences, often involving software, processes, and tools - those with "bad" UX - have critical consequences for our warfighter. Bad UX serves as a detriment to battlefield outcomes and mission success, overloading warfighter processing capabilities, introducing errors into the mission, and potentially compounding those errors to such an extent that it results in mission failure and loss of life.

In the modeling, simulation and wargaming communities, good UX can help:

• Generate requirements for products that are based on end user input

• Iteratively design and test experiences with end users

• Focus solutions on solving the right problem and avoid over-engineering solutions that are solving unnecessary problems

This tutorial will explain the UX design process and explain how it reduces overall risk to delivery. Participants will also learn how incorporating UX de-

sign principles ensures the output of modeling and simulation is aligned to the intended application. We will also discuss how to acquire UX capabilities to support your next project.

This tutorial is for those interested in understanding the basic principles of UX and how these principles can be applied in processes like waterfall and agile within the modeling and simulation and the U.S. Government. Project managers, software developers, acquisition professionals and anyone who wants to deliver better experiences to the warfighter should attend. No background knowledge of UX is required to fully participate in this session.

PRESENTERS
AMANDA HAWKINS, OUSD R&E DCTO(MC)
VEL PRESTON, U.S. Air Force, CyberWorx
DOLORES KUCHINA-MUSINA, REXOTA Solutions, LLC

TUT 4: DISTRIBUTED SIMULATION PROTOCOLS
1245 – 1415 • W307C

USING OMG DDS FOR SECURE INTEROPERABILITY BETWEEN MULTIPLE DISTRIBUTED LVC SIMULATORS
23T21

This tutorial outlines the use of the Object Management Group's Data Distribution Service (DDS) standard in distributed LVC simulation, with a focus on the security capabilities provided by DDS. DDS provides a comprehensive middleware solution for data distribution, and its security features are crucial for LVC simulation in sensitive environments. The tutorial covers DDS fundamentals, such as configuring DDS for LVC simulation, designing DDS entities and the DDS data model, and integrating DDS with LVC simulations. It also highlights best practices and case studies for DDS implementation. Additionally, the tutorial emphasizes the security features of DDS, such as authentication, access control, data encryption, and data integrity, which are essential for securing data in distributed simulation environments.

Integrating global simulation training systems can be a formidable challenge. Legacy simulators often use different standards. Modern architectures require the use of cloud-based distributed assets. To top it off, security requirements now force integrators to become experts in information assurance. Winning solutions will be ones who create synthetic training environments that can quickly be assembled and reconfigured from ready-made components. How can simulation systems integrators keep pace by limiting integration time to meet these requirements? Attend this tutorial to learn how the Object Management Group's Data Distribution Service (DDS) can ease integration, while also delivering National Security Agency tested security for distributed training systems over any transport.

This tutorial introduces the DDS and DDS Security standards. You will learn how to use the DDS Security standard to securely interoperate with real-world systems that already communicate over DDS, to distributed LVC Simulations.

The tutorial will further describe how to integrate DDS with existing simulation standards, simulation object modes, and data models of any kind, allowing for a large suite of 'qualities of service' to help fine-tune performance and scalability, while also providing robust security for individual entities and topics of simulation data. Next the tutorial will introduce you to the Real-Time WAN Transport that extends DDS capabilities to enable secure, scalable, and

high-performance communication over WANs, TDL, RF and public 5G networks. The Real-Time WAN Transport uses UDP as the underlying IP transport-layer protocol to better anticipate and adapt to the challenges of diverse network conditions.

By following this tutorial, readers will gain a comprehensive understanding of how to implement DDS for secure and reliable data distribution in LVC simulations.

PRESENTERS
ROBERT PROCTOR, JR., Real-Time Innovations
JOHN BREITENBACH, Real-Time Innovations

TUT 5: MANAGING LEARNING DATA – xAPI ESSENTIALS AND STRATEGIES
1245 – 1415 • W307D

CREATING A DATA STRATEGY AND LEARNING ANALYTICS
23T30

Understanding data strategy, analytics, and key performance indicators is critical to the successful application of learning analytics in an organization. Many organizations develop and deploy expensive training solutions but do not include a comprehensive data strategy and analytics plan. As a result organizations may not understand how their learning content is used, when students require intervention, and when and how to update content so that learning is more effective and efficient.

This tutorial provides a comprehensive overview of designing and implementing an effective data strategy for learning analytics. Participants will gain knowledge and skills necessary to document algorithms, metrics, and visualization requirements to create effective analytics. The tutorial will include the development of a short data strategy to address a sample use case. Attendees will perform an evaluation of the key performance indicators by determining how to evaluate data visualizations. Participants will leave the tutorial with a solid understanding of the main functions of learning analytics, the components of a data strategy, and how to apply these concepts in practice.

This tutorial is for data scientists, xAPI professionals, learning content developers, and instructional designers who have a requirement for or interest in learning analytics and visualizations.

PRESENTERS
JONATHAN POLTRACK, Veracity Technology Consultants
ROB CHADWICK, Veracity Technology Consultants

TUT 6: EXTENDED REALITY ON THE MOVE – SEEING IS BELIEVING
1245 – 1415 • W308A

DRIVING PROFICIENCY THROUGH MOBILE, IMMERSIVE, HANDS–ON EXTENDED REALITY (XR) TRAINING
23T47

Training is often consumed in the classroom or remotely as a one size fits all structure with limited opportunity and/or costly simulations to practice hands-on skills in contextualized situations. Providing training to sustain a global force in a digital world must be mobile and offer the ability to "act out" or practice

critical skills to instill muscle memory, embody actions, and formulate critical thinking. By utilizing an integrated approach of augmented, virtual, and mixed reality technologies, eXtended Reality (XR) training can provide a contextualized virtual environment (which links the learning of foundational skills to practical scenarios and operational stressors) with augmented overlays and real-world objects (to scaffold instruction via multimodal cues tied to the real-world) creating a fully immersive and highly engaging training environment. When XR training applications are embodied and accessible an opportunity exists to provide psychomotor practice in a highly engaging environment leading to significant proficiency gains in both primary and refresher training. Providing trainees immersive, hands-on XR training anytime, anywhere using applications downloaded to a mobile device enables consumption to be readily available and learner centered offering an action-oriented option very different from traditional classroom and remote training.

It is crucial when developing XR training solutions to evaluate the utility of the novel contextually based design elements and embodied interactions afforded by XR. This challenge is further complicated when implementing XR training using handheld mobile devices. XR does not have a proven, common mental map for the way users expect to interact with XR content on a mobile device especially when spatial movement is required. It is critical to build systems and UI/UX interaction capabilities that optimize users expected interaction paradigm with future facing technology.

This Emerging and Innovative Concepts tutorial will dive into the key elements of a mobile immersive training platform that leverages andragogically-based activities and formative assessments to infer trainee proficiency by providing insights into: key drivers of immersive, accessible training in XR; potential implementation barriers and technical challenges to embodied training in XR when using mobile devices; value-added case studies with end-user feedback; and user-centered guidelines for designing, developing and implementing mobile XR training systems. By the end of this tutorial, attendees will be able to implement effective techniques for developing and implementing immersive, accessible mobile XR training applications based on case studies in the military medical, transportation, logistics, and maintenance domains.

PRESENTERS
JOANN ARCHER, Design Interactive
CLAIRE HUGHES, Design Interactive
ERIC MARTIN, Design Interactive
JOE RUISI, AETC Medical Modernization Division, AFMMAST Program Office

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TUT 7: ACORN TO OAK:
STRONG CONCEPT, ACCREDITED EVENT
1245 – 1415 • W308B

ACCREDITATION OF SIMULATION–BASED EXPERIMENTS: BEYOND THE M&S
23T22

The Department of the Army has no individual or organization that accredits simulation-based experimentation (SIMEXp). Army Regulations require that the models and simulations (M&S) be accredited- but not any of the other components required to execute a SIMEXp. The purpose of this tutorial is present a framework for SIMEXp accreditation and enable attendees to understand all of the areas which much be accredited for the overall accreditation of a SIMEXp. Accreditation of the M&S will be discussed as it serves as the foundation for an overall accreditation, but there are other equally important components requiring separate accreditations. Attendees will be able to identify the components of tactical and operational scenario which must be validated by current warfighters- and that the person who accredits those aspects must have credible knowledge of the current state of doctrine, military organizations, and operational concepts (friendly and enemy) to be studied. Nothing in the Army's regulatory accreditation of the M&S addresses the physical and computational environment on which the SIMEXp is conducted. For example, if the company commander would only know the happenings of a subordinate platoon's area of operations by what is reported on by voice or texted on a mission command system, then the SIMEXp should be physically structured to reflect those same conditions. Not only must the M&S be accredited, but also the hardware and network on which it is running to ensure processors are robust enough to execute as required, the network transmission speeds are sufficient and no packets are being lost during execution. Finally, attendees will learn how to design and assess the analytical methods used during a SIMEXp to ensure accreditation of the analytical portion of the SIMEXp. The analysis plan, data collection and reduction methodology, and computational methods for analyzing the data must all be documented and accredited in a peer-reviewed final report in order for the overall SIMEXp to be accredited. This tutorial is for those interested in gaining a better understanding of proper SIMEXp design and why more than just the M&S must be accredited. The methodology learned also can be applied to improve simulation-enabled training events and wargames.

PRESENTERS
THOMAS YANOSCHIK, CMSP, SAIC
CYNTHIA FORGIE, PH.D., Maneuver Battle Lab
CYNTHIA DUNN, CMSP, SAIC
STEPHEN MILLER, SAIC
MAJOR SEAN FRASER, CMSP, Maneuver Battle Lab

TUT 8: HUMANS NEED NOT APPLY
1245 – 1415 • W308C

GENERATIVE AI APPLIED TO RAPID DEVELOPMENT OF SIMULATION AND MODELING ASSETS
23T52

Simulation environments, virtual and otherwise, are often bottlenecked by the content creation process of art design, graphical modeling, and data integration. This asset development pipeline is slow and costly, requiring specialized labor that can complicate the logistics or expose the operational security of a training objective. However, the emerging field of generative AI allows one individual to direct a single computer to build libraries of relevant, usable materials through simple voice or text prompts. Once the tools have fully matured, the net increase in productivity and speed will likely be measured in multiple orders of magnitude.

This tutorial will review and critically analyze modern sim production workflows against the next-generation approach of directed AI, and explore the numerous possible trajectories of this highly disruptive new technology. The audience will gain a deep understanding of the current generative AI methodologies with a particular emphasis on applied utility rather than theoretical potential.

Together, we will walk through common simulation challenges and dissect the corresponding AI prompts that generate passable solutions within mere seconds. The audience will learn how to begin testing these new tools and be given recommendations on how to use them effectively and securely.

PRESENTERS
JAD MEOUCHY, BadVR
SUZANNE BORDERS, BadVR

TUT 9: CREATING THE RIGHT ENVIRONMENT
1245 – 1415 • W308D

INTRODUCTION TO DESIGN OF EXPERIMENTS
23T69

Understanding the experimental design process is fundamental to conducting efficient and effective tests and model and simulation experiments. This tutorial aims to provide a comprehensive understanding of the test design process, with practical examples and demonstrations. Our goal is to provide you with the skills to create a good test design and effectively communicate statistical results in reports.

