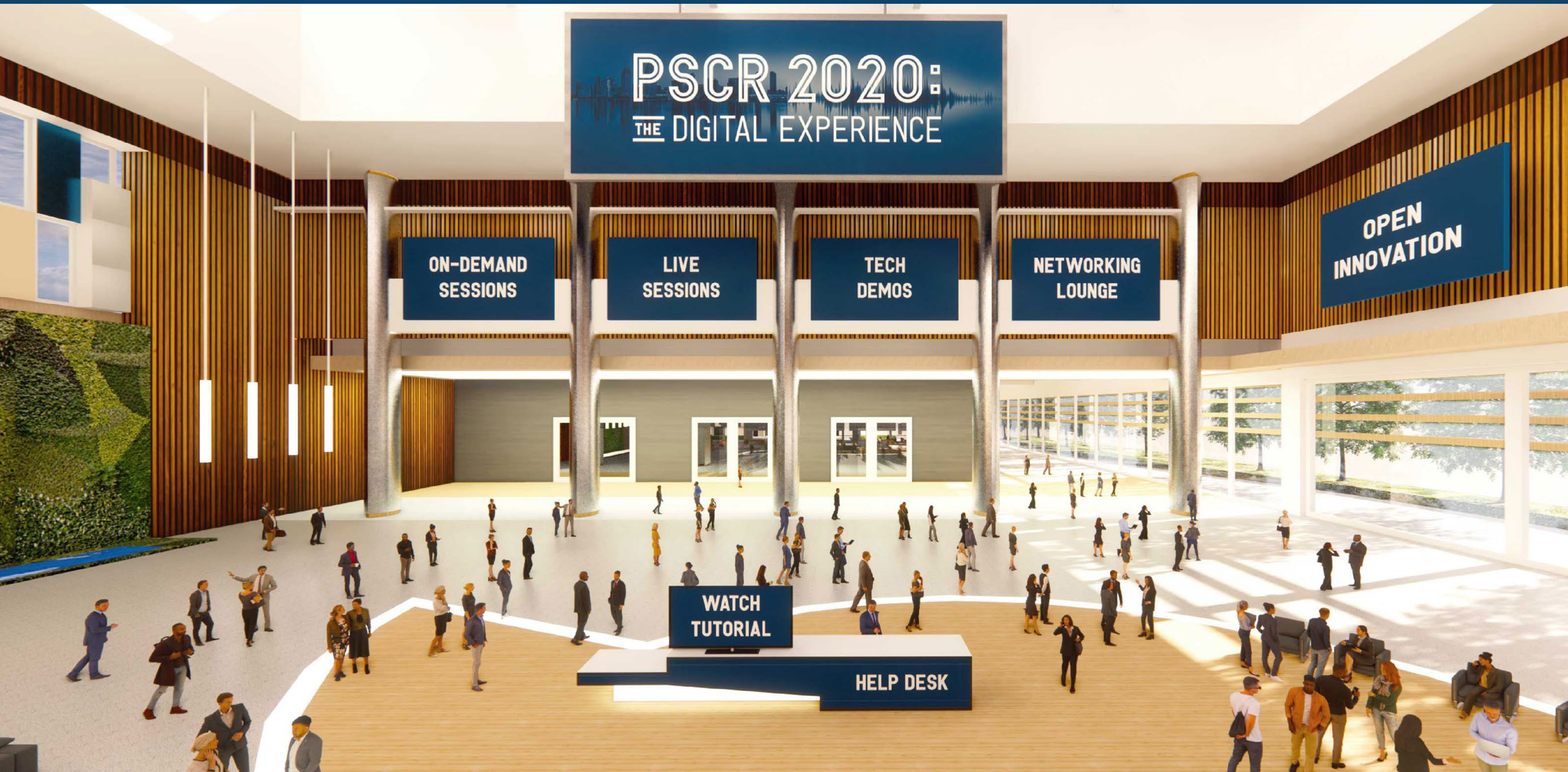
PUBLIC SAFETY COMMUNICATIONS RESEARCH

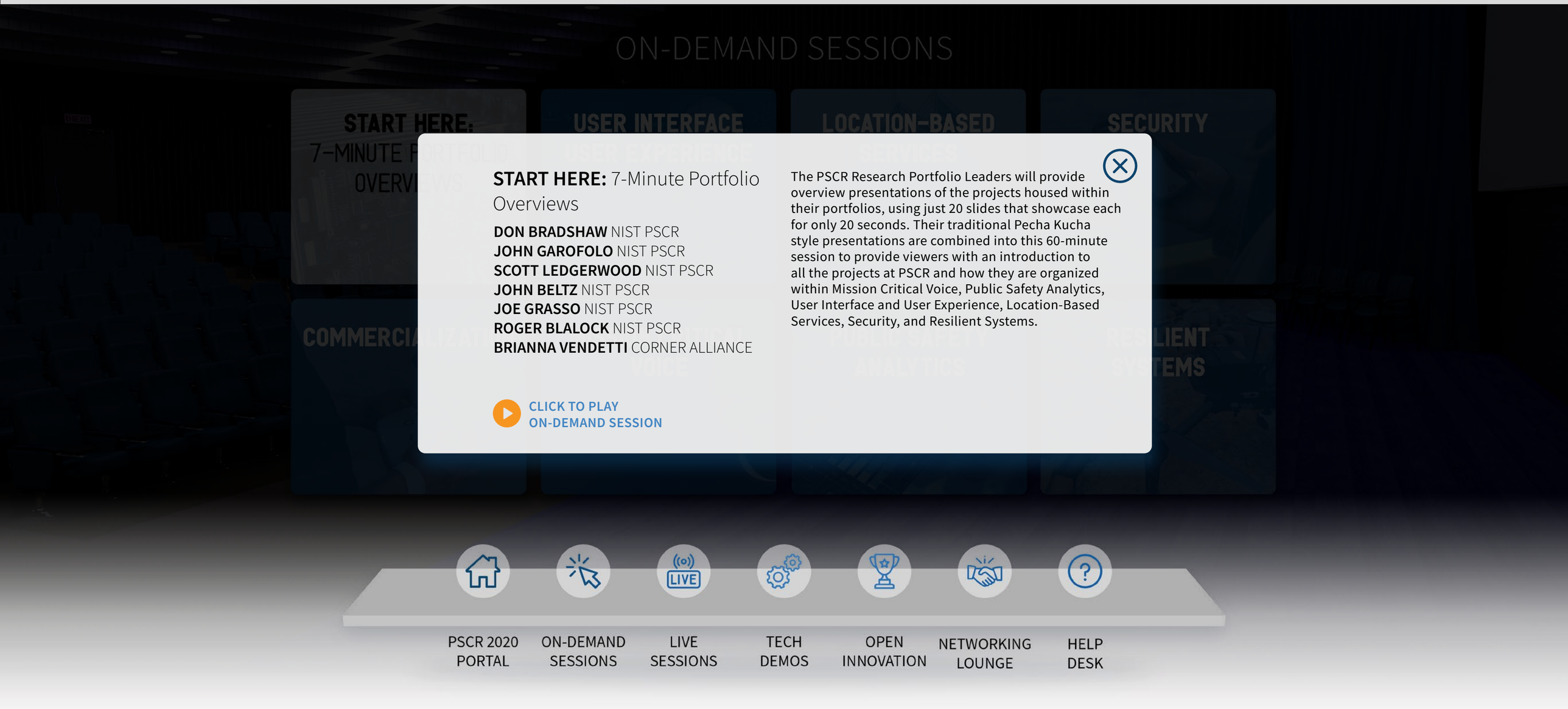
PSCR

NIST National Institute of Standards and Technology U.S. Department of Commerce



ON-DEMAND SESSIONS

- START HERE: 7-MINUTE PORTFOLIO OVERVIEWS
- USER INTERFACE USER EXPERIENCE
- LOCATION-BASED SERVICES
- SECURITY
- COMMERCIALIZATION
- MISSION CRITICAL VOICE
- PUBLIC SAFETY ANALYTICS
- RESILIENT SYSTEMS



START HERE: 7-Minute Portfolio Overviews

DON BRADSHAW NIST PSCR
JOHN GAROFOLO NIST PSCR
SCOTT LEDGERWOOD NIST PSCR
JOHN BELTZ NIST PSCR
JOE GRASSO NIST PSCR
ROGER BLALOCK NIST PSCR
BRIANNA VENDETTI CORNER ALLIANCE

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ON-DEMAND SESSION

The PSCR Research Portfolio Leaders will provide overview presentations of the projects housed within their portfolios, using just 20 slides that showcase each for only 20 seconds. Their traditional Pecha Kucha style presentations are combined into this 60-minute session to provide viewers with an introduction to all the projects at PSCR and how they are organized within Mission Critical Voice, Public Safety Analytics, User Interface and User Experience, Location-Based Services, Security, and Resilient Systems.

ON-DEMAND SESSIONS

BACK

USER INTERFACE USER EXPERIENCE

LEGEND
- ●○○ Beginner
- ●●○ Intermediate
- ●●● Advanced

Prototyping 3D User Interfaces for First Responders
CLICK TO PLAY ON-DEMAND SESSION
●●○ MORE INFO

Immersive Ballistic Simulation in Virtual Reality
CLICK TO PLAY ON-DEMAND SESSION
●●○ MORE INFO

7000+ First Resonders Have More to Say: Nationwide Usability Survey Results at Your Fingertips
CLICK TO PLAY ON-DEMAND SESSION
●○○ MORE INFO

Building Virtual Reality for Public Safety
CLICK TO PLAY ON-DEMAND SESSION
●●○ MORE INFO

CHARIoT Prize Challenge Discussion
CLICK TO PLAY ON-DEMAND SESSION
●○○ MORE INFO

Cameras That Understand Your Needs
CLICK TO PLAY ON-DEMAND SESSION
●○○ MORE INFO

First Responder Feedback on a VR Emergency Response Scenario and User Interface
CLICK TO PLAY ON-DEMAND SESSION
●○○ MORE INFO

ARTEMIS: Measuring Usability in a Virtual Environment
CLICK TO PLAY ON-DEMAND SESSION
●○○ MORE INFO

ON-DEMAND SESSIONS

BACK

USER INTERFACE USER EXPERIENCE

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Simulating Next-Generation Public Safety User Interfaces in Virtual Reality
CLICK TO PLAY ON-DEMAND SESSION
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Mixed Reality Training and Testing Facility for First Responders (VALOR)
CLICK TO PLAY ON-DEMAND SESSION
●○○ MORE INFO

FirstSimVR: Prototyping the Future Using Today's VR
CLICK TO PLAY ON-DEMAND SESSION
●●○ MORE INFO

Personalized Wayfinding System Based on Real-Time Cognitive Load Measures
CLICK TO PLAY ON-DEMAND SESSION
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Believability with Actionable Metrics
CLICK TO PLAY ON-DEMAND SESSION
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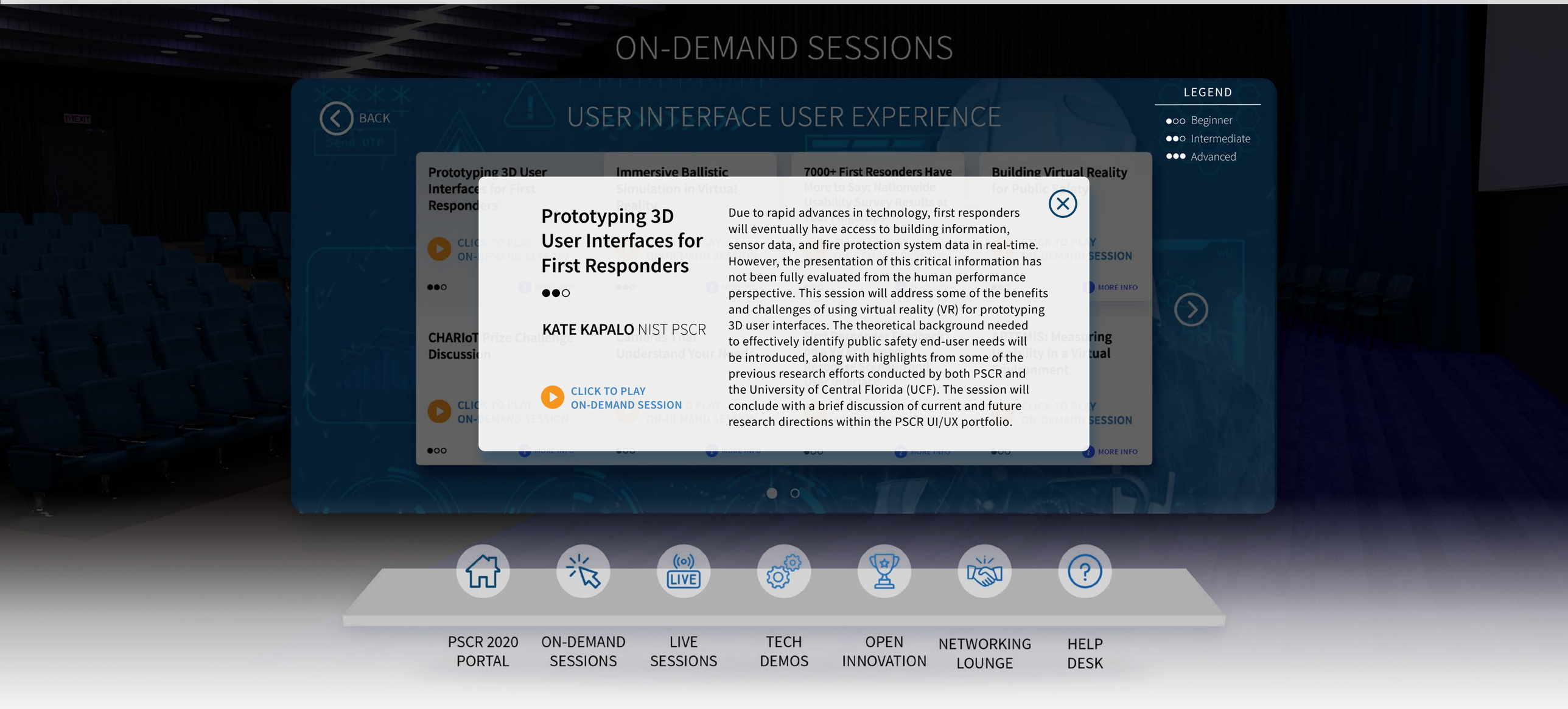
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Prototyping 3D User Interfaces for First Responders
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KATE KAPALO NIST PSCR
CLICK TO PLAY ON-DEMAND SESSION
Due to rapid advances in technology, first responders will eventually have access to building information, sensor data, and fire protection system data in real-time. However, the presentation of this critical information has not been fully evaluated from the human performance perspective. This session will address some of the benefits and challenges of using virtual reality (VR) for prototyping 3D user interfaces. The theoretical background needed to effectively identify public safety end-user needs will be introduced, along with highlights from some of the previous research efforts conducted by both PSCR and the University of Central Florida (UCF). The session will conclude with a brief discussion of current and future research directions within the PSCR UI/UX portfolio.
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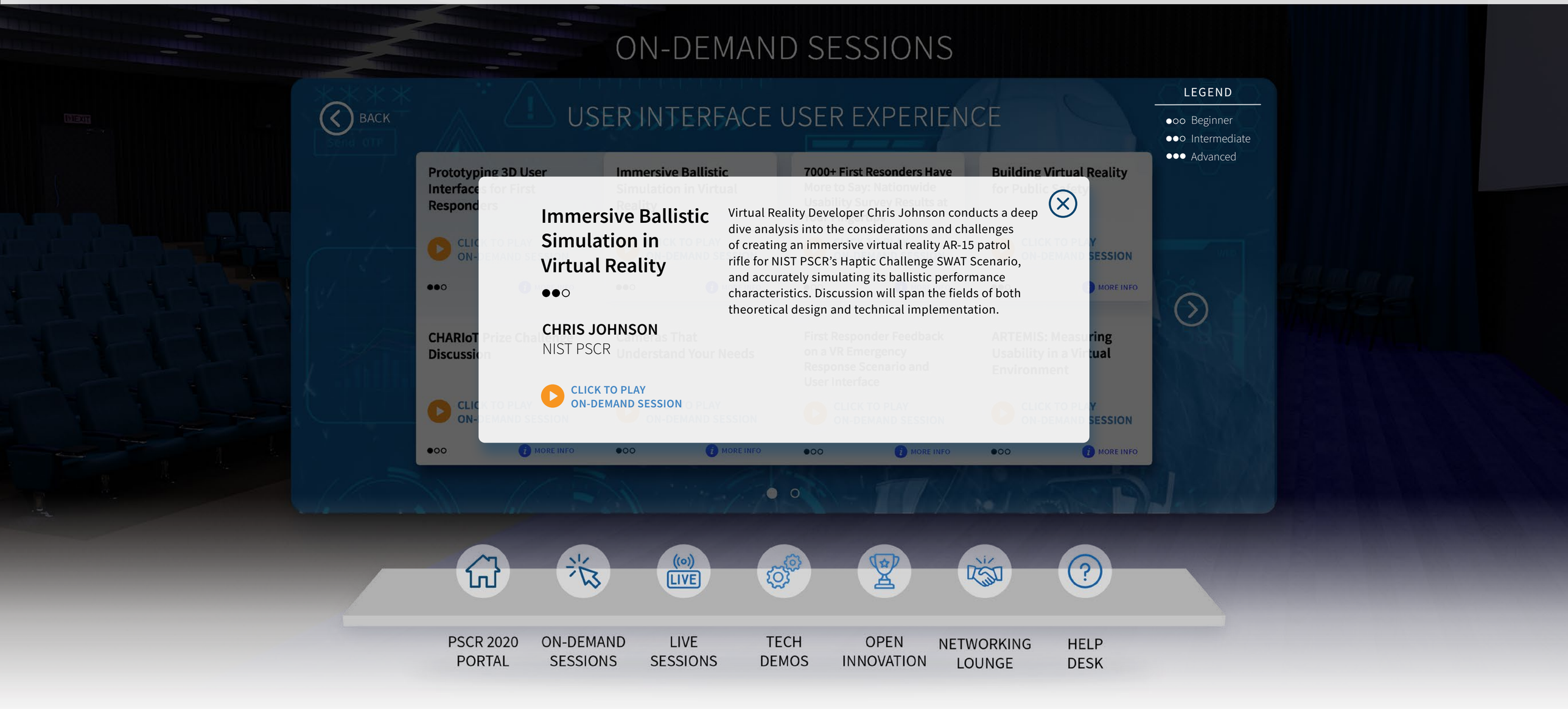
ON-DEMAND SESSIONS
LIVE SESSIONS
TECH DEMOS
OPEN INNOVATION
NETWORKING LOUNGE
HELP DESK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CLICK TO PLAY ON-DEMAND SESSION
MORE INFO
Immersive Ballistic Simulation in Virtual Reality
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Virtual Reality Developer Chris Johnson conducts a deep dive analysis into the considerations and challenges of creating an immersive virtual reality AR-15 patrol rifle for NIST PSCR's Haptic Challenge SWAT Scenario, and accurately simulating its ballistic performance characteristics. Discussion will span the fields of both theoretical design and technical implementation.
CHRIS JOHNSON
NIST PSCR
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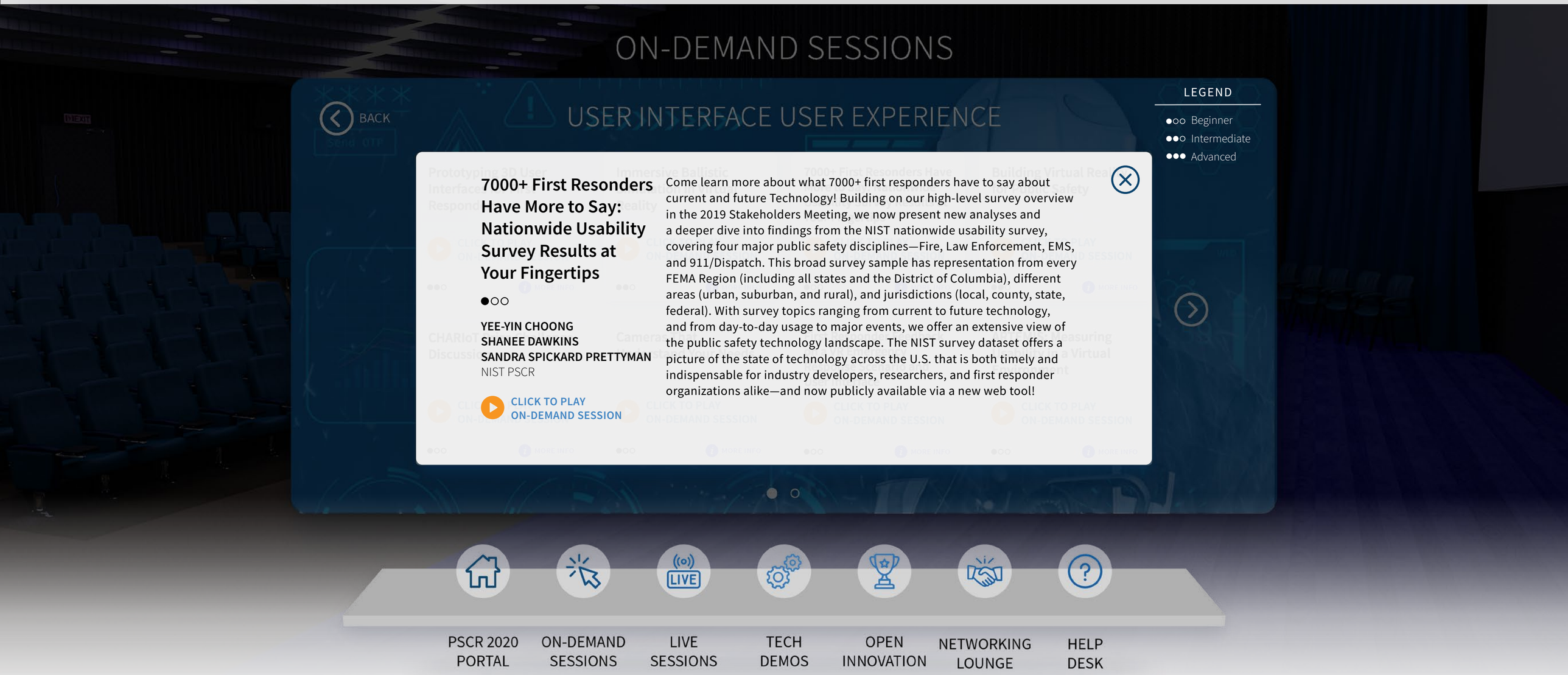
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YEE-YIN CHOONG
SHANEE DAWKINS
SANDRA SPICKARD PRETTYMAN
NIST PSCR
CLICK TO PLAY ON-DEMAND SESSION
Come learn more about what 7000+ first responders have to say about current and future Technology! Building on our high-level survey overview in the 2019 Stakeholders Meeting, we now present new analyses and a deeper dive into findings from the NIST nationwide usability survey, covering four major public safety disciplines—Fire, Law Enforcement, EMS, and 911/Dispatch. This broad survey sample has representation from every FEMA Region (including all states and the District of Columbia), different areas (urban, suburban, and rural), and jurisdictions (local, county, state, federal). With survey topics ranging from current to future technology, and from day-to-day usage to major events, we offer an extensive view of the public safety technology landscape. The NIST survey dataset offers a picture of the state of technology across the U.S. that is both timely and indispensable for industry developers, researchers, and first responder organizations alike—and now publicly available via a new web tool!