The tutorial begins with an introduction that explores the test design framework and explains the concept and purpose of experimental design. We then delve into the various aspects of planning, design selection and evaluation, and the analysis of an experimental design. Within the planning phase, we cover the essential elements such as identifying test objectives, response variables, and factor selection. We then provide an overview of different types of experimental designs and their purpose. In evaluating a test design, we discuss important metrics like power and confidence that are used to ensure adequate data collection and assess the quality of the design. Lastly, we cover some best practices for analysis and reporting, such as avoiding data "roll-ups", incorporating interval estimates, and utilizing high-level graphical summaries to effectively communicate the results.

By the end of the tutorial, you will have gained a better understanding of the test design process and will be equipped with valuable insights and techniques for creating and analyzing experimental designs.

PRESENTERS
KELLY AVERY, IDA
KEYLA PAGAN-RIVERA, IDA
JOHN HAMAN, IDA
REBECCA MEDLIN, IDA

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ROOM	SESSION/CHAIR	1400	1430	1500
W300 – THEATRE	Best Paper Nominee Session 1 Chair: Maureen Holbert	23233 Developing the Human Machine Teaming (HMT) Ecosystem	23210 Effects of Trust Calibration on Human-Machine Team Performance in Operational Environments	23273 Wires Crossed in a Digital World: How to Prevent Misalignments in Human and AI Decision Making
W307A	SIM 1: Effects-Based Cyber Defense Chair: Gabriel Diaz	23260 A Flight-Representative Operational Cyber Test Environment	23295 Incorporating Navigation Effects into Synthetic Environments for Improved Cyberspace Training	23306 A Generic Missile Defense System Model for Use in Cybersecurity Vulnerability Assessments
W307B	ED 1: Evaluation and Application of Instructional Strategies Chair: Wendi Van Buskirk, Ph.D.	23174 Using Non-immersive VR Simulations in Conjunction with Priming to Enhance Conceptualizing Radiation and Risk	23196 Leveraging Machine Learning and Cognitive Science to Enhance Knowledge Retention in Air Force Special Warfare Trainees	23199 Using Feedback to Increase Engagement with Adaptive Training Tools in USMC Classrooms
W307D	TR 1: Simulation IS Better, Right?! Chair: Perry McDowell	23331 Cybersickness Considerations for Curricula Using Virtual Reality Training Systems	23333 Simulators Provide Adequate Training – Says Who?	
W308A	ECIT 1: AI and Language Processing in Complex Systems Chair: Wesley Fine	23264 Winning Hearts & Tongues: A Polish to Lemko Case Study	23269 The Simplification of Complex Systems using Natural Language Processing	23291 Refugee Flow Management and Resilience Implications
W308B	ECIT 2: 5G Networks and Real-Time Command and Control Chair: Ed Jezisek	23377 Digital Twin Approach for 3D Visualization and Optimization of 5G Non-Terrestrial Network	23384 Real-time Updated Digital Twins for Drone Swarm Command and Control	23434 Blockchain Cybersecurity for Edge Computing Nodes such as Digital Twin, and Other Deployed Edge Systems

ROOM	SESSION/CHAIR	1600	1630	1700
W300 – THEATRE	Best Paper Nominee Session 2 Chair: Toni Hawkins-Scribner, Ph.D.	23179 Contextualizing Cyberspace Electromagnetic Activities (CEMA) in Multi-Domain Operations (MDO) Through Playbooks	23241 Developing Criteria to Compare Military Medical Trauma Simulations Across Modalities	23225 Practical Magic: Applying Guidelines to Serious Game Accessibility
W307A	SIM 2: Converging Realities Through AI and Visualization Chair: Tammie Smiley	23141 Optimizing Dynamic Visualizations, Operational and Engineering Models for Today's Warfighter	23357 Real-Time Surface-to-Air Missile Engagement Zone Prediction Using Simulation and Machine Learning	23426 Immersive AI Assistance During eVTOL Multi-Agent ATC Traffic Routing
W307B	ED 2: Medical-ish Chair: M. Beth Pettitt, Ph.D.	23109 Using Biometrics to Evaluate the Efficacy of Virtual Reality Learning Environments Through the Detection of Awe	23285 A Review of Research Discussing Analysis of EEG Data During Training and Skill Transfer for Skills Learned in Virtual Reality	23428 Disrupting the Status Quo: Nursing Curriculum Transformation with Virtual Reality
W308A	ECIT 3: Leveraging AI for Optimization and Simulation Chair: John Killilea, Ph.D.	23114 AI/ML-driven Network Optimization to Enable Synthetic Training and Distributed Simulation	23139 How Large Language Models Translate Raw Data into Expert Rules	23232 Rapid Retraining Architecture for Deploying AI/ML at the Speed of Relevance
W308B	ECIT 4: Emerging Technologies in XR and 5G Chair: Erica Dretzka	23104 Demystifying 5G for Extended Reality (XR) and Spatial Computing: Five Critical Lessons from a Year in Independent Research and Development (IRAD)	23134 How Immersive Technology Augments Operations Centers	23138 Simulation Model Abstraction Issues for Digital Twins; Separated at Birth?

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ROOM	SESSION/CHAIR	0830	0900	0930
W3O7A	SIM 3: Modeling and Simulation Services: What's Hot Chair: Tammie Smiley	23223 Constructive Simulation Limitations and Cloud Scalability	23421 Enabling Multi-Domain Operations through Simulation Services	
W3O7B	ED 3: Preparing the Workforce through STEM Chair: Summer Rebensky, Ph.D.	23301 Advancing Career Aspirations in STEM Fields through Co-Design and XR-Enabled Educational Delivery Models	23392 Understanding STEM Education Opportunities to Build the Future Workforce	23455 Learning to Learn: The Trials and Tribulations of CBE Implementation in Technical Training
W3O7C	PSMA 1: Who's In Charge Here... Git'r Dun Chair: Robert Epstein	23133 Development of a Digital Simulation Supporting the U.S. Space Force National Test and Training Complex	23262 A Data Strategy for Data-Driven Training Management: Artificial Intelligence and the Army's Synthetic Training Environment	23410 An Inflection Point for Defense Modeling and Simulation (M&S) Management – Redefining Roles and Responsibilities Across the Department's M&S Enterprise
W3O7D	TR 2: Structured Chaos Chair: Wendy Johnson	23203 Mixed Reality Bloodstain Pattern Analysis Simulation Training System	23228 Exploring Multimodal Blended Environments for Medical Training and Simulation	23308 Enabling Point of Injury Care in Live Force-on-Force Exercises
W3O8C	HPAE 1: On Target: Integrating Technologies Chair: Randy Jensen	23235 Towards Robust Estimation of Cognitive Workload from Wearable Physiological Sensors	23277 The Criticality of Human Computer Interface/ Human-Machine Interaction for Healthcare	23411 Pilot Performance Assessment Using a Hybrid Expert System and Machine Learning for An Automatic Objective Assessment in Flight Simulation

ROOM	SESSION/CHAIR	1030	1100	1130
W3O7A	SIM 4: Modeling Structure into the World Chair: Samuel Halverson	23240 Unreal Oceans: Using Unreal Engine 5 to Simulate Realistic Maritime Vessel Motion	23286 Automated Building Corner Detection for Validating 3D Point Cloud Data	23338 Automated Generation of Accurate 3D Building Interiors: Lessons Learned and Challenges
W3O7B	ED 4: Transformative Application of VR in the Real World Chair: Duke Tucker	23120 Evaluate the Benefits of Employing Immersive Learning Techniques: Improve the Effectiveness of Sexual Assault and Prevention (SAPR) Training	23130 Examining Full-Spectrum Embedded Training Modules for a Crew's Task Simulation Task	23375 Virtual Reality Provides Real Data: How Data in VR Transforms the Concept of Readiness
W3O7C	PSMA 2: Standards Are Great! Let's Use Them Chair: Nick Giannias	23352 The Digital Twin Encapsulation Standard: An Open Standard Proposal for Simulation-Ready Digital Twins	23195 Standard Protocol Stack Improves Short-Range Wireless Communication in Live Simulation	23454 The NISP Standard (NATO Interoperability Standards and Profiles) and Data Governance
W3O7D	TR 3: Distributed Training: Anytime, Anywhere Chair: Tim Woodard	23224 Warfighter Readiness: Virtual Training on Demand	23271 Simulating the Whole Picture with Distributed Mixed LVC	23248 Can Synthetic Coaching Using an Immersive Training Device Effectively Train Student Pilots? A Field Study
W3O8A	ECIT 5: Visualizing and Understanding Decision-Making in AI Chair: Shannon Craig	23122 An Approach for Visualizing Comparison of Human and AI Decision-Making	23145 Neural Activity Mapping of Army Aviation Flight Task Performance	23316 Using AI to Increase Trust in AI - Yes, We're Serious
W3O8B	ECIT 6: Developments in Virtualized Simulation and Wargame Planning Chair: Keith Holt	23372 Virtualized Simulation for Military Concept Development and Experimentation: The Cerebro Battle Lab, a Case Study	23373 Genetic Algorithms for Wargame Operational Planning	23406 Joint Data Mesh – A Data-Centric Approach for Modeling & Simulations
W3O8C	HPAE 2: Tailored to Me: Immersive Technologies Chair: Sondra Chambers	23403 Taking Control: An HFACS Analysis of Loss of Control in Helicopter EMS Flights	23431 A Framework for Performance Assessment Across Multiple Training Scenarios Using Hierarchical Bayesian Competency Models	23449 Me and My Report: A Segmentized After-Action Review Embedded Report Application for Supporting Maintenance Training in VR

ROOM	SESSION/CHAIR	1330	1400	1430
W3O7A	SIM 5: Simulating Stressy Situations Chair: Simon Skinner	23275 Techniques for Simulating Data Visualization of the Digital Patient	23414 Virtual Reality-based Medical Simulation for Pre-Hospital Space Medicine Care: VALOR PHSMCC	23180 Creation of a Human-in-the-Loop Simulator Environment for Fifth Generation Stressor Research
W3O7B	SIM 6: Extending XR to the Real World Chair: Colleen Matthews	23186 Toward Next Generation Aerial Refueling Airplane Simulator Qualification	23309 An XR Authoring Tool for Customizing Aviation Weather Educational Content	23388 Using Virtual Reality to Connect Military Families Together: A Diary Study with the Virtual Family Room
W3O7C	PSMA 3: Guide To Simulation Management by Air, Land and Sea Chair: Paul Butler	23135 An Ontology-based Approach for Scenario Generation in Flight Simulation Systems	23106 A Hybrid Approach to Combat Simulation Experimentation	23272 Enabling Distributed Maritime Operations Through Live, Virtual, Constructive Technologies
W3O7D	TR 4: Reality Re-Imagined Chair: Luis Velazquez	23103 RFID Sensing and Analytics to Improve Team Training	23119 The Coast Guard Investigating Officer Course: An Analysis and Redesign Using Immersive Technologies	23321 Immersive Space Operations Training in Extended Reality
W3O8A	ECIT 7: AI in Schedule Forecasting and Behavior Scaling Chair: Maureen Holbert	23302 Scaling Intelligent Agent Combat Behaviors Through Hierarchical Reinforcement Learning	23364 Novel Schedule Forecasting for Low-Volume Highly-Complex New Product Development	23416 Force Design Using AI, Digital Engineering, and Wargaming: Sports Insights
W3O8B	ECIT 8: Authorizations and Enabling the Human Dimension in Digital Applications Chair: Anastacia MacAllister, Ph.D.	23274 Enabling Agile Authorization for Mixed Reality Training Applications and Devices	23283 Enabling the Human Dimension in Joint All Domain Command and Control (JADC2)	23354 Finding Critical Areas of Concern for sUAS Collision Avoidance
W3O8C	HPAE 3: Unlocking Minds: Learning and Instruction Chair: Paul Andrzejewski	23144 Leadership Gaps in Army Training Organizations: Misunderstanding and Misapplication of the Instructional Systems Specialist (ISS)	23268 Assessing Information Maneuver Performance and Effectiveness	23399 Learning Engineering Virtual Training Systems with Learning Science, Data Standards and a Capabilities Maturity Model