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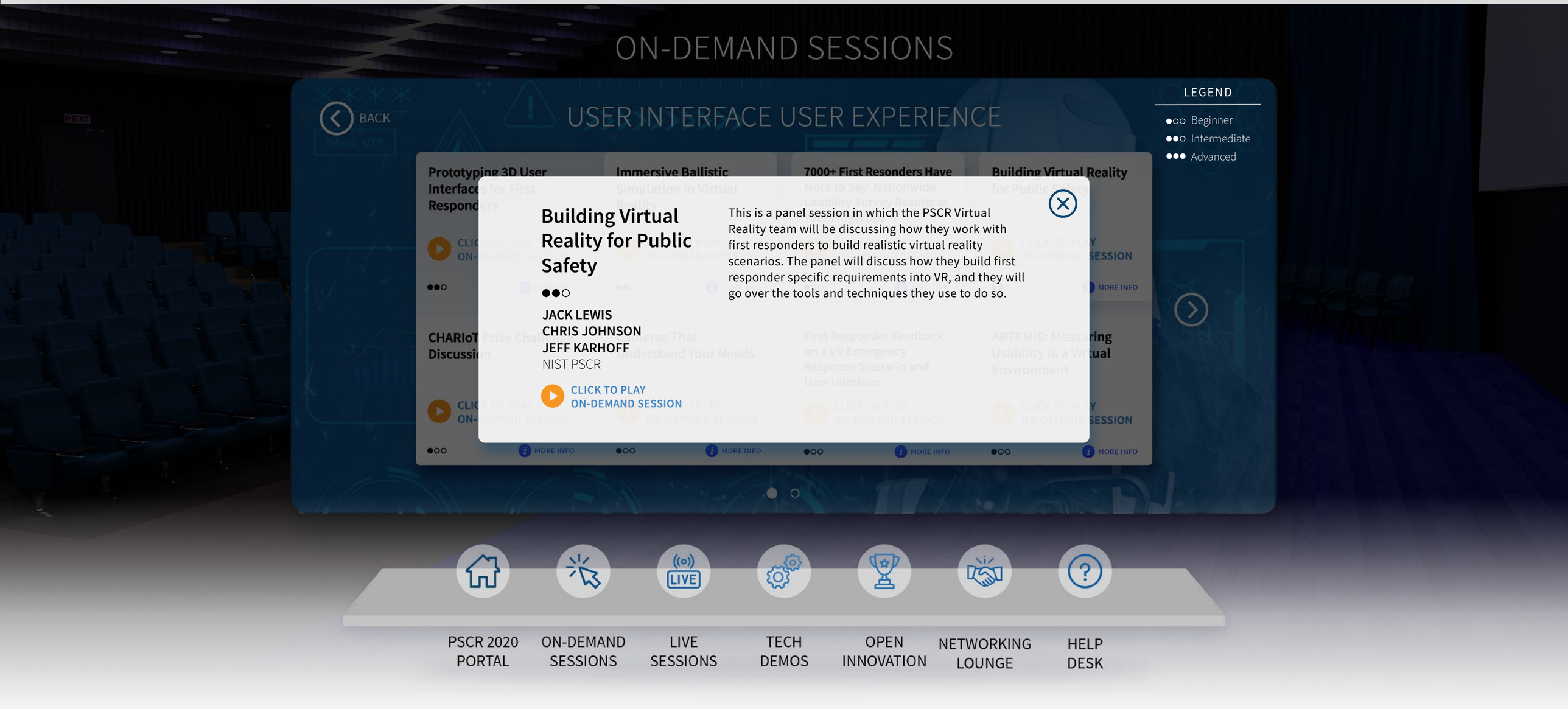
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MORE INFO
Building Virtual Reality for Public Safety
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JACK LEWIS
CHRIS JOHNSON
JEFF KARHOFF
NIST PSCR
CLICK TO PLAY ON-DEMAND SESSION
This is a panel session in which the PSCR Virtual Reality team will be discussing how they work with first responders to build realistic virtual reality scenarios. The panel will discuss how they build first responder specific requirements into VR, and they will go over the tools and techniques they use to do so.
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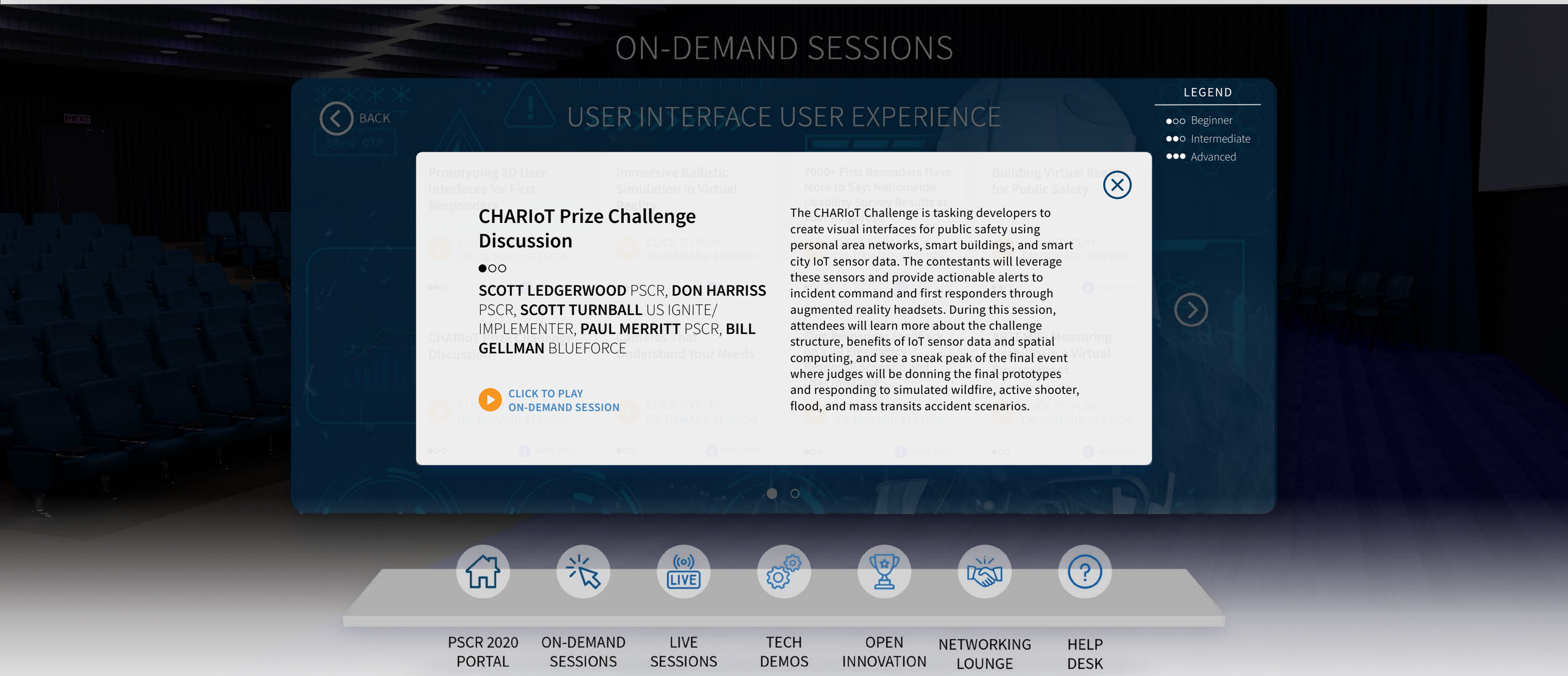
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SCOTT LEDGERWOOD PSCR, DON HARRISS PSCR, SCOTT TURNBALL US IGNITE/ IMPLEMENTER, PAUL MERRITT PSCR, BILL GELLMAN BLUEFORCE
CLICK TO PLAY ON-DEMAND SESSION
The CHARIoT Challenge is tasking developers to create visual interfaces for public safety using personal area networks, smart buildings, and smart city IoT sensor data. The contestants will leverage these sensors and provide actionable alerts to incident command and first responders through augmented reality headsets. During this session, attendees will learn more about the challenge structure, benefits of IoT sensor data and spatial computing, and see a sneak peak of the final event where judges will be donning the final prototypes and responding to simulated wildfire, active shooter, flood, and mass transits accident scenarios.
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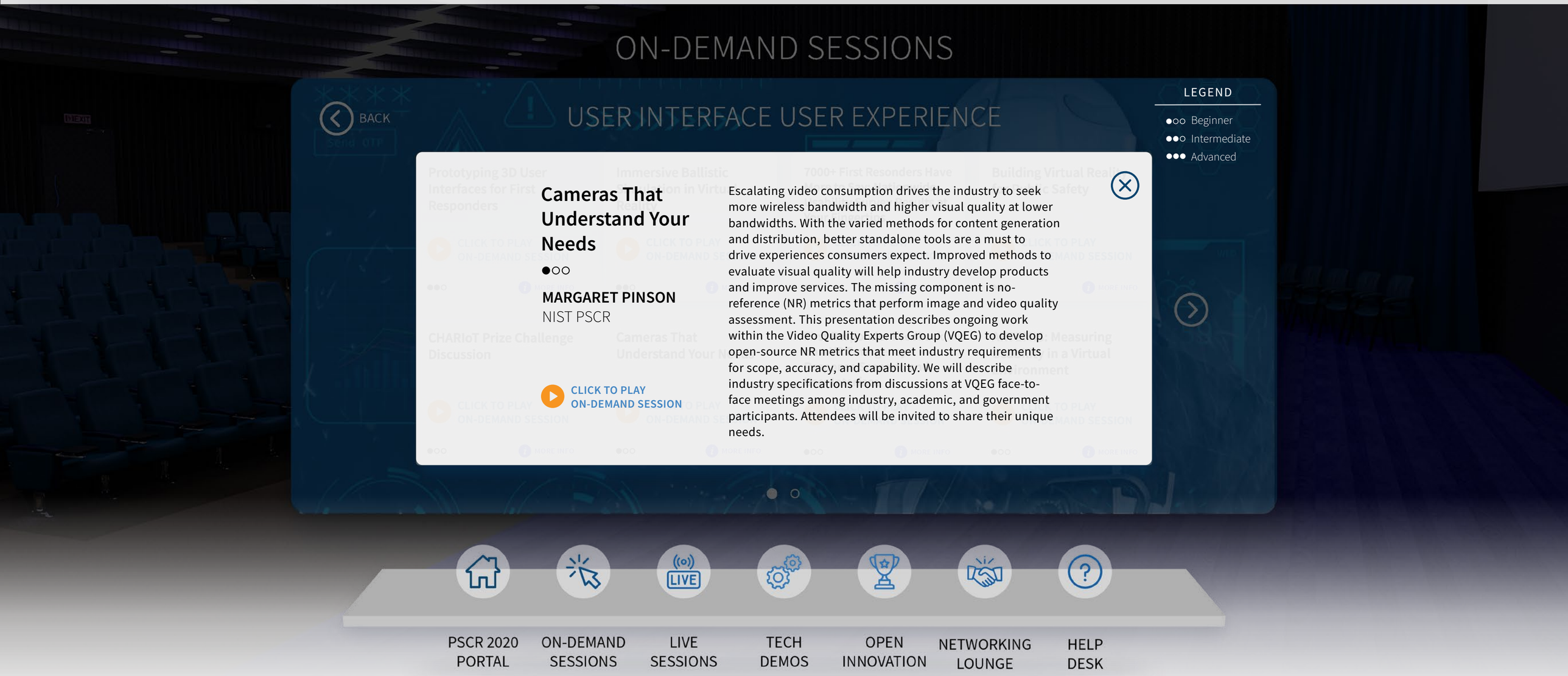
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Cameras That Understand Your Needs
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MARGARET PINSON
NIST PSCR
CLICK TO PLAY ON-DEMAND SESSION
Escalating video consumption drives the industry to seek more wireless bandwidth and higher visual quality at lower bandwidths. With the varied methods for content generation and distribution, better standalone tools are a must to drive experiences consumers expect. Improved methods to evaluate visual quality will help industry develop products and improve services. The missing component is no-reference (NR) metrics that perform image and video quality assessment. This presentation describes ongoing work within the Video Quality Experts Group (VQEG) to develop open-source NR metrics that meet industry requirements for scope, accuracy, and capability. We will describe industry specifications from discussions at VQEG face-to-face meetings among industry, academic, and government participants. Attendees will be invited to share their unique needs.
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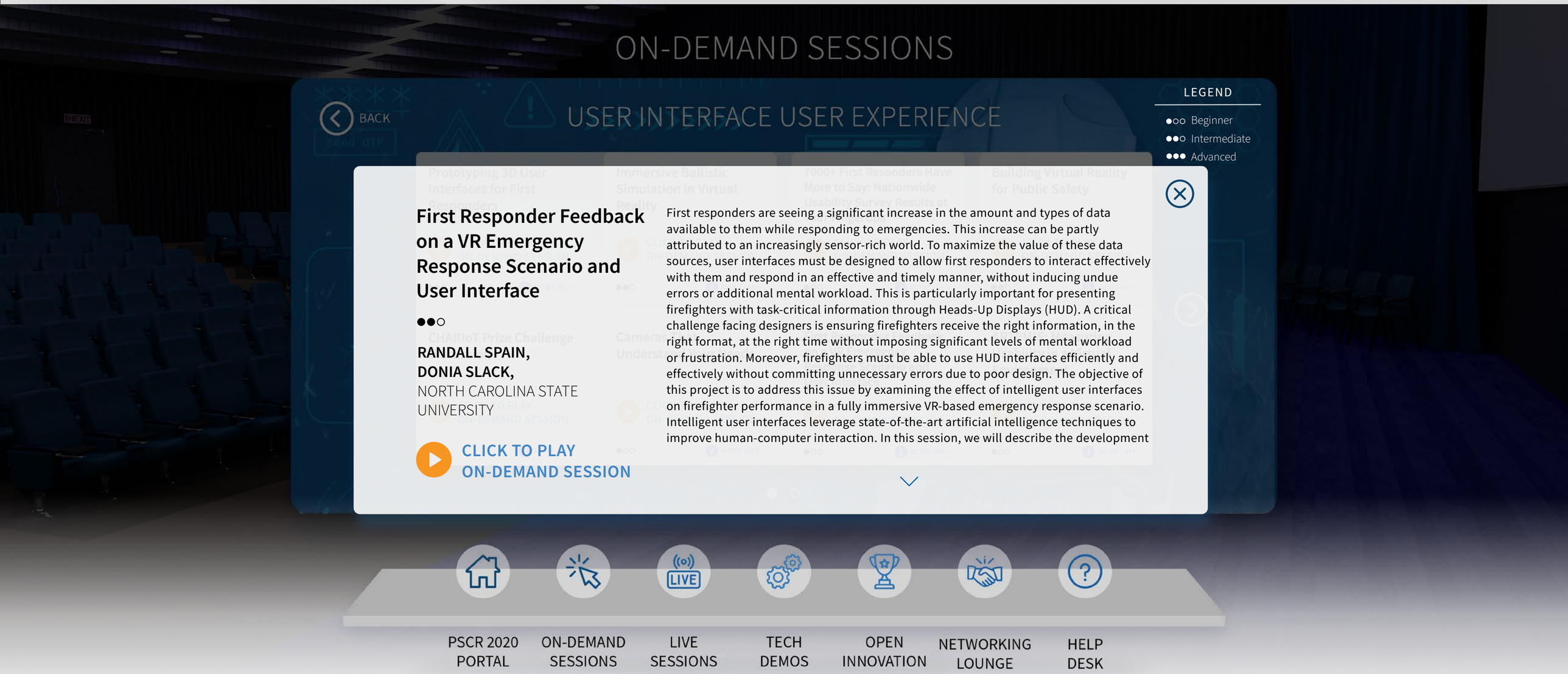