ROOM	SESSION/CHAIR	1530	1600	1630
W3O7A	SIM 7: Cyber Attack: The Unseen Chair: Miranda Frost	23217 Extending PNPSC Player Strategies with Continuous Firing Rates	23303 Cyber Reactive Adversary Framework for Training	
W3O7B	SIM 8: Lego Modeling Chair: Connie Perry	23146 Modeling and Simulation for Hypersonic Missile Threat Assessment	23279 Integrating New Engagement Types in Live Training Exercises	23398 Iterative and Incremental Validation of Simulation Conceptual Models
W3O7C	PSMA 4: How Do I Acquire Thee, Let Me Count the Ways Chair: Lisa Bair	23288 Virtual Pathways: Application of the Adaptive Acquisition Framework for Synthetic Training Environments	23353 Cyber Resiliency at the Edge – From Technology to Policy	
W3O7D	TR 5: Learning to Train, Training to Learn Chair: Liz Gehr, Ph.D.	23251 Failure is an Option: Implementing Safe Failure as a Learning Strategy	23396 On Episodic Memory in Experiential Learning via Flightcrew Training Simulations	23401 Immersive Aviation Training Design Driven by the Science of Learning
W3O8A	ECIT 9: AI and Intelligent Decision Support Technologies Chair: Eugene Pursel	23219 AI Inference of Team Effectiveness for Training and Operations	23226 On Developing the Intelligent Decision Supporting Technologies for Ground Operations	23270 Continuous Asymmetric Risk Analysis: A New Method to Analyze Risk
W3O8B	ECIT 10: Adapting Training Technologies for Teaming Operations Chair: Jenifer Wheeler	23125 Considerations for Adapting Training Technologies for Manned-Unmanned Teaming Operations	23247 Training Implications for Future Advanced Air Mobility Operations	23207 Automatic Creation of High Fidelity Open Terrain Digital Twins for Off-Road Autonomous Vehicles Training and Validation
W3O8C	HPAE 4: Teams, Training, and Misinformation Chair: Sean Carey	23325 Team Training for Collaborative Cross-Functional Problem-Solving in Wargaming Exercises	23332 Dangers and Solutions for Systematic Misinformation at Scale	23337 Unobtrusive Measures and Understanding Team Processes

ROOM	SESSION/CHAIR	0830	0900	0930
W3O7A	SIM 9: Simulating Complex Threats in Complex Environments Chair: Susan Harkrider	23151 Adding Weather to Wargame Simulation	23256 ELMO (Electromagnetic Layer for Multi-domain Operations) Developing and Testing Activities	23457 Numerical Study of Ammonium Nitrate/Fuel Oil Detonations for Large Scale Pattern of Life Simulations
W3O7B	ED 5: Performance Improvement Chair: Bill Gerber, Ph.D.	23142 Teaching Simple Combat Models through Spike TV's "Deadliest Warrior"	23171 Leveraging Sports Psychology to Improve Team Performance Huddles	23299 From Classroom to Field: Topological and Tactical Terrain Analysis Inside a Learning Environment
W3O7D	TR 6: Toys to Task Chair: Mike Thorpe	23140 Media and Fidelity Analysis: Predicting Technological Training Requirements for Unidentified Future Vertical Lift Program	23166 On Approach to Reality: The Impact of a Simulated Air Traffic Control Environment (SATCE) on Workload and Situational Awareness in Military Aviators	
W3O8A	ECIT 11: AI-Driven Clustering and Data Transformation Chair: Lloyd Kleinman	23153 A Novel Approach to Dynamic Unsupervised Clustering	23173 Transforming a Digital World into Real Insights Using Synthetic Data	23176 Unsupervised Clustering for Image Data
W3O8B	ECIT 12: Geospatial Data Analysis and Terrain Generation Chair: LCDR Michael Natali, Ph.D., USN	23366 Hyper-Concurrency: The Convergence of Development, Test, and Training	23412 Using AI and Neuroscience in Immersive 3D Flight Simulation Device to Accelerate Pilot Training	23420 How Are You Enabling Model Reuse and Development for Simulation?

ROOM	SESSION/CHAIR	1030	1100	1130
W3O7A	SIM 10: Representing Atypical Patterns Chair: Craig Unrath	23335 A Structure for Representing Critical Infrastructures	23370 Evaluation of Open-Source Data for Gray-zone Operations Decision-Systems	23448 Simulating Civil Security Activities in Stability Operations
W3O7B	ED 6: Alcademy: Mastering the Future Chair: Christina Bouwens, Ph.D.	23157 Generating Procedural Knowledge Test Items Using Natural Language Processing Techniques	23163 Toward a Theory of Human-AI Co-Learning and Trustworthiness	
W3O7C	PSMA 5: What If I Told You You're In The Digital World? Chair: Marco Lassus	23129 Remodeling Readiness: Using Digitization to Enable Organizational Expertise	23365 AI/ML-Driven Content Repository Maintenance	23360 Augmented Maintenance: Setting Expectations for Augmented Reality
W3O7D	TR 7: Data...Make it Matter! Chair: Marwane Bahbaz	23184 Data-Driven and Personalized Training as a Service Infrastructure & Techologies	23198 A Machine Learning Approach for Identiying At-Risk Students in Learning Record Stores: A Case Study Using USALearning Experience API	23409 Digitizing Performance and Competencies
W3O8A	ECIT 13: Communication in AI-Driven Teams and Large Language Models Chair: Angela Alban	23190 Communication Styles in Human-AI Teams Tasked with Urban Search and Rescue Missions	23206 Large Language Models Have Transformed Our World – Can They Help to Build It?	23266 Developing Methods to Support Social Media Intelligence Analysis
W3O8B	ECIT 14: Real-Time Analytics and Cybersecurity Visualization Chair: Neil Stagner	23137 Visualizing Cybersecurity Data for Detection and Assistance in Cyber Operations	23265 Leveraging AI to Create Real-time, Character-based Virtual Trainers	23437 Real-time Analytics to Support Operational Decision Making

ROOM	SESSION/CHAIR	1330	1400	1430
W3O7A	SIM 11: Complex Future Operational Environments Chair: Glenn Hodges, Ph.D.	23257 Modelling & Simulation in Support of a Comprehensive CBRN Layer Development	23284 Comparison of Visualization Technologies to Support RCAF Training Modernization	
W3O8A	ECIT 15: Accelerating Training with AI and Neuroscience in Simulation Devices Chair: Mike Lokuta	23287 Analyzing, Preparing, and Processing Input Geospatial Data for High-Resolution Terrain Generation	23382 Crowdsensing of Meteorological Data for Safety and Efficiency of Unmanned Aerial Traffic in Urban Environment	23408 Model Mining in Sensor Data for Rapid Terrain Analysis
W3O8B	ECIT 16: Learning and Visualization in Virtual Reality Chair: Eric Jarabak	23250 Using VR to Validate and Visualize MBSE-Designed Interfac	23294 Learning and Emotional Outcomes in an Immersive Omnidirectional Pilot Study	23413 Creating Robust Evolvable MSaaS Services: An Integrated Model-Driven Engineering Approach

PAPERS

BEST PAPERS

BEST PAPER SESSION 1

Session Chair: Maureen Holbert, Booz Allen Hamilton
Session Deputy: Sondra Chambers, General Dynamics Mission Systems

23233 Developing the Human Machine Teaming (HMT) Ecosystem
Anastacia MacAllister, Ph.D., Rey Nicolas, General Atomics Aeronautical Systems, Inc.; Col Daniel Javorsek, Ph.D., USAF AFOTEC DET 6/CC; Patrick Rupp, George Hellstern, Miguel Morales, Lockheed Martin Corporation; Louis Dube, EpiSci

23210 Effects of Trust Calibration on Human-Machine Team Performance in Operational Environments
Beth Hartzler, Ph.D., Sandro Scielzo, Ph.D., Alvin Abraham, Rachel Wong, CAE USA; Spencer Kohn, Ph.D., Perceptronics Solutions

23273 Wires Crossed in a Digital World: How to Prevent Misalignments in Human and AI Decision Making
Maria Chaparro Osman, Ph.D., Summer Rebensky, Ph.D., Audrey Reinert, Ph.D., Valarie Yerdon, Ph.D., Christopher Jenkins, Jianna Logue, Charles Jusko, Gabriel Ganberg, Aptima, Inc.

BEST PAPER SESSION 2

Session Chair: Toni Hawkins-Scribner, Ph.D., Air University/Squadron Officer School
Session Deputy: Wendy Johnson, Ph.D., HQ AETC/A5X – TR2

23179 Contextualizing Cyberspace Electromagnetic Activities (CEMA) in Multi-Domain Operations (MDO) Through Playbooks
COL Chad Bates, Ph.D., U.S. Army War College; Jacob Cox, Ph.D., Clark Heidelbaugh, Jim Ruth, Tim Friest, Trideum Corporation

23241 Developing Criteria to Compare Military Medical Trauma Simulations Across Modalities
Shannon Bailey, Ph.D., Michael Brannick, Colleen Reiner, Luis Llerena, USF Health CAMLS; F. Bowling, HQ USSOCOM; Dennis Lyons, U.S. Army (Retired)/Smith and Nephew, Inc.; Samantha Tromly, Institute of Applied Engineering, University of South Florida

23225 Practical Magic: Applying Guidelines to Serious Game Accessibility
Jennifer McNamara, Breakaway Games; Michael Brooks, The Pennsylvania State University World Campus

EDUCATION

EVALUATION AND APPLICATION OF INSTRUCTIONAL STRATEGIES

Session Chair: Wendi Van Buskirk, Ph.D., NAWCTSD
Session Deputy: Henry Phillips, Ph.D., Soar Technology, LLC

23174 Using Non-immersive VR Simulations in Conjunction with Priming to Enhance Conceptualizing Radiation and Risk
Angela Leek, Nir Keren, Ph.D., Andrew Lawson, Aidan Webster, Iowa State University

23196 Leveraging Machine Learning and Cognitive Science to Enhance Knowledge Retention in Air Force Special Warfare Trainees
Amy Smith, Blank Slate Technologies

23199 Using Feedback to Increase Engagement with Adaptive Training Tools in USMC Classrooms
Matthew Marraffino, Ph.D., NAWCTSD; Allison Garibaldi; Nicholas Fraulini, Ph.D., StraCon Services Group; Cheryl Johnson, Ph.D., Quantum Improvements Consulting; Micah Soboleski, MCCSSS

MEDICAL-ISH

Session Chair: William Pike, Ph.D., U.S. Army DEVCOM SC STTC
Session Deputy: Frank Karluk, DLH Corporation

23109 Using Biometrics to Evaluate the Efficacy of Virtual Reality Learning Environments Through the Detection of Awe
Christopher Yockey, 775 Test Squadron

23285 A Review of Research Discussing Analysis of EEG Data During Training and Skill Transfer for Skills Learned in Virtual Reality
Shawn Adams, USAFR; Andrew Clayton, Ph.D., Air University

23428 Disrupting the Status Quo: Nursing Curriculum Transformation with Virtual Reality
Juliet Kolde, Ph.D., Jeffrey Olsen, Casey Brown, Nightingale College; Jack Pottle, M.D., Oxford Medical Simulation

PREPARING THE WORKFORCE THROUGH STEM

Session Chair: Summer Rebensky, Ph.D., Aptima, Inc.
Session Deputy: Thea Albertson, Serco North America

23301 Advancing Career Aspirations in STEM Fields through Co-Design and XR-Enabled Educational Delivery Models
Alex Renner, Eliot Winer, Ph.D., Kimberly Zarecor, Ph.D., Evrim Baran, Ph.D., Ezequiel Aleman, Ph.D., Anasilvia Salazar Morales, Iowa State University

23392 Understanding STEM Education Opportunities to Build the Future Workforce
James Belanich, Franklin Moses, Allyson Buytendyk, Christian Dobbins, Dan Kolodrubetz, Alex Pang, IDA

23455 Learning to Learn: The Trials and Tribulations of CBE Implementation in Technical Training
Nathan Jones, Problem Solutions LLC; Nate Ferrara, Allen Interactions

TRANSFORMATIVE APPLICATION OF VR IN THE REAL WORLD
Session Chair: Duke Tucker, Pinnacle Solutions
Session Deputy: Erin McCormick, Ph.D., 711 HPW, AFRL

23120 Evaluate the Benefits of Employing Immersive Learning Techniques: Improve the Effectiveness of Sexual Assault and Prevention (SAPR) Training
Kellie Hill, Air Force Sustainment Command (AFSC)

23130 Examining Full-Spectrum Embedded Training Modules for a Crew's Task Simulation Task
Crystal Maraj, Ph.D., UCF-SMST; Shelley Brown, Dean Reed, Jonathan Hurter, Clive Hoayun, University of Central Florida Institute for Simulation and Training

23375 Virtual Reality Provides Real Data: How Data in VR Transforms the Concept of Readiness
Summer Rebensky, Ph.D., William Stalker, Shawn Turk, Samantha Perry, Ph.D., Aptima, Inc.; Jonathan Diemunsch, Quintin Oliver, Wink Bennett, Ph.D., AFRL

PERFORMANCE IMPROVEMENT
Session Chair: Bill Gerber, Ph.D., IDA
Session Deputy:

23142 Teaching Simple Combat Models through Spike TV's "Deadliest Warrior"
Vikram Mittal, United States Military Academy

23171 Leveraging Sports Psychology to Improve Team Performance Huddles
Joanne Barnieu, Steven Aude, Ph.D., Heidi Keller-Glaze, Ph.D., Ryan Riley, Kate Lambourne, Ph.D., Maryann Strassen, Angela Ferreira, ICF; Nathanael Keiser, Ph.D., Christopher Vowels, Ph.D., U.S. Army Research Institute

23299 From Classroom to Field: Topological and Tactical Terrain Analysis Inside a Learning Environment
Raphael de Souza, Thiago Da Goncalves, Diogenes Silva, Rodrigo Mendonca, Fabio Torres, Diego Hermes, Brazilian Marines Simulation Center; Alberto Raposo, PUC-Rico

AIcademy: MASTERING THE FUTURE
Session Chair: Christina Bouwens, Ph.D., L3Harris
Session Deputy: Josh Looper, USAF

23157 Generating Procedural Knowledge Test Items Using Natural Language Processing Techniques
Bridge Eimon, Sowmya, Ramachandran, Ph.D., Jeremy Ludwig, Ph.D., Stottler Henke Associates, Inc.

23163 Toward a Theory of Human-AI Co-Learning and Trustworthiness
Frederick Diedrich, Ph.D., Independent Consultant; Gary Riccio, Ph.D., Independent Consultant; Tatiana Toumbeva, Ph.D., Aptima, Inc.; Scott Flanagan, Sophia Solutions

EMERGING CONCEPTS & INNOVATIVE TECHNOLOGIES
AI AND LANGUAGE PROCESSING IN COMPLEX SYSTEMS
Session Chair: John Killilea, Ph.D., NAWCTSD
Session Deputy: Marcus Boyd, CAE USA

23264 Winning Hearts & Tongues: A Polish to Lemko Case Study
Petro Orynycz, Orynycz.com; Tom Dobry, Antech Systems

23269 The Simplification of Complex Systems using Natural Language Processing
Jaden Flint, Chanler Cantor, William Marx, Ph.D., CAPT Timothy Hill, USN (Ret.), COL John Frasier, USA (Ret.), Kyle Russell, Intuitive Research and Technology Corporation

23291 Refugee Flow Management and Resilience Implications
Kostadin Lazarov, Orlin Nikolov, CMDR COE

5G NETWORKS AND REAL-TIME COMMAND AND CONTROL
Session Chair: Ed Jezisek, Training and Simulation | Land Systems, Saab, Inc.
Session Deputy: Enrique Mertins, 75th IC, U.S. Army

23377 Digital Twin Approach for 3D Visualization and Optimization of 5G Non-Terrestrial Network
Chuan Pham, Maroua Ben-Attia, Abdo Shabah, Humanitas Solutions; Kaniz Mahdi, Jaroslav Holiš, Deutsche Telekom AG

23384 Real-time Updated Digital Twins for Drone Swarm Command and Control
Berk Cetinsaya, Carsten Neumann, Dirk Reiners, Carolina Cruz-Neira, University of Central Florida

23434 Blockchain Cybersecurity for Edge Computing Nodes such as Digital Twin, and Other Deployed Edge Systems
Michael Wikan, Yugandhar Cindepalle, Booz Allen Hamilton

LEVERAGING AI FOR OPTIMIZATION AND SIMULATION
Session Chair: Wesley Fine, Bohemia Interactive Simulations
Session Deputy: Syed Mohammad, Ph.D., DHS Science and Technology Directorate

23114 AI/ML-driven Network Optimization to Enable Synthetic Training and Distributed Simulation
Jack Burbank, June Gordon, Todd Lutton, Gregory Patti, Ebony Robinson, Antonio Fiuza, Sabre Systems, Inc.; Brad Friedman, U.S. Army Futures Command, Synthetic Training Environment CFT

23139 How Large Language Models Translate Raw Data into Expert Rules
David Noever, Joseph Regian, PeopleTec, Inc.

23232 Rapid Retraining Architecture for Deploying AI/ML at the Speed of Relevance
Anastacia MacAllister, Ph.D., Dennis Chen, Vasna Khani, Victoria Dorn, Arman Ommid, Rey Nicolas, General Atomics Aeronautical Systems, Inc.

EMERGING TECHNOLOGIES IN XR AND 5G

Session Chair: Erica Dretzka, OSD Force Readiness

Session Deputy: Samantha Dubrow, Ph.D., The MITRE Corporation

23104   Demystifying 5G for Extended Reality (XR) and Spatial Computing: Five Critical Lessons from a Year in Independent Research and Development (IRAD)

Michael Zurat, General Dynamics IT

23134   How Immersive Technology Augments Operations Centers

William Liggett, III, USCYBERCOM; Andrew Clayton, Ph.D., Air University

23138   Simulation Model Abstraction Issues for Digital Twins; Separated at Birth?

Simon Skinner, Thales Training and Simulation

VISUALIZING AND UNDERSTANDING DECISION-MAKING IN AI

Session Chair: Shannon Craig, MAK Technologies

Session Deputy: Rishabh Kaushik, Collins Aerospace, Inc.

23122   An Approach for Visualizing Comparison of Human and AI Decision-Making

Henry Phillips, Ph.D., Alyssa Tanaka, Ph.D., Angela Woods, Soar Technology, LLC

23145   Neural Activity Mapping of Army Aviation Flight Task Performance

Christina Parker, Ed.D., Air Force Special Operations Command; JJ Walcutt, Ph.D., Clay Strategic Designs; LT Nicholas Armendariz, USN, Naval Aerospace Medical Institute; Dhiraj Jeyanandarajan, QNeuro

23316   Using AI to Increase Trust in AI - Yes, We're Serious

Kyle Russell, Connor Green, Charles Etheredge, Michael Yohe, William Marx, Ph.D., CAPT Timothy Hill, USN (Ret.), Lt Col Robert Odom, USAF (Ret.), Col Daron Drown, USAF (Ret.), Intuitive Research and Technology Corporation

DEVELOPMENTS IN VIRTUALIZED SIMULATION AND WARGAME PLANNING

Session Chair: Keith Holt, Lockheed Martin Corporation

Session Deputy: Adam Kohl, Iowa State University

23372   Virtualized Simulation for Military Concept Development and Experimentation: The Cerebro Battle Lab, a Case Study

Dirk oude Egbrink, Jan Jaap Knobbout, Zeeger Lubsen, Royal Netherlands Aerospace Centre

23373   Genetic Algorithms for Wargame Operational Planning

John Pav, Eric Jamieson, Booz Allen Hamilton; Adam Haywood, HAF A5/7

23406   Joint Data Mesh – A Data-Centric Approach for Modeling & Simulations

Samuel Chambers, Joint Staff J7; Walter Cedeño, Jay Freeman, Colby McAlexander, CAE USA

AI IN SCHEDULE FORECASTING AND BEHAVIOR SCALING

Session Chair: Maureen Holbert, Booz Allen Hamilton

Session Deputy: Steven Godby, AFLCMC/WNS

23302   Scaling Intelligent Agent Combat Behaviors Through Hierarchical Reinforcement Learning

LtCol Scotty Black, USMC, Naval Postgraduate School

23364   Novel Schedule Forecasting for Low-Volume Highly-Complex New Product Development

Bruce Chehroudi, Ph.D., Scott Morchower, Mantech International; Jonathan Lam, Ph.D., USSF; Gus Benavides, Axient Corp

23416   Force Design Using AI, Digital Engineering, and Wargaming: Sports Insights

Matthew Bowler, Joshua Traub, Booz Allen Hamilton; Brian Hall, New York University

AUTHORIZATIONS AND ENABLING THE HUMAN DIMENSION IN DIGITAL APPLICATIONS

Session Chair: Anastacia MacAllister, Ph.D., General Atomics Aeronautical Systems, Inc.