First Responder Feedback on a VR Emergency Response Scenario and User Interface

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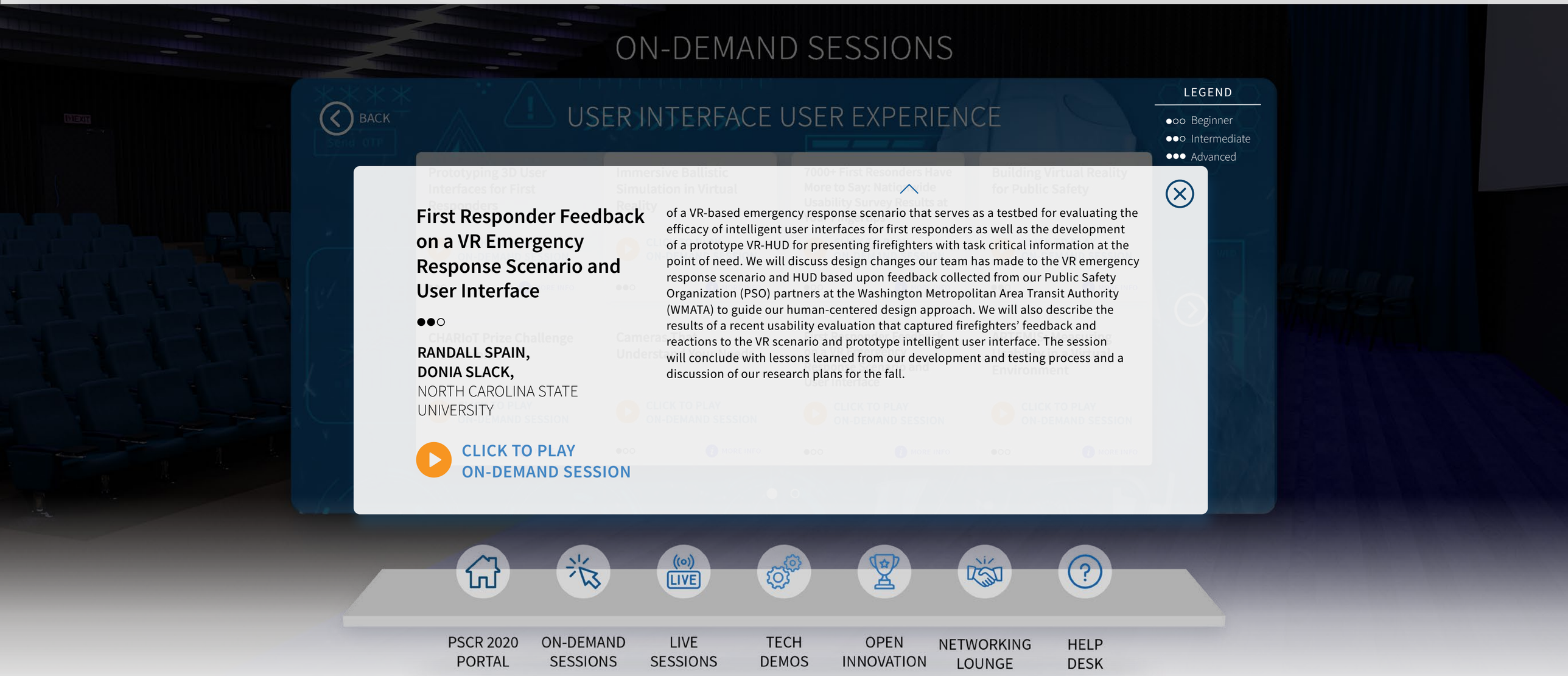
RANDALL SPAIN,
DONIA SLACK,
NORTH CAROLINA STATE UNIVERSITY

CLICK TO PLAY ON-DEMAND SESSION

First responders are seeing a significant increase in the amount and types of data available to them while responding to emergencies. This increase can be partly attributed to an increasingly sensor-rich world. To maximize the value of these data sources, user interfaces must be designed to allow first responders to interact effectively with them and respond in an effective and timely manner, without inducing undue errors or additional mental workload. This is particularly important for presenting firefighters with task-critical information through Heads-Up Displays (HUD). A critical challenge facing designers is ensuring firefighters receive the right information, in the right format, at the right time without imposing significant levels of mental workload or frustration. Moreover, firefighters must be able to use HUD interfaces efficiently and effectively without committing unnecessary errors due to poor design. The objective of this project is to address this issue by examining the effect of intelligent user interfaces on firefighter performance in a fully immersive VR-based emergency response scenario. Intelligent user interfaces leverage state-of-the-art artificial intelligence techniques to improve human-computer interaction. In this session, we will describe the development



First Responder Feedback on a VR Emergency Response Scenario and User Interface

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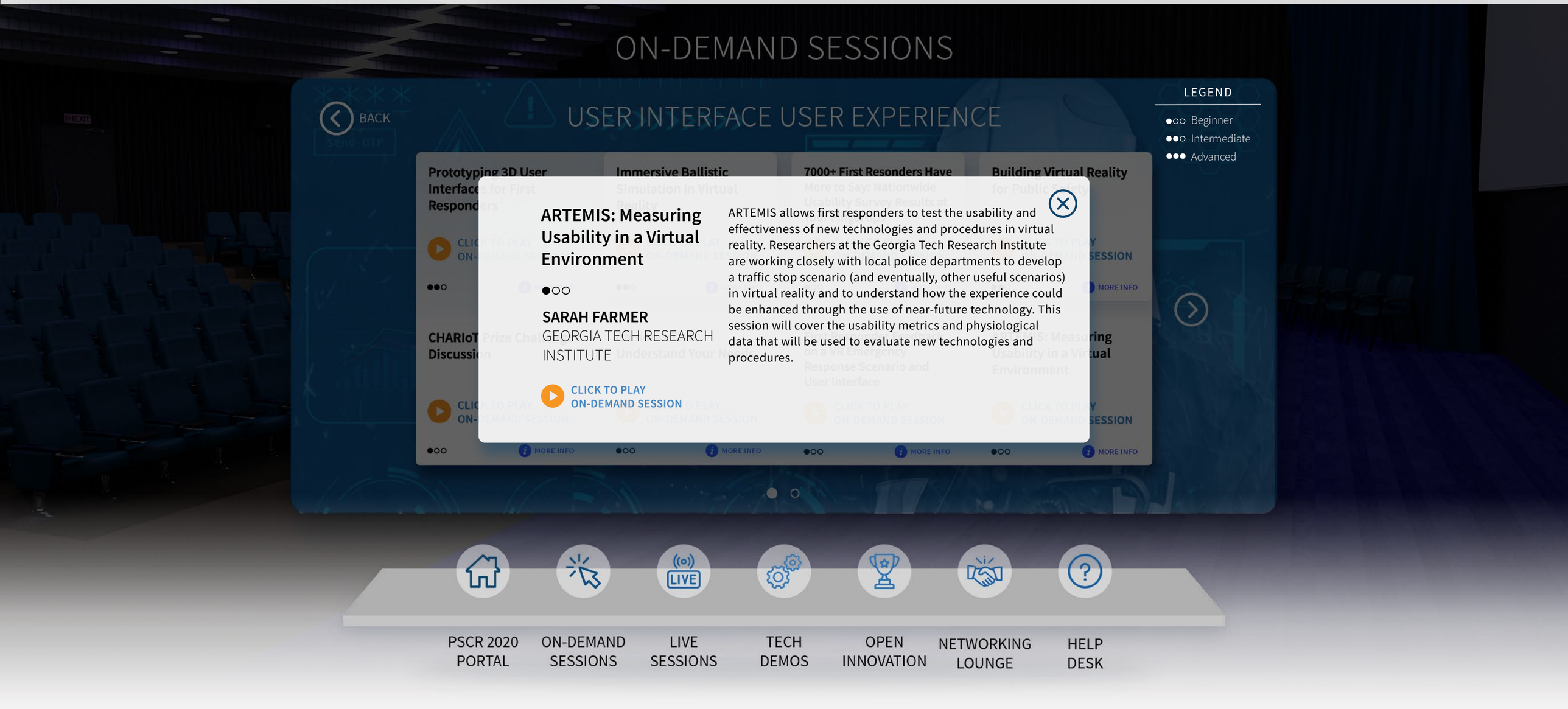
RANDALL SPAIN,
DONIA SLACK,
NORTH CAROLINA STATE UNIVERSITY

CLICK TO PLAY ON-DEMAND SESSION

of a VR-based emergency response scenario that serves as a testbed for evaluating the efficacy of intelligent user interfaces for first responders as well as the development of a prototype VR-HUD for presenting firefighters with task critical information at the point of need. We will discuss design changes our team has made to the VR emergency response scenario and HUD based upon feedback collected from our Public Safety Organization (PSO) partners at the Washington Metropolitan Area Transit Authority (WMATA) to guide our human-centered design approach. We will also describe the results of a recent usability evaluation that captured firefighters' feedback and reactions to the VR scenario and prototype intelligent user interface. The session will conclude with lessons learned from our development and testing process and a discussion of our research plans for the fall.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Understand Your Needs
on a VR Emergency Response Scenario and User Interface
Usability in a Virtual Environment
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ARTEMIS: Measuring Usability in a Virtual Environment
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SARAH FARMER
GEORGIA TECH RESEARCH INSTITUTE
CLICK TO PLAY ON-DEMAND SESSION
ARTEMIS allows first responders to test the usability and effectiveness of new technologies and procedures in virtual reality. Researchers at the Georgia Tech Research Institute are working closely with local police departments to develop a traffic stop scenario (and eventually, other useful scenarios) in virtual reality and to understand how the experience could be enhanced through the use of near-future technology. This session will cover the usability metrics and physiological data that will be used to evaluate new technologies and procedures.
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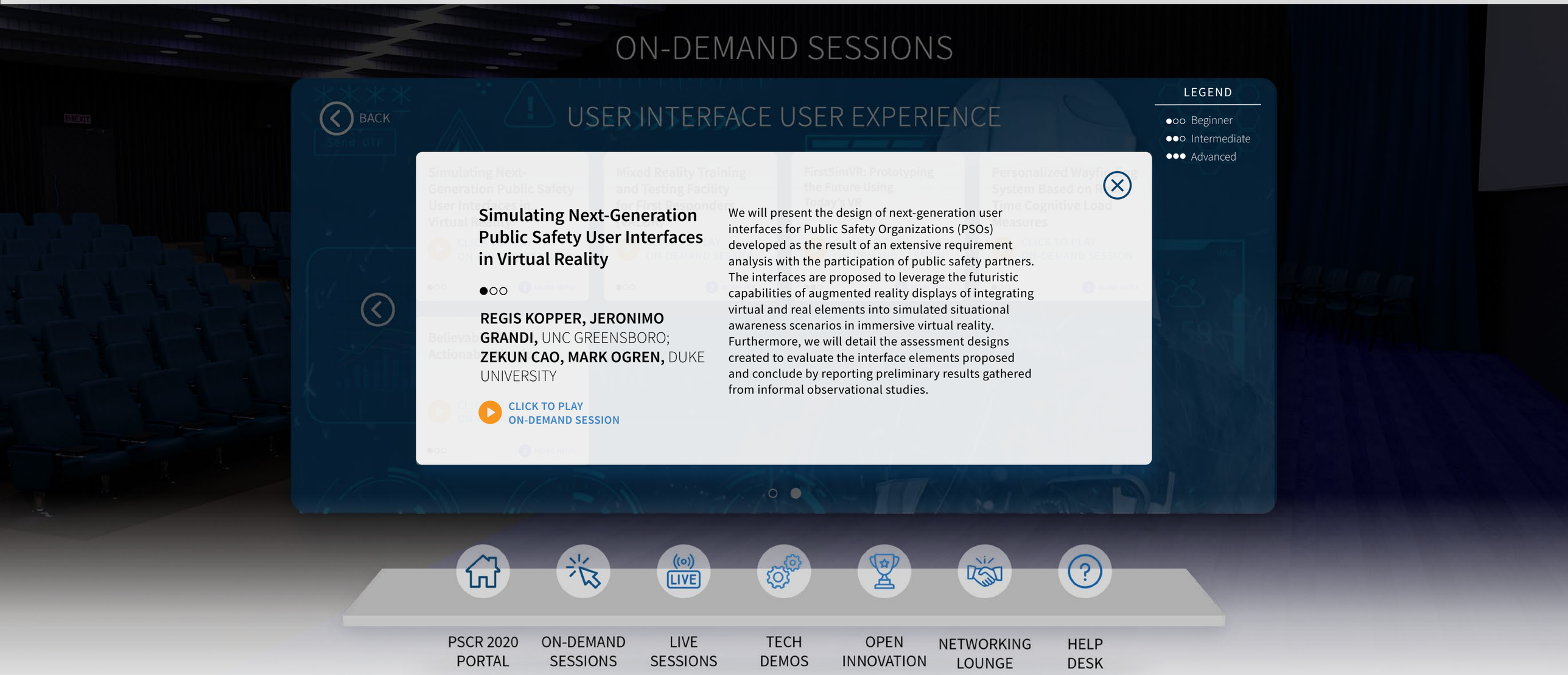
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Simulating Next-Generation Public Safety User Interfaces in Virtual Reality
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REGIS KOPPER, JERONIMO GRANDI, UNC GREENSBORO; ZEKUN CAO, MARK OGREN, DUKE UNIVERSITY
CLICK TO PLAY ON-DEMAND SESSION
We will present the design of next-generation user interfaces for Public Safety Organizations (PSOs) developed as the result of an extensive requirement analysis with the participation of public safety partners. The interfaces are proposed to leverage the futuristic capabilities of augmented reality displays of integrating virtual and real elements into simulated situational awareness scenarios in immersive virtual reality. Furthermore, we will detail the assessment designs created to evaluate the interface elements proposed and conclude by reporting preliminary results gathered from informal observational studies.
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ON-DEMAND SESSIONS
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USER INTERFACE USER EXPERIENCE
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Mixed Reality Training and Testing Facility for First Responders (VALOR)
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JOHN BLACKWELL
TRACLABS
CLICK TO PLAY ON-DEMAND SESSION
We will discuss the practical utility of the current simulation, the technical progress made during the last two years, experiment designs, and the intended next steps for our research and development. We will provide an immersive tour of the virtual reality firefighter simulation environment, including its relation to real-world objects in the mixed reality training facility, and the capabilities of the core software infrastructure built on VALOR, the Virtual and Augmented Laboratory for Objective Realities. The mixed reality facility is designed for training and testing of first responders as well as for use as a validated virtual testbed for assessing the impact of new technologies on first responders. Mixed reality training offers many of reality's benefits with few of its drawbacks. Its digital nature allows us to prepare for more types of emergency events in less time and provides better opportunities to improve performance through data. As a product deployment testbed, it offers economic efficiencies and rapid iteration opportunities. The ultimate goal of VALOR is to save the lives and resources of first responders and the public they serve.
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FirstSimVR: Prototyping the Future Using Today's VR

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JASON JERALD, JASON HASKINS, CHARLES LAIRD
NEXTGEN INTERACTIONS

CLICK TO PLAY ON-DEMAND SESSION

Next-generation first responder tools and their interfaces have the potential to significantly enhance public safety. However, many such tools are still at an early experimental stage and are not yet ready to be used or fully tested. Even when the tools come to fruition, it can be difficult to evaluate and optimize their use in the context for which they will be deployed. To propel tool development, evaluation, and usage, we are leveraging virtual reality (VR) technologies to efficiently test early prototypes of those new tools in virtual environments that simulate the context in which they will be used.
Whereas consumer VR systems can support scenarios that are quite visually and aurally realistic, most of today's VR hardware is lacking when it comes to physical touch. This shortfall is especially critical when simulating real-world user interfaces and the real physical world first responders work in. For FirstSimVR, we focus on adding (and evaluating) realistic physical cues to VR interfaces and the environment the system is simulating. For this talk, we will discuss three scenarios we are building: 1) teaching to use a gas monitor device for a hazmat incident, 2) simulating a traffic stop that includes a vehicle search, and 3) a mass casualty situation where data can be entered via an armband interface. We will also discuss the user studies we are designing to evaluate if integrating physicality into VR simulations can lead to performance that more closely matches real world usage.