Session Deputy: Keith Brawner, Ph.D., U.S. Army DEVCOM SC STTC

23274   Enabling Agile Authorization for Mixed Reality Training Applications and Devices

Brandi Pickett, Jason Ingalls, Ingalls Information Security

23283   Enabling the Human Dimension in Joint All Domain Command and Control (JADC2)

Emilie Reitz, Joint Staff, J6; Kevin Seavey, JS J6 Joint Fires Integration Division; Samuel Chambers, Joint Staff J7; Justin Wright, Huntington Ingalls Industries

23354   Finding Critical Areas of Concern for sUAS Collision Avoidance

Elijah Keck, Mustafa Akbas, Embry-Riddle Aeronautical University

AI AND INTELLIGENT DECISION SUPPORT TECHNOLOGIES

Session Chair: Eugene Pursel, USSTRATCOM

Session Deputy: William Pike, Ph.D., U.S. Army DEVCOM SC STTC

23219   AI Inference of Team Effectiveness for Training and Operations

Rob Hyland, Kenneth Lu, Spencer Lynn, Stephen Marotta, James Niehaus, Ph.D., William Norsworthy, Avi Pfeffer, Curtis Wu, Bryan Loyall, Charles River Analytics

23226   On developing the Intelligent Decision Supporting Technologies for Ground Operations

Sangheun Shim, Kiwoong Park, Dongkuk Ryu, Suhyun Kim, Taejong Lee, Agency for Defense Development

23270   Continuous Asymmetric Risk Analysis: A New Method to Analyze Risk

Zachry Engel, Nickalus Harrill, Jacob Ediger, Nicolas Velez Camacho, Randal Allen, Ph.D., Lone Star Analysis, Inc.

ADAPTING TRAINING TECHNOLOGIES FOR TEAMING OPERATIONS

Session Chair: Jenifer Wheeler, Southwest Research Institute

Session Deputy: Christopher Chambers, Serious Simulations, LLC

23125 Considerations for Adapting Training Technologies for Manned-Unmanned Teaming Operations

Scott Scheff, HF Designworks, Inc.; John O'Malia, ThayerMahan; Beth Atkinson, James Pharmer, Ph.D., NAWCTSD

23247 Training Implications for Future Advanced Air Mobility Operations

Kendall Carmody, Maureen Namukasa, Bhoomin Chauhan, Vivek Sharma, Meredith Carroll, Ph.D., Florida Institute of Technology

23207 Automatic Creation of High Fidelity Open Terrain Digital Twins for Off-Road Autonomous Vehicles Training and Validation

Ido Ariav, David Zaphir, Alon Faraj, Asaf Avinoam, Yisachar Shapira, Elbit Systems Ltd.

AI-DRIVEN CLUSTERING AND DATA TRANSFORMATION

Session Chair: Lloyd Kleinman, Surface Combat Systems Training Command

Session Deputy: Matt Canonico, NVIDIA

23153 A Novel Approach to Dynamic Unsupervised Clustering

Christopher Heinlen, Mark Volpi, Randal Allen, Ph.D., Lone Star Analysis, Inc.

23173 Transforming a Digital World into Real Insights Using Synthetic Data

Javier Garza, Lockheed Martin Corporation

23176 Unsupervised Clustering for Image Data

Nickolas Vlahopoulos, Spiridon Kasapis, University of Michigan; Geng Zhang, MES; Jonathon Smereka

GEOSPATIAL DATA ANALYSIS AND TERRAIN GENERATION

Session Chair: LCDR Michael Natali, Ph.D., USN, ONR

Session Deputy: James Ohlman, CAE USA

23366 Hyper-Concurrency: The Convergence of Development, Test, and Training

Joshua Fields, Timothy Mobeck, Trevor Rossi, Craig Smith, Jason Valestin, Collins Aerospace

23412 Using AI and Neuroscience in Immersive 3D Flight Simulation Device tto Accelerate Pilot Training

Jean-Francois Delisle, CAE Inc.

23420 How Are You Enabling Model Reuse and Development for Simulation?

Chris McGroarty, Christopher Metevier, U.S. Army DEVCOM SC STTC; Scott Gallant, Effective Applications Corporation; Keith Snively, U.S. Army DEVCOM C5ISR; Anup Raval, Greg Tracy, Mark Schlottke, Dynamic Animation Systems, Inc.

COMMUNICATION IN AI-DRIVEN TEAMS AND LARGE LANGUAGE MODELS

Session Chair: Angela Alban, SIMETRI, Inc.

Session Deputy: Don Lail, U.S. Army DEVCOM CBC

23190 Communication Styles in Human-AI Teams Tasked with Urban Search and Rescue Missions

Ashish Amresh, Northern Arizona University

23206 Large Language Models Have Transformed Our World – Can They Help to Build It?

Graham Long, Thales

23266 Developing Methods to Support Social Media Intelligence Analysis

Daniela Miele, Lauren Glenister, Angela Woods, Soar Technology, LLC

REAL-TIME ANALYTICS AND CYBERSECURITY VISUALIZATION

Session Chair: Neil Stagner, PM TRASYS, MARCORSYSCOM

Session Deputy: Greg Ouellette, NAWCTSD

23137 Visualizing Cybersecurity Data for Detection and Assistance in Cyber Operations

Jason Ingalls, Ingalls Information Security; Judson Dressler, U.S. Air Force; Kaur Kullman, University of Maryland Baltimore County

23265 Leveraging AI to Create Real-time, Character-based Virtual Trainers

Dennis O'Dell, Jr., Pinnacle Solutions, Inc.

23437 Real-time Analytics to Support Operational Decision Making

Dejan Neskovic, Jerry Sheehan, Alec "AJ" Gray, Jr., Booz Allen Hamilton

ACCELERATING TRAINING WITH AI AND NEUROSCIENCE IN SIMULATION DEVICES

Session Chair: Mike Lokuta, CAE Inc.

Session Deputy: Javier Garza, Lockheed Martin Corporation

23287 Analyzing, Preparing, and Processing Input Geospatial Data for High-Resolution Terrain Generation

Tu Lam, Matt Reilly, Pedro Ramos, Hunter York, Scot Shiflett, Amanda Larrieu, Leidos, Inc.; Clayton Burford, U.S. Army DEVCOM SC STTC

23382 Crowdsensing of Meteorological Data for Safety and Efficiency of Unmanned Aerial Traffic in Urban Environment

Jose Alejandro Gonzalez Nunez, Mustafa Akbas, Embry-Riddle Aeronautical University

23408 Model Mining in Sensor Data for Rapid Terrain Analysis

Frido Kuijper, Ruben Smelik, Ewan Demeur, Remco van der Meer, Vera Bekkers, TNO

LEARNING AND VISUALIZATION IN VIRTUAL REALITY

Session Chair: Eric Jarabak, PM TRASYS, MARCORSYSCOM
Session Deputy: Scott Burdick, AFLCMC/XA

23250 Using VR to Validate and Visualize MBSE-Designed Interfaces
Sean Flanagan, Jake Bolton, Hunter Stinson, Integration Innovation, Inc.

23294 Learning and Emotional Outcomes in an Immersive Omnidirectional Pilot Study
Fred Martin, Jr., U.S. Army; Maria Harrington, University of Central Florida

23413 Creating Robust Evolvable MSaaS Services: An Integrated Model-Driven Engineering Approach
Chris McGroarty, Christopher Metevier, U.S. Army DEVCOM SC STTC; Scott Gallant, Effective Applications Corporation; Keith Snively, U.S. Army DEVCOM C5ISR; Herwig Mannaert, Alexander Boucquey, Normalized Systems eXpanders Factory

HUMAN PERFORMANCE, ANALYSIS AND ENGINEERING

ON TARGET: INTEGRATING TECHNOLOGIES

Session Chair: Randy Jensen, Stottler Henke Associates, Inc.
Session Deputy: Victoria Claypoole, Ph.D., Dynepic, Inc.

23235 Towards Robust Estimation of Cognitive Workload from Wearable Physiological Sensors
Aaron Novstrup, Stottler Henke Associates, Inc.; Monica Tynan, James Heaton, Massachusetts General Hospital; Gianluca De Luca, Delsys, Inc.; Joshua Kline, Altec and Delsys, Inc.

23277 The Criticality of Human Computer Interface/ Human-Machine Interaction for Healthcare
Steven Michael Thomas, William Marx, Ph.D., CAPT Timothy Hill, USN (Ret.), Chanler Cantor, Intuitive Research and Technology Corporation

23411 Pilot Performance Assessment Using a Hybrid Expert System and Machine Learning for An Automatic Objective Assessment in Flight Simulation
Jean-Francois Delisle, Maher Chaouachi, Melvyn Tan, Laurent Desmet, CAE Inc.; Andrea Lodi, Polytechnique de Montréal

TAILORED TO ME: IMMERSIVE TECHNOLOGIES

Session Chair: Sondra Chambers, General Dynamics Mission Systems
Session Deputy: Matthew Stone, NAWCAD

23403 Taking Control: An HFACS Analysis of Loss of Control in Helicopter EMS Flights
Paige Lawton, Albert Boquet, Embry-Riddle Aeronautical University

23431 A Framework for Performance Assessment Across Multiple Training Scenarios Using Hierarchical Bayesian Competency Models
Caleb Vatral, Gautam Biswas, Naveeduddin Mohammed, Institute for Software Integrated Systems - Vanderbilt University; Benjamin Goldberg, Ph.D., U.S. Army DEVCOM SC STTC

23449 Me and My Report: A Segmented After-Action Review Embedded Report Application for Supporting Maintenance Training in VR
Nir Keren, Ph.D., Andrew Lawson, Amon McAllister, Ashwin Jacob, Iowa State University; Robert Johnson, Christopher Boswell, Glenne Goode, Iowa Department of Transportation; Angela Leek, Aiden Webster, Iowa State University

UNLOCKING MINDS: LEARNING AND INSTRUCTION

Session Chair: Paul Andrzejewski, HigherEchelon, Inc.
Session Deputy: Miriam Plaza, Intelligent Decision Systems, Inc.

23144 Leadership Gaps in Army Training Organizations: Misunderstanding and Misapplication of the Instructional Systems Specialist (ISS)
Christina Parker, Ed.D., AFSOC; Leonard Momeny, USAACE

23268 Assessing Information Maneuver Performance and Effectiveness
Morgan Borders, William Ross, Michael Williams, Cognitive Performance Group; Rebecca Goolsby, ONR

23399 Learning Engineering Virtual Training Systems with Learning Science, Data Standards and a Capabilities Maturity Model
Kevin Owens, Applied Research Laboratories: The University of Texas at Austin; Shelly Blake-Plock, Yet Analytics, Inc.; Jim Goodell, QIP

TEAMS, TRAINING, AND MISINFORMATION

Session Chair: Sean Carey, USAF/AMC/A3TD
Session Deputy: Annie Robinson, Overmatch, Inc.