ON-DEMAND SESSIONS

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Personalized Wayfinding System Based on Real-Time Cognitive Load Measures

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ERIC JING DU
UNIVERSITY OF FLORIDA

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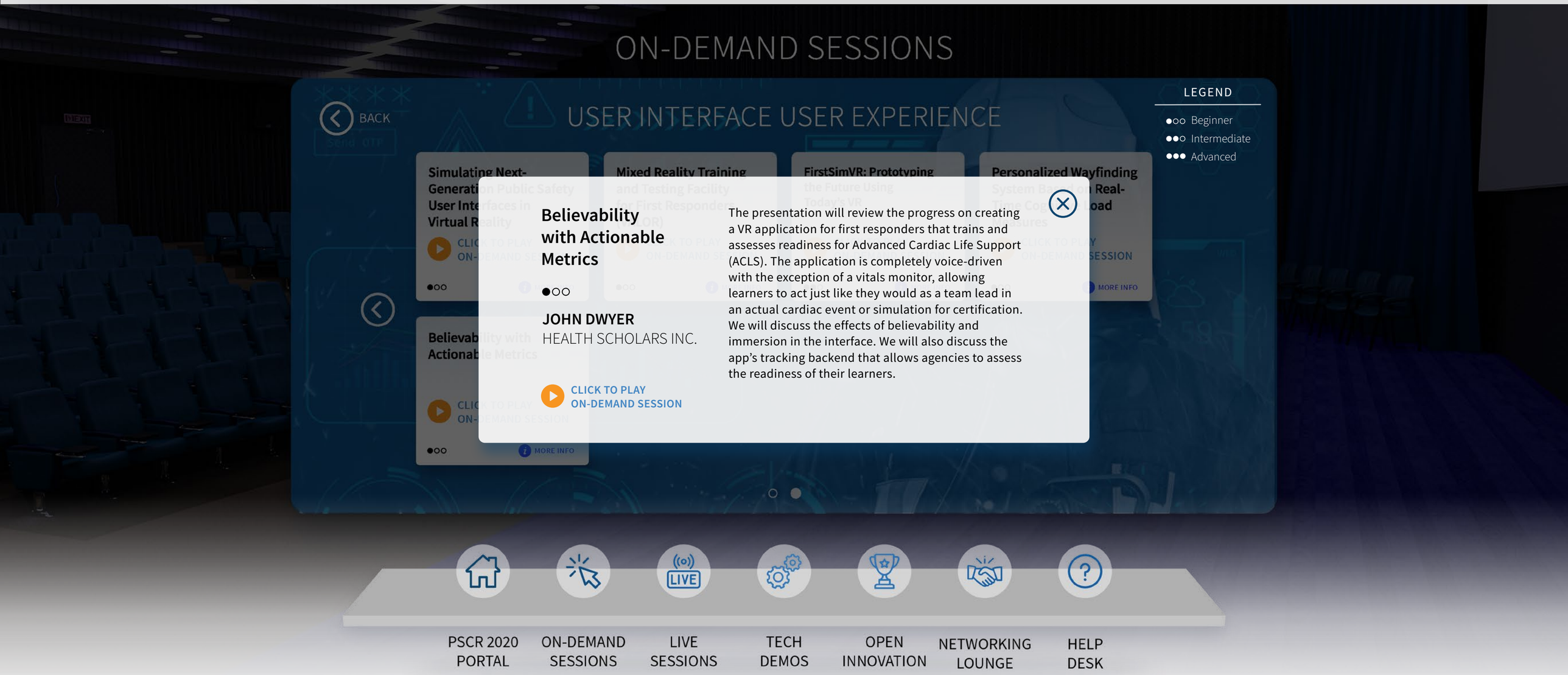
This session will introduce a cognition-driven, personalized information system for emergency indoor wayfinding. It addresses the emerging yet critical challenge in emergency response: information overload. On the one hand, as modern buildings become more spatially complex and are equipped with new sensing and information systems, firefighters can be exposed to huge volumes of information in the line of duty. On the other hand, these first responders have only limited capacity for information processing. Aimed to solve this conflict, this research employs the latest neuroimaging technologies (brain sensing) to monitor a firefighter's cognitive status in real time, providing the basis to adjust the contents and format of wayfinding information and consequently control the level of the cognitive load. The system also captures and tracks "information personality," i.e. the firefighters' preferences to different types of information. To achieve these goals, the research integrates the latest developments in visualization (e.g., virtual reality), building science, neuroscience, and information technologies. Ultimately, the research paves a path to develop individualized intelligent and adaptive systems for firefighters.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Believability with Actionable Metrics
CLICK TO PLAY ON-DEMAND SESSION
MORE INFO
Believability with Actionable Metrics
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JOHN DWYER
HEALTH SCHOLARS INC.
CLICK TO PLAY ON-DEMAND SESSION
The presentation will review the progress on creating a VR application for first responders that trains and assesses readiness for Advanced Cardiac Life Support (ACLS). The application is completely voice-driven with the exception of a vitals monitor, allowing learners to act just like they would as a team lead in an actual cardiac event or simulation for certification. We will discuss the effects of believability and immersion in the interface. We will also discuss the app's tracking backend that allows agencies to assess the readiness of their learners.
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ON-DEMAND SESSIONS

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LOCATION-BASED SERVICES

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Hancock County Public Schools Indoor Mapping
CLICK TO PLAY ON-DEMAND SESSION
●●○ MORE INFO

Map901: Building Rich Interior Hazard Maps for First Responders
CLICK TO PLAY ON-DEMAND SESSION
●●○ MORE INFO

Mapping Indoor Environments to Support Navigation Systems for First Responders
CLICK TO PLAY ON-DEMAND SESSION
●○○ MORE INFO

Situational Awareness for Emergencies Through Network-Enabled Technologies (SafeT-Net)
CLICK TO PLAY ON-DEMAND SESSION
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Developing a Best Practices Framework for Indoor Mapping, Tracking, & Navigation
CLICK TO PLAY ON-DEMAND SESSION
●○○ MORE INFO

Hyper-Reality Helmet for Public Safety
CLICK TO PLAY ON-DEMAND SESSION
●●○ MORE INFO

Real-Time First-Responder Tracking and Mapping with Thermal, Inertial and Radar
CLICK TO PLAY ON-DEMAND SESSION
●●○ MORE INFO

Ultimate Navigation Chip (uNavChip): Chip-Scale Personal Navigation System
CLICK TO PLAY ON-DEMAND SESSION
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ON-DEMAND SESSIONS

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A Body-Worn Localization System for Firefighters

CLICK TO PLAY ON-DEMAND SESSION

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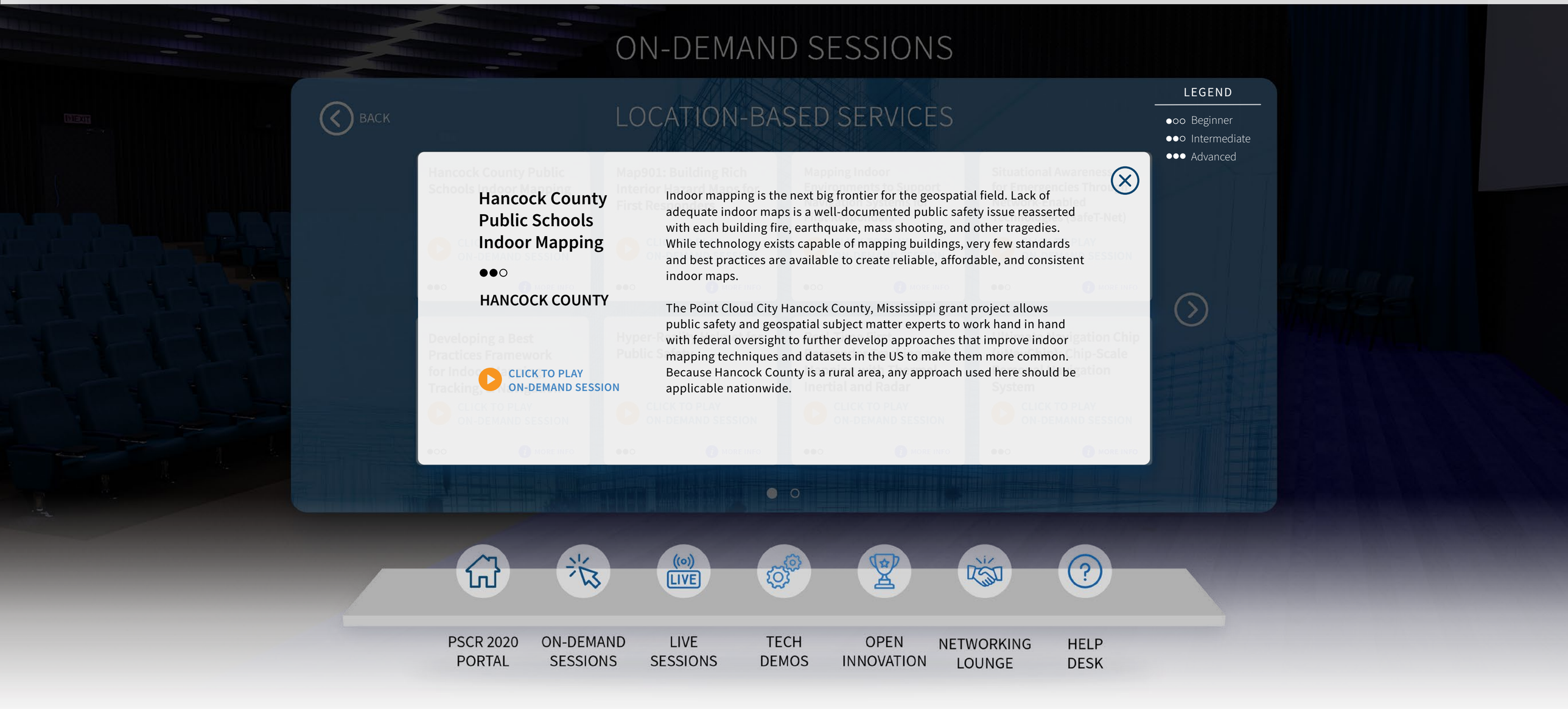
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Hancock County Public Schools Indoor Mapping
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HANCOCK COUNTY
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Indoor mapping is the next big frontier for the geospatial field. Lack of adequate indoor maps is a well-documented public safety issue reasserted with each building fire, earthquake, mass shooting, and other tragedies. While technology exists capable of mapping buildings, very few standards and best practices are available to create reliable, affordable, and consistent indoor maps.
The Point Cloud City Hancock County, Mississippi grant project allows public safety and geospatial subject matter experts to work hand in hand with federal oversight to further develop approaches that improve indoor mapping techniques and datasets in the US to make them more common. Because Hancock County is a rural area, any approach used here should be applicable nationwide.
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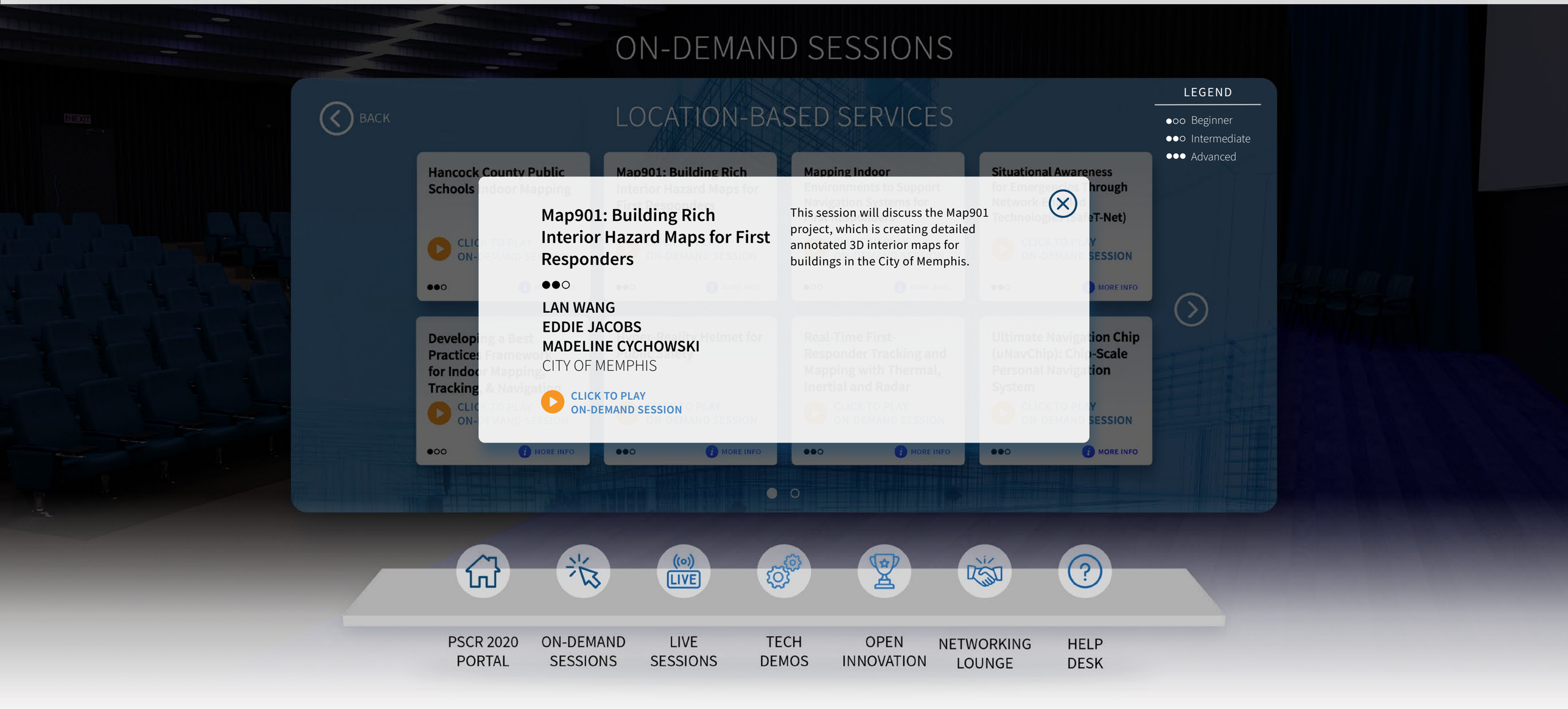
NETWORKING LOUNGE
HELP DESK