23325 Team Training for Collaborative Cross-Functional Problem-Solving in Wargaming Exercises
Randy Jensen, Stottler Henke Associates, Inc.; Grace Teo, Quantum Improvements Consulting; Lisa Townsend, U.S. Army DEVCOM SC STTC

23332 Dangers and Solutions for Systematic Misinformation at Scale
Joseph Regian, David Noever, PeopleTec, Inc.

23337 Unobtrusive Measures and Understanding Team Processes
Alexxa Bessey, Ph.D., Kara Orvis, Ph.D., Robert McCormack, Ph.D., Aptima, Inc.; Marissa Shuffler, Ph.D., Clemson University; Tara Brown, Ph.D., Niagara Bottling; Dorothy Carter, Ph.D., Michigan State University; Amanda Thayer, Ph.D., Florida Institute of Technology; Eduardo Salas, Ph.D., Rice University

POLICY, STANDARDS, MANAGEMENT AND ACQUISITION

WHO'S IN CHARGE HERE…GIT'R DUN

Session Chair: Robert Epstein, Leidos
Session Deputy: Sean Osmond, Bohemia Interactive Simulations

23133 Development of a Digital Simulation Supporting the U.S. Space Force National Test and Training Complex
Major Cameron Webster, USSF, U.S. Space Force; Doug Parsons, DEVCOM Aviation & Missile Center; Mike Farmer, Palski & Associates, Inc.; Bryan Johnson, Aerospace Corporation; Tony Kubat, The MITRE Corporation

23262 A Data Strategy for Data-Driven Training Management: Artificial Intelligence and the Army's Synthetic Training Environment

Benjamin Goldberg, Ph.D., Chris McGroarty, U.S. Army DEVCOM SC STTC; Kevin Owens, Kevin Gupton, Applied Research Laboratories: The University of Texas at Austin; COL Paul Kwon, USA, Jeremy Lanman, Ph.D., U.S. Army PEO STRI; Paul Butler, The MITRE Corporation

23410 An Inflection Point for Defense Modeling and Simulation (M&S) Management – Redefining Roles and Responsibilities Across the Department's M&S Enterprise

Scott Schutzmeister, Annie Patenaude, IDA

PSMA 2   29 WEDNESDAY, NOVEMBER • 1030 • W307C

STANDARDS ARE GREAT! LET'S USE THEM

Session Chair: Nick Giannias, CAE Inc.
Session Deputy: E. Michael Bearss, Ph.D., CMSP, Trideum Corporation

23352 The Digital Twin Encapsulation Standard: An Open Standard Proposal for Simulation-Ready Digital Twins

Francesco Leacche, Roberto De Ioris, Amey Godse, Apurva Shah, Duality AI

23195 Standard Protocol Stack Improves Short-Range Wireless Communication in Live Simulation

Reto Haldemann, Thierry Hischier, Thales Simulation & Training

23454 The NISP Standard (NATO Interoperability Standards and Profiles) and Data Governance

Colonel Alexandre Freitas, Brazilian Army

PSMA 3   WEDNESDAY, 29 NOVEMBER • 1330 • W307C

GUIDE TO SIMULATION MANAGEMENT BY AIR, LAND AND SEA

Session Chair: Paul Butler, The MITRE Corporation
Session Deputy: LT Nicholas Armendariz, USN, Naval Aerospace Medical Institute

23135 An Ontology-based Approach for Scenario Generation in Flight Simulation Systems

Hung Tran, Michael Tillett, Howard Cheung, CAE USA

23106 A Hybrid Approach to Combat Simulation Experimentation

Christopher Willis, CMSP, John Bayer, CMSP, Major Jacob Kelly, CMSP, Samford Anderson, CMSP, Maneuver Battle Lab (MBL)

23272 Enabling Distributed Maritime Operations Through Live, Virtual, Constructive Technologies

Jennifer Pagan, NAWCTSD; CAPT Joseph Cohn, Ph.D., Peter Squire, Ph.D., Natalie Steinhauser, ONR; LCDR Joseph Geeseman, Ph.D., PMA 205; Rudolph Darken, Ph.D., Christian Fitzpatrick, Ph.D., Naval Postgraduate School

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PSMA 4   WEDNESDAY, 29 NOVEMBER • 1530 • W307C

HOW DO I ACQUIRE THEE, LET ME COUNT THE WAYS

Session Chair: Lisa Bair, SAIC
Session Deputy: Nicole Dees, PM TRASYS, MARCORSYSCOM

23288 Virtual Pathways: Application of the Adaptive Acquisition Framework for Synthetic Training Environments

Brian Serra, Thomas Kehr, Ph.D., Cole Engineering Services, Inc.; Matthew Masson, Ricardo Escobar, U.S. Army PEO STRI

23353 Cyber Resiliency at the Edge – From Technology to Policy

Dustin Easterling, Jason Smith, Michael Yohe, CAPT Timothy Hill, USN (Ret.), William Marx, Ph.D., Intuitive Research and Technology Corporation

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PSMA 5   THURSDAY, 30 NOVEMBER • 1030 • W307C

WHAT IF I TOLD YOU YOU'RE IN THE DIGITAL WORLD?

Session Chair: Marco Lassus, U.S. Air Force Simulators Division
Session Deputy: Jeremy Gneiting, U.S. Army DEVCOM Aviation and Missile Center

23129 Remodeling Readiness: Using Digitization to Enable Organizational Expertise

Brooke Shields, Debbie Brown, Tim Welch, Eduworks Corporation

23365 AI/ML-Driven Content Repository Maintenance

John Carney, James King, Nancy Belmont, MARi, LLC; John Stamper, Christine Kwon, Joanie Lam, Anahita Sehgal, Carnegie Mellon University

23360 Augmented Maintenance: Setting Expectations for Augmented Reality

B. Adrian Flowers, Michael Keeney, Ph.D., Werner Born, Ph.D., Jeffrey Beaubien, Ph.D., Aptima, Inc.

SIMULATION

SIM 1   TUESDAY, 28 NOVEMBER • 1400 • W307A

EFFECTS-BASED CYBER DEFENSE

Session Chair: Gabriel Diaz, Scientific Research Corporation
Session Deputy: John Aughey, Boeing Company

23260 A Flight-Representative Operational Cyber Test Environment

Jacob Pryor, Tara Clayton, Steven Hildebrand, Trideum Corporation; Andrew Smilie, U.S. Army Redstone Test Center

23295 Incorporating Navigation Effects into Synthetic Environments for Improved Cyberspace Training

Omar Hasan, Ph.D., Andrew Mendoza, Jeffrey Welch, Robert Burch, Dignitas Technologies; J. Allen Geddes, U.S. Army DEVCOM SC STTC

23306 A Generic Missile Defense System Model for Use in Cybersecurity Vulnerability Assessments

Shelton Wright, Ph.D., Thomas Morris, Ph.D., William Meehan, The University of Alabama in Huntsville; John Bland, Ph.D., C. Daniel Colvett, Ph.D., Christian Schenck, U.S. Army DEVCOM AvMC

CONVERGING REALITIES THROUGH AI AND VISUALIZATION

Session Chair: Tammie Smiley, Trideum Corporation / Army Modeling and Simulation Office (AMSO)

Session Deputy: Corey Hendricks, Ph.D., Leidos

23141 Optimizing Dynamic Visualizations, Operational and Engineering Models for Today's Warfighter
CDR Herbert Honaker, USN (Ret.), CPT Logan Rash, USA, Compendium Federal Technology

23357 Real-Time Surface-to-Air Missile Engagement Zone Prediction Using Simulation and Machine Learning
Joao Dantas, Diego Geraldo, Felipe Medeiros, Institute for Advanced Studies; Marcos Maximo, Takashi Yoneyama, Aeronautics Institute of Technology

23426 Immersive AI Assistance During eVTOL Multi-Agent ATC Traffic Routing
Jean-Francois Delisle, Simon Riendeau, CAE Inc.; Clodéric Mars, Sagar Kurandwad, AI-Redefined

MODELING AND SIMULATION SERVICES: WHAT'S HOT

Session Chair: Tammie Smiley, Trideum Corporation / Army Modeling and Simulation Office (AMSO)

Session Deputy: James (Paul) Rowlett, USSOCOM

23223 Constructive Simulation Limitations and Cloud Scalability
Jackie Zhang, Reese Gallagher, Cristhian De La Paz, Infinitas Engineering, Inc.; Peter Drewes, Mike Baker, Brian McDonell, Ph.D., Amazon Web Services

23421 Enabling Multi-Domain Operations through Simulation Services
Chris McGroarty, U.S. Army DEVCOM SC STTC; Jose Orozco; Alpesh Patel, Bruce Robbins, U.S. Army PEO STRI; Robert Kewley, simlytics.cloud, LLC; Charles Sanders; Susan Harkrider, U.S. Army DEVCOM C5ISR; Kevin Steffenson, AFRL/RQSA; Scott Gallant, Effective Applications Corporation

MODELING STRUCTURE INTO THE WORLD

Session Chair: Samuel Halverson, L3Harris Technologies

Session Deputy: Einav Kiperman, Independent Consultant

23240 Unreal Oceans: Using Unreal Engine 5 to Simulate Realistic Maritime Vessel Motion
Brandon Rudolph, Matthew Thompson, Mark Thoreson, NSWC Crane

23286 Automated Building Corner Detection for Validating 3D Point Cloud Data
Amy Neuenschwander, Jeff Perry, Center for Space Research; Lori Magruder, Dept. of Aerospace Engineering

23338 Automated Generation of Accurate 3D Building Interiors: Lessons Learned and Challenges
Aaron Katzman, Joseph Moran, Jr., Dignitas Technologies

SIMULATING STRESSY SITUATIONS

Session Chair: Simon Skinner, Thales Training and Simulation

Session Deputy: Susan Harkrider, U.S. Army DEVCOM C5ISR

23275 Techniques for Simulating Data Visualization of the Digital Patient
Liv Weaver, Harleigh Bass, William Marx, Ph.D., Steven Michael Thomas, Chanler Cantor, Intuitive Research and Technology Corporation; Chase Mitchell, M.D., Radiology of Huntsville

23414 Virtual Reality-based Medical Simulation for Pre-Hospital Space Medicine Care: VALOR PHSMCC
Karthik Sarma, M.D., Ph.D., Michael Barrie, M.D., John Dorsch, D.O., Nora Carr, Nilesh Patel, M.D., Michael Poppe, Ph.D., Talia Weiss, Jennifer Polson, Ph.D., Ryan Ribeira, M.D., SimX, Inc.

23180 Creation of a Human-in-the-Loop Simulator Environment for Fifth Generation Stressor Research
Maykel van Miltenburg, Lodewijck Foorthuis, Rolf Zon, Royal Netherlands Aerospace Centre (Royal NLR)

EXTENDING XR TO THE REAL WORLD

Session Chair: Colleen Matthews, U.S. Army PEO STRI

Session Deputy: Paul Bogard, AFMC AFLCMC/WIH

23186 Toward Next Generation Aerial Refueling Airplane Simulator Qualification
Zack Kirkendoll, Brandon McCullough, Michael Millington, James Cook, Ph.D., Brian Morris, CymSTAR, LLC

23309 An XR Authoring Tool for Customizing Aviation Weather Educational Content
Kexin Wang, Jack Miller, Jiwon Kim, Michael C. Dorneich, Ph.D., Eliot Winer, Ph.D., Iowa State University

23388 Using Virtual Reality to Connect Military Families Together: A Diary Study with the Virtual Family Room
Joshua Baldwin, Andrew Rukangu, Kyle Johnsen, Ph.D., Sun Joo (Grace) Ahn, Ph.D., University of Georgia

CYBER ATTACK: THE UNSEEN

Session Chair: Miranda Frost, LogiCore Corporation

Session Deputy: Margaret Nolan, NAWCTSD

23217 Extending PNPSC Player Strategies with Continuous Firing Rates
E. Michael Bearss, Ph.D., CMSP, Trideum Corporation; Mikel Petty, Ph.D., University of Alabama in Huntsville

23303 Cyber Reactive Adversary Framework for Training
Sean Guarino, William Norsworthy, John Steigerwald, David Kelle, Charles River Analytics; Dorsey Wilkin, Patch Plus Consulting

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SIM 8 — WEDNESDAY, 29 NOVEMBER • 1530 • W307B

LEGO MODELING

Session Chair: Connie Perry, U.S. Army PEO STRI
Session Deputy: Maj Matthew Morse, USMC, TECOM

23146 Modeling and Simulation for Hypersonic Missile Threat Assessment
Randal Allen, Ph.D., Lone Star Analysis, Inc.

23279 Integrating New Engagement Types in Live Training Exercises
Tagg LeDuc, Marwane Bahbaz, U.S. Army PEO STRI; Julie Kent, Ph.D., The MITRE Corporation

23398 Iterative and Incremental Validation of Simulation Conceptual Models
Erkin Çilden, Ph.D., Ahmet Sezer, Haluk Canberi, STM Savunma Teknolojileri Mühendislik ve Tic. A.Ş.; Halit Oguztuzun, Ph.D., Middle East Technical University

SIM 9 — THURSDAY, 30 NOVEMBER • 0830 • W307A

SIMULATING COMPLEX THREATS IN COMPLEX ENVIRONMENTS

Session Chair: Susan Harkrider, U.S. Army DEVCOM C5ISR
Session Deputy: Nathan Jones, Problem Solutions, LLC

23151 Adding Weather to Wargame Simulation
Hung Tran, CAE USA; John Wokurka, BAE Systems, Inc.

23256 ELMO (Electromagnetic Layer for Multi-domain Operations) Developing and Testing Activities
LTC Piergiorgio Ventura, CPT Salvatore De Mattia, NATO Modelling & Simulation Centre of Excellence

23457 Numerical Study of Ammonium Nitrate/Fuel Oil Detonations for Large Scale Pattern of Life Simulations
Mike Theophanides, CAE Inc.

SIM 10 — THURSDAY, 30 NOVEMBER • 1030 • W307A

REPRESENTING ATYPICAL PATTERNS

Session Chair: Craig Unrath, Trideum Corporation
Session Deputy: Thomas Kehr, Ph.D., CESI

23335 A Structure for Representing Critical Infrastructures
Edward Carmona, Freddie Santiago, Dignitas Technologies

23370 Evaluation of Open-Source Data for Gray-zone Operations Decision-Systems
Robert Ducharme, Ph.D., Colby McAlexander, Brian Mills, Jay Freeman, CAE USA

23448 Simulating Civil Security Activities in Stability Operations
Susan Aros, Ph.D., Mary McDonald, Naval Postgraduate School

SIM 11 — THURSDAY, 30 NOVEMBER • 1330 • W307A

COMPLEX FUTURE OPERATIONAL ENVIRONMENTS

Session Chair: Glenn Hodges, Ph.D., Mile Two, LLC
Session Deputy: Ray Compton, LMI

23257 Modelling & Simulation in Support of a Comprehensive CBRN Layer Development
LTC Piergiorgio Ventura, CPT Salvatore De Mattia, NATO Modelling & Simulation Centre of Excellence

23284 Comparison of Visualization Technologies to Support RCAF Training Modernization
Maj Jason Munn, RCAF AWC; Jerzy Jarmasz, Ph.D., DRDC; Capt Daniel Deluce, RCAF AWC

TRAINING

TR 1 — TUESDAY, 28 NOVEMBER • 1400 • W307D

SIMULATION IS BETTER, RIGHT?!

Session Chair: Perry McDowell, MOVES Institute
Session Deputy: Gernai Bledsoe, USAF AFLCMC/WNS

23331 Cybersickness Considerations for Curricula Using Virtual Reality Training Systems
Nicholas Adriaanse, NSWCDD DNA

23333 Simulators Provide Adequate Training – Says Who?
Alexxa Bessey, Ph.D., Mark Schroeder-Strong, Brian Schreiber, Aptima, Inc.; Steven Macut, BGI, LLC; Wink Bennett, Ph.D., AFRL

TR 2 — WEDNESDAY, 29 NOVEMBER • 0830 • W307D

STRUCTURED CHAOS

Session Chair: Wendy Johnson, Ph.D., HQ AETC/A5X – TR2
Session Deputy: Nir Keren, Ph.D., Iowa State Universit

23203 Mixed Reality Bloodstain Pattern Analysis Simulation Training System
Terence Teng, Derek Chong, Saravana Kumar, Ph.D., Meng Fai Ying, Home Team Science and Technology Agency; Pei Pei Lei, Denzyl Tai, Jaya Ganase, Siong Chun, Shawn Foo, Singapore Police Force

23228 Exploring Multimodal Blended Environments for Medical Training and Simulation
Darin Hughes, Ph.D., Edward Stadler, Liam O'Neill, SIMETRI, Inc.; William Pike, Ph.D., U.S. Army DEVCOM SC STTC

23308 Enabling Point of Injury Care in Live Force-on-Force Exercises
Matthew Hackett, Ph.D., Mark Mazzeo, Jack Norfleet, Ph.D., U.S. Army DEVCOM SC STTC; Darin Hughes, Angela Alban, Edward Stadler, SIMETRI, Inc.; Conner Parsey, U.S. Army DEVCOM SC STTC; Brian VanVoorst, Nicholas Walczak, Raytheon BBN Technologies

| TR 3 | WEDNESDAY, 29 NOVEMBER • 1030 • W307D |

DISTRIBUTED TRAINING: ANYTIME, ANYWHERE

Session Chair: Tim Woodard, NVIDIA
Session Deputy: Jennifer Serra, Collins Aerospace

23224 Warfighter Readiness: Virtual Training on Demand
Jennifer Quinton, Arorae Corporation; William Rossi, Tactical Training Group Pacific; Brian Roder, Huntington Ingalls Industries; J. Garrick Sheatzley, EWTGLANT

23271 Simulating the Whole Picture with Distributed Mixed LVC
Emilie Reitz, Joint Staff J6; Kevin Seavey, Joint Staff J6 Joint Fires Integration Division; Major Sander Cruiming, Royal Netherlands Army; Justin Wright, Huntington Ingalls Industries

23248 Can Synthetic Coaching Using an Immersive Training Device Effectively Train Student Pilots? A Field Study
Sandro Scielzo, Ph.D., Gary Eves, Ph.D., Beth Hartzler, Ph.D., CAE USA

| TR 4 | WEDNESDAY, 29 NOVEMBER • 1330 • W307D |

REALITY RE-IMAGINED

Session Chair: Luis Velazquez, MARCORSYSCOM
Session Deputy: Julie Suereth, NSWC PCD/PM TRASYS

23103 RFID Sensing and Analytics to Improve Team Training
Samantha Dubrow, Ph.D., Michael Fine, Ph.D., Brian Colder, Ph.D., Abdul Noor, Anthony Santago II, Ph.D., The MITRE Corporation

23119 The Coast Guard Investigating Officer Course: An Analysis and Redesign Using Immersive Technologies
LCDR John Botti, III, U.S. Coast Guard

23321 Immersive Space Operations Training in Extended Reality
Daniel Stouch, Rob Hyland, Susan Latiff, Ph.D., Sean Guarino, Kimberly Brady, Dan Duggan, Charles River Analytics, Inc.

| TR 5 | WEDNESDAY, 29 NOVEMBER • 1530 • W307D |

LEARNING TO TRAIN, TRAINING TO LEARN

Session Chair: Liz Gehr, Ph.D., The Boeing Company
Session Deputy: Benjamin Goldberg, Ph.D., U.S. Army DEVCOM SC STTC

23251 Failure is an Option: Implementing Safe Failure as Learning Strategy
Cami Sims, Thea Albertson, Sharon Rosenthal, Serco, Inc.

23396 On Episodic Memory in Experiential Learning via Flightcrew Training Simulations
Nathan Sonnenfeld, Caroline Gomez, Florian Jentsch, Ph.D., Blake Nguyen, Stephen Fiore, Ph.D., Institute for Simulation & Training, University of Central Florida

23401 Immersive Aviation Training Design Driven by the Science of Learning
CDR Adam Jackson, Andrew Clayton, Ph.D., Air University

| TR 6 | THURSDAY, 30 NOVEMBER • 0830 • W307D |

TOYS TO TASK

Session Chair: Mike Thorpe, Serco, Inc.
Session Deputy: Eric Carrasco, NSWC PCD/PM TRASYS

23140 Media and Fidelity Analysis: Predicting Technological Training Requirements for Unidentified Future Vertical Lift Program
Matthew Pierce, Jacob Entinger, Mitchell Tindall, Ph.D., Emily Anania, Ph.D., Beth Atkinson, James Pharmer, Ph.D., NAWCTSD

23166 On Approach to Reality: The Impact of a Simulated Air Traffic Control Environment (SATCE) on Workload and Situational Awareness in Military Aviators
Jonathan Allsop, Ph.D., Richard Keeling, RAF Central Flying School

| TR 7 | THURSDAY, 30 NOVEMBER • 1030 • W307D |

DATA…MAKE IT MATTER!

Session Chair: Marwane Bahbaz, U.S. Army PEO STRI
Session Deputy: Nancy Russell, Northrop Grumman

23184 Data-Driven and Personalized Training as a Service Infrastructure & Techologies
Manfred Roza, Guido Tillema, Royal Netherlands Aerospace Centre (Royal NLR)

23198 A Machine Learning Approach for Identiying At-Risk Students in Learning Record Stores: A Case Study Using USALearning Experience API
Paul Jesukiewicz, Office of Personnel Management (OPM) USALearning; Jim Bilitski, Ph.D., University of Pittsburgh at Johnstown; Rob Chadwick, Jonathan Poltrack, Veracity Technology Consultants; John DeCore, PowerTrain

23409 Digitizing Performance and Competencies
Robby Robson, Ph.D., Fritz Ray, Gregg Connell, Eduworks Corporation; Shelly Blake-Plock, Cliff Casey, Yet Analytics, Inc.; Benjamin Goldberg, Ph.D., U.S. Army DEVCOM SC STTC; Kevin Owens, Applied Research Laboratories: The University of Texas at Austin

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FRIDAY, 1 DECEMBER 2023 — PROFESSIONAL DEVELOPMENT WORKSHOPS

LOCATION: Orange County Convention Center, West Concourse, note room assignments below.