ON-DEMAND SESSIONS
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Hancock County Public Schools Indoor Mapping
Map901: Building Rich Interior Hazard Maps for First Responders
Mapping Indoor Environments to Support Navigation Systems for
Situational Awareness for Emergencies through Network
Technologies (GeoT-Net)
Developing a Best Practices Framework for Indoor Mapping, Tracking & Navigation
Real-Time First-Responder Tracking and Mapping with Thermal, Inertial and Radar
Ultimate Navigation Chip (uNavChip): Chip-Scale Personal Navigation System
CLICK TO PLAY ON-DEMAND SESSION
MORE INFO
Map901: Building Rich Interior Hazard Maps for First Responders
●●○
LAN WANG
EDDIE JACOBS
MADELINE CYCHOWSKI
CITY OF MEMPHIS
CLICK TO PLAY ON-DEMAND SESSION
This session will discuss the Map901 project, which is creating detailed annotated 3D interior maps for buildings in the City of Memphis.
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ON-DEMAND SESSIONS
LIVE SESSIONS
TECH DEMOS
OPEN INNOVATION
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ON-DEMAND SESSIONS
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Mapping Indoor Environments to Support Navigation Systems for First Responders
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JASON PARENT
PAUL JANUSZEWSKI
ENFIELD CONNECTICUT
CLICK TO PLAY ON-DEMAND SESSION
First responder navigation and tracking systems will require accurate maps of indoor environments. To help create a database to support the development and deployment of indoor navigation and tracking systems, we used Paracosm's PX-80 handheld LiDAR to collect imagery and 3D point cloud data for 11 schools, administrative buildings, and industrial buildings in Enfield and Storrs, Connecticut. We developed a manual procedure for mapping features-of-interest that used Paracosm's Retrace and ESRI's ArcGIS software. Retrace provides an immersive view of the image and point cloud data and we used it to identify features and tag their approximate 3D locations. We used ArcGIS to create 3D polygons that define the horizontal and vertical boundaries of each tagged feature. A script was then used to classify the point cloud based on the 3D polygons. The final products include classified and georeferenced 3D point clouds that will be useful for researchers as well as interactive 2D floor plans with embedded videos that will allow first responders to effectively make use of the data during pre-planning, training, and active incidents. The procedure that we developed allowed us to accurately map a variety of features ranging from recessed sprinkler heads and fire alarms to windows and doors. We estimate that the complete process, from collecting data to creating the final products, takes about 20-30 hours for a 175,000 square foot building and requires personnel with little technical skill and training. This project demonstrated that a handheld LiDAR data can be used to efficiently create products to support indoor navigation and tracking systems as well as provide more general support to first responder operations.
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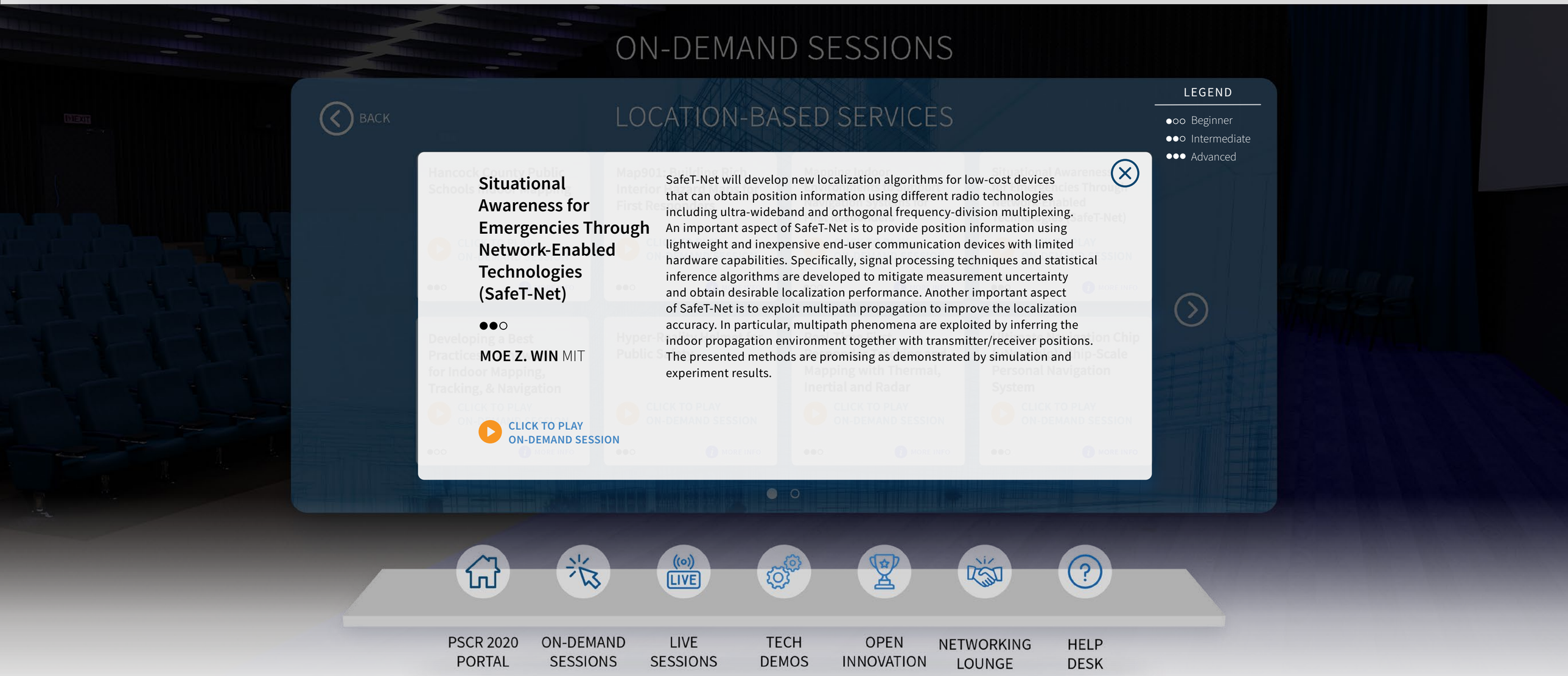
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Situational Awareness for Emergencies Through Network-Enabled Technologies (SafeT-Net)
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MOE Z. WIN MIT