DATE: Friday, 1 December

TIMES: 0700 – 0800   Continental Breakfast and Registration
0800 – 1200   All Sessions

WHO MAY ATTEND? All registrants of I/ITSEC are welcome to attend – I/ITSEC badge is required for entry.

FEES: There is no fee for I/ITSEC Conference Registrants/Exhibitors – I/ITSEC badge required for entry.

CEU/CLP: Paid I/ITSEC Conference registrants are eligible to receive CEU/CLP credits. If not a paid attendee, a $50 fee will be charged only if you wish to receive the CEU credits.

REGISTRATION: Registration for individual workshops is not required. Workshops fill on a first-come, first-serve basis. Please arrive early for topics that interest you the most — **seating is limited**. If you wish to receive CEU credits, be sure to request CEUs during your conference registration. You may update your registration to include CEUs at any time at **http://www.iitsec.org/attend/registration-fees**

LUNCH: On own

Workshop Schedule:

0700   Continental Breakfast and Registration

0800 – 1200   All Sessions
- Fundamentals of Artificial Intelligence for Simulation-Based Training
- Certified Modeling and Simulation Professional 3.0
- Serious Game Design Workshop
- From the Last of Us to the First of Us: Rebuilding after a Zombie Crisis
- Demystifying Learning Engineering and Immersive Design: The Workshop
- Cognitive Load Assessment During Training in Immersive Environments
- Using DDS for Distributed Training Simulators
- Disrupt, Design, Deploy: A Human-Centered Approach to Learning and Development

PDW 1 • ROOM W308A
FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE FOR SIMULATION–BASED TRAINING
23W2

Presenters: Robert Sottilare, Ph.D., Brice Colby, Ph.D., Randolph Jones, Ph.D., CMSP, Soar Technology, LLC

This half-day professional development workshop is designed to provide participants with a comprehensive overview of the fundamentals of artificial intelligence (AI) in the context of simulation-based training. Through a combination of lectures, hands-on activities, and case studies, participants will gain a deeper understanding of the key concepts and technologies in this field, and will learn how to apply these methods to improve the quality and effectiveness of simulation-based training.

PDW 2 • W308B
CERTIFIED MODELING AND SIMULATION PROFESSIONAL 3.0
23W15

Presenter: Ivar Oswalt, Ph.D., CMSP, The MIL Corporation

The Certified Modeling and Simulation Profession (CMSP) certification program has been reinvented and reintroduced to the M&S community as CMSP 3.0. The certification's application process has been streamlined, the examination updated, and an approach to ensure readily available reference material developed, amongst many other additional improvements. This proposal is to conduct a CMSP 3.0 Professional Development Workshop. This four-hour session will describe the requirements needed to achieve this valuable certification. It will cover the application and examination processes including education, work experience, and reference requirements for the Apprentice, Practitioner, and Master Levels; application processes; how the exam is administered and scored; and the role of continuing education in certificate renewal. It will also provide timely insights into preparing for and achieving this certification including, new in 2023, review of sample questions from each of the three certification levels. It will discuss fundamental M&S topics covered in the exams and will also include several relevant simulation videos. Finally, the workshop will conclude with two enjoyable interactive game-show style exercises to summarize the material covered, a rapid-fire question and answer game, as well as a round-table discussion regarding ongoing efforts to ensure this certification's future success. The proposed Professional Development Workshop would be provided by Ivar Oswalt — a Senior M&S Expert that is CMSP Certified, that has been an integral part of its reinvention, and that has previously led CMSP Professional Development Workshops.

PDW 3 • ROOM W308D

SERIOUS GAME DESIGN WORKSHOP
23W10

Presenters: Vance Souders, Thermo Fisher Scientific; Radhakishan R. Shetty, JANUS Research Group

During this workshop, participants will be introduced to key concepts, steps, and processes involved in designing a game for learning. Through hands-on activities and working together in groups, participants will work through the initial phases of the design process. Participants will identify a topic, audience, training requirements and learning objectives, creating an effective story, determining instructional and gaming strategies, designing key game mechanics, and choosing the appropriate delivery technology. Presenters will facilitate the groups and give examples from past experiences and provide examples from the Serious Game Showcase and Challenge.

PDW 4 • ROOM W207C

FROM THE LAST OF US TO THE FIRST OF US: REBUILDING AFTER A ZOMBIE CRISIS
23W7

Presenter: Tamara Griffith, Ph.D., U.S. Army DEVCOM SC STTC; Patricia Bockelman, Ph.D., SAIC; Joan Johnston, Ph.D.; Sarah Matthews, Ph.D., Health Communications Consultants Inc.; Lisa Townsend, U.S. Army DEVCOM SC STTC; Grant Johnston

WE SURVIVED THE APOCALYPSE!!!... Now what?

This workshop takes participants through a post-crisis timeline in which the decisions and actions taken today will impact scenarios tomorrow. This is an interdisciplinary exploration of how a civilized society might thrive, or fail to survive, after a potential infrastructure collapse. While the scenario uses metaphor for engagement (the zombies), it is inspired by a combination of real-world events involving public health, national security, and public resources (e.g. transportation, supply chain, cyber/information). Nested in this fictional storyline, participants will establish needed resources, skills, and new social norms and by doing so, these participants will create the world that next year's I/ITSEC participants inherit. Participant groups will represent various perspectives as they try to transition from "survival" to recovery and (hopefully) "thriving". While the storyline is fantastic, the scenarios pose challenges that call for real decision-making strategies, negotiation skills, and short-/long-term planning; the scenarios demand the same types of skills as actual recovery requires. This is intended to be a multi-year exploration with the results of the previous year feeding a paper for the next year, and a workshop that starts where the previous year's workshop ends pursuing a stable and sustainable future. The immediate and longitudinal data from this format will provide insights into tacit knowledge involved in complex team problem-solving. Come for the fun; learn from the insights!

You may have outlived the zombies, but can you thrive with whatever unfolds next? At the end of the workshop participants should understand the 4 dimensions of teamwork and how team self-correction during an after action review can improve teamwork.

PDW 5 • ROOM W208A

DEMYSTIFYING LEARNING ENGINEERING AND IMMERSIVE DESIGN: THE WORKSHOP
23W12

Presenters: Jeanine DeFalco, Ph.D., University of New Haven; Marina Halter, Emily Ouellette

Designing virtual reality (VR) training simulations may not seem difficult at a glance, but even the simplest interactions can be complex in the VR space. In this workshop, participants will experience what it's like to go through the design process, create a prototype, and iterate until a final product is produced. Participants will review the basics of learning engineering, immersive design, and constructivist learning theory, and come to understand how these disciplines are leveraged to construct training simulations. Participants will identify important traits, skills, and capabilities that combine into up-skilling an immersive learning engineer. Participants will be introduced to how learning engineering combines fundamentals of instructional designers and learning experience designers (LXDs) while simultaneously engaging in collaborative design work as part of a cross-functional design team. Best practices for engineering dynamic immersive learning experiences will be discussed.

PDW 6 • ROOM W208B

COGNITIVE LOAD ASSESSMENT DURING TRAINING IN IMMERSIVE ENVIRONMENTS
23W13

Presenter: Andrew Beall, Ph.D., Matthias Pusch, Bryce Armstrong, Todd Hartwig, WorldViz VR

Join us for a hands-on workshop where we will explore the measurement of cognitive load and the application of immersive training simulators. Researchers and developers will delve into projection-based simulation room technology, a robust alternative to head-mounted displays, offering enhanced realism and interaction capabilities vital for standardized training processes. With the Tactical Combat Casualty Care (TCCC) protocol serving as our case study, participants will learn to integrate cognitive load measurements into simulation scenarios. Attendees will gain practical experience with an immersive projection system and learn how to capture 360 degree photographic scenes for evoking contextual cues. An experimental session will allow some participants to have their cognitive load measured under various conditions, and then all participants will be able to conduct real-time data analysis guidance using open-source tools. This workshop is designed to equip attendees with an understanding of cognitive load measurement, immersive training technology, and data analysis for effective training simulator development.

PROFESSIONAL DEVELOPMENT
WORKSHOPS

DOWNLOAD
MOBILE APP

PDW 7 • ROOM W308C

USING DDS FOR DISTRIBUTED
TRAINING SIMULATORS
23W4

Presenter: Andre Odermat, John Breitenbach, Real-Time Innovations

This workshop outlines the use of the Object Management Group® (OMG®) Data Distribution Service (DDSTM) standard in distributed Live, Virtual, & Constructive (LVC) simulation, with a focus on the security capabilities provided by DDS. DDS provides a comprehensive middleware solution for data distribution, and its security features are crucial for LVC simulation in sensitive environments. The tutorial covers DDS fundamentals, such as configuring DDS for LVC simulation, designing DDS entities and the DDS data model, and integrating DDS with LVC simulations. It also highlights best practices and case studies for DDS implementation. Additionally, the tutorial emphasizes the security features of DDS, such as authentication, access control, data encryption, and data integrity, which are essential for securing data in distributed simulation environments.

Integrating global simulation training systems can be a formidable challenge. Legacy simulators often use different standards. Modern architectures require the use of cloud-based distributed assets. To top it off, security requirements now force integrators to become experts in information assurance. Winning solutions will be the ones that create synthetic training environments that can quickly be assembled and reconfigured from ready-made components.How can simulation systems integrators keep pace by limiting integration time to meet these requirements? Attend this tutorial to learn how DDS can ease integration, while also delivering National Security Agency (NSA)-tested security for distributed training systems over any transport."

PDW 8 • ROOM W208C

DISRUPT, DESIGN, DEPLOY:
A HUMAN–CENTERED APPROACH
TO LEARNING AND DEVELOPMENT
23W14

Presenter: Sydney Heimbrock, Ph.D., Ryan Twedell, Cydney Miller, Qualtrics

The discipline of Learning Engineering has emerged as mission critical for enabling evidence-based designs for improved learning outcomes. Harvard University's Huntington Lambert defines Learning Engineers as understanding the "who" an organization is teaching, and the "what" the learning must deliver, in order to design the "how" of learning experiences. Because humans are at the center of this challenge, the methods and tools of human centered design are critical for effective learning design, development and delivery. This workshop will give participants an immersive experience in Human Centered Design (HCD) for Learning and Development. The workshop will kick off with a brief presentation framing the value, history and outcomes of HCD as it relates to the future of learning. Participants will learn and practice HCD by applying the framework, methods and tools to a real government learning experience use case.

Participants will learn the four key phases of the HCD process:
- Discover
- Reframe
- Implement, measure and continuously improve

For each phase of the HCD process, facilitators will present the principles, methods and tools, then support participant small groups to apply them in the room to design the future of learning in their organizations. Participants will then explore how to apply HCD to digital learning ecosystems through automated qualitative data collection and analysis. Participants will leave the workshop educated, inspired and equipped to apply a human centered approach to their learning design, delivery and evaluation strategies.