SafeT-Net will develop new localization algorithms for low-cost devices that can obtain position information using different radio technologies including ultra-wideband and orthogonal frequency-division multiplexing. An important aspect of SafeT-Net is to provide position information using lightweight and inexpensive end-user communication devices with limited hardware capabilities. Specifically, signal processing techniques and statistical inference algorithms are developed to mitigate measurement uncertainty and obtain desirable localization performance. Another important aspect of SafeT-Net is to exploit multipath propagation to improve the localization accuracy. In particular, multipath phenomena are exploited by inferring the indoor propagation environment together with transmitter/receiver positions. The presented methods are promising as demonstrated by simulation and experiment results.
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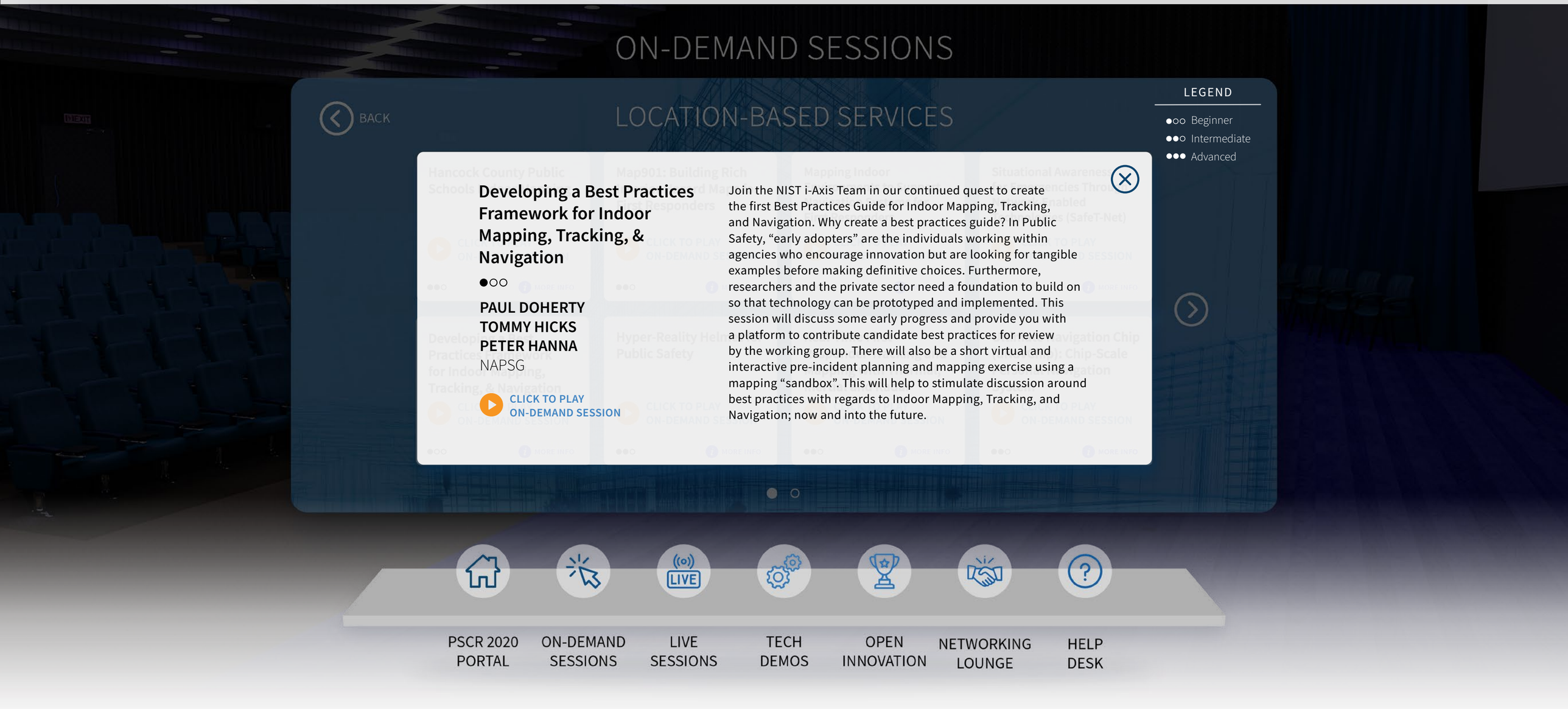
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Developing a Best Practices Framework for Indoor Mapping, Tracking, & Navigation
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PAUL DOHERTY
TOMMY HICKS
PETER HANNA
NAPSG
CLICK TO PLAY ON-DEMAND SESSION
Join the NIST i-Axis Team in our continued quest to create the first Best Practices Guide for Indoor Mapping, Tracking, and Navigation. Why create a best practices guide? In Public Safety, “early adopters” are the individuals working within agencies who encourage innovation but are looking for tangible examples before making definitive choices. Furthermore, researchers and the private sector need a foundation to build on so that technology can be prototyped and implemented. This session will discuss some early progress and provide you with a platform to contribute candidate best practices for review by the working group. There will also be a short virtual and interactive pre-incident planning and mapping exercise using a mapping “sandbox”. This will help to stimulate discussion around best practices with regards to Indoor Mapping, Tracking, and Navigation; now and into the future.
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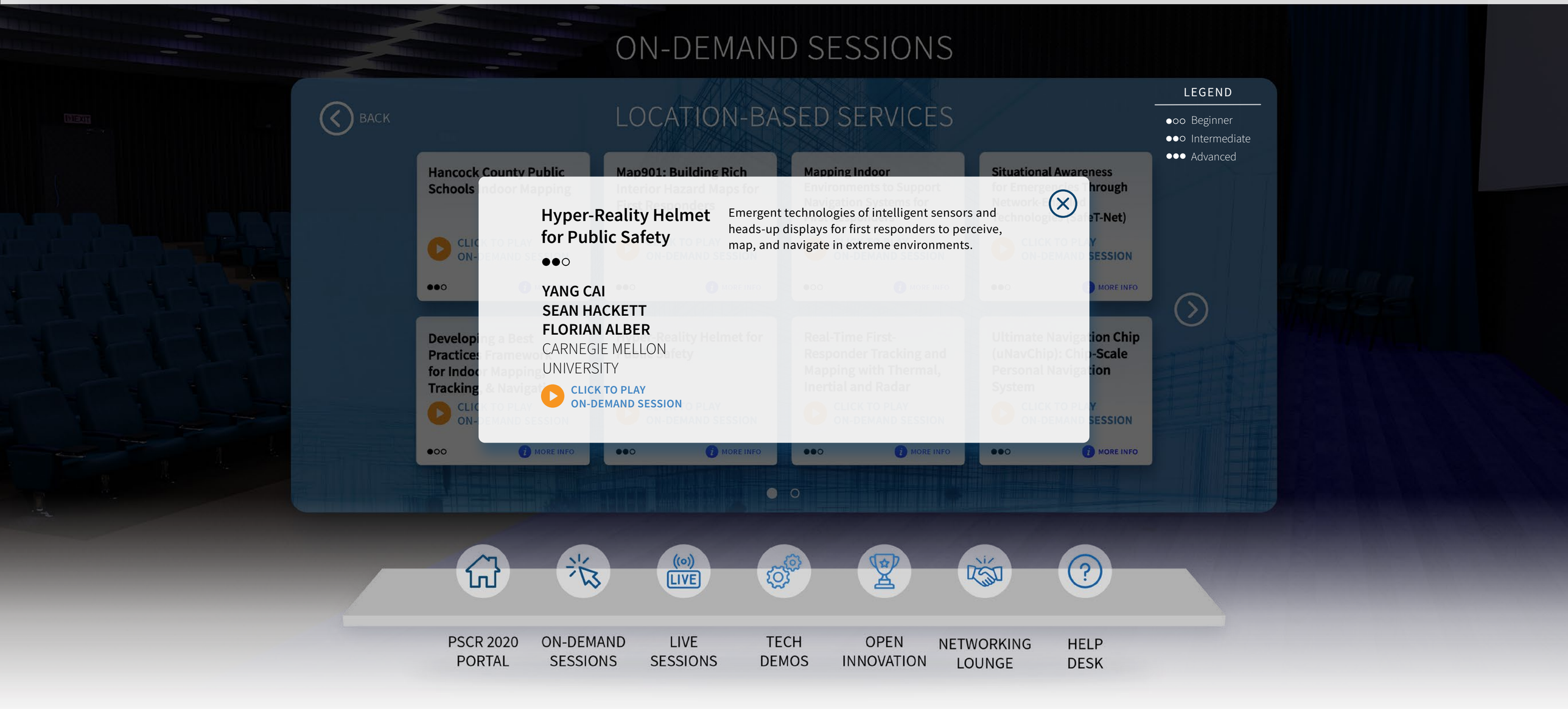
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Hyper-Reality Helmet for Public Safety
Real-Time First-Responder Tracking and Mapping with Thermal, Inertial and Radar
Ultimate Navigation Chip (uNavChip): Chip-Scale Personal Navigation System
CLICK TO PLAY ON-DEMAND SESSION
MORE INFO
Hyper-Reality Helmet for Public Safety
●●○
YANG CAI
SEAN HACKETT
FLORIAN ALBER
CARNEGIE MELLON UNIVERSITY
Emergent technologies of intelligent sensors and heads-up displays for first responders to perceive, map, and navigate in extreme environments.
CLICK TO PLAY ON-DEMAND SESSION
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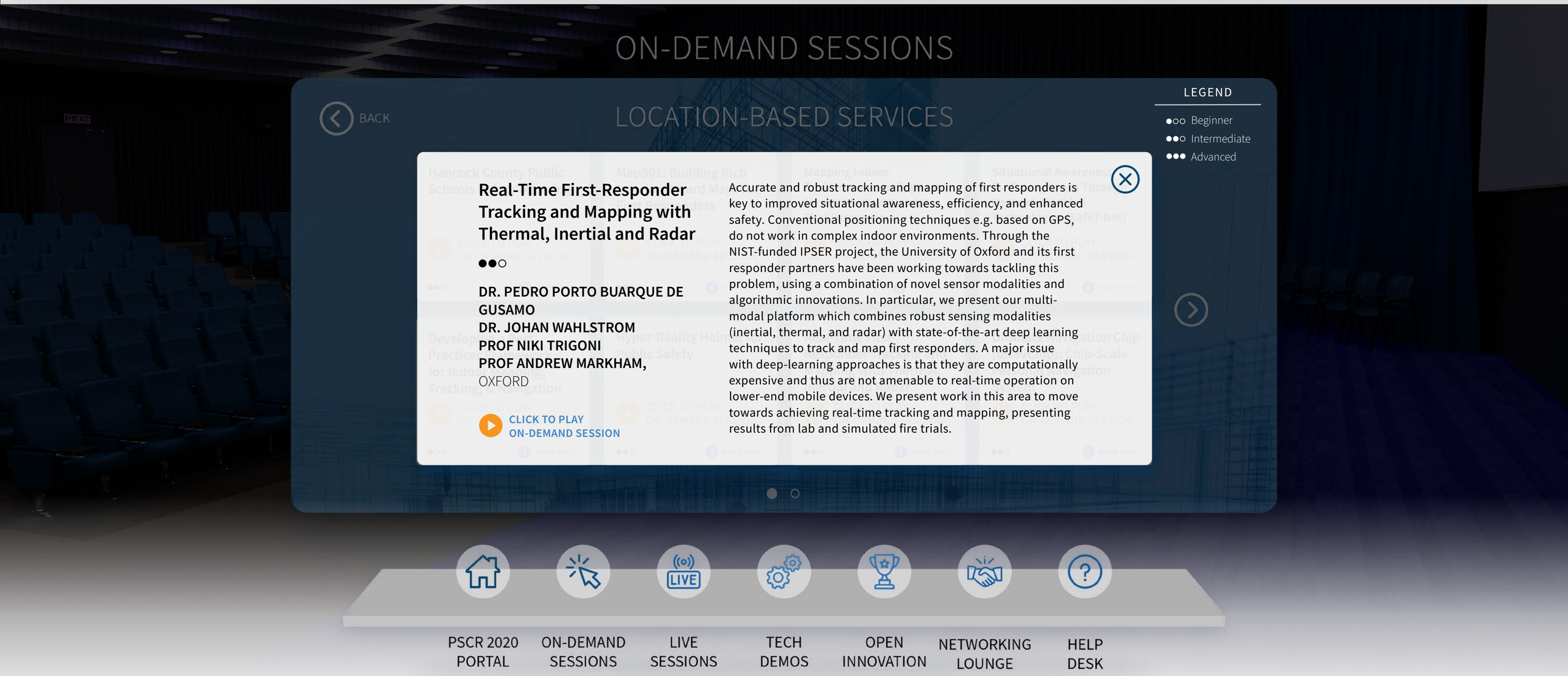
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Real-Time First-Responder Tracking and Mapping with Thermal, Inertial and Radar
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DR. PEDRO PORTO BUARQUE DE GUSAMO
DR. JOHAN WAHLSTROM
PROF NIKI TRIGONI
PROF ANDREW MARKHAM,
OXFORD
CLICK TO PLAY ON-DEMAND SESSION
Accurate and robust tracking and mapping of first responders is key to improved situational awareness, efficiency, and enhanced safety. Conventional positioning techniques e.g. based on GPS, do not work in complex indoor environments. Through the NIST-funded IPSER project, the University of Oxford and its first responder partners have been working towards tackling this problem, using a combination of novel sensor modalities and algorithmic innovations. In particular, we present our multi-modal platform which combines robust sensing modalities (inertial, thermal, and radar) with state-of-the-art deep learning techniques to track and map first responders. A major issue with deep-learning approaches is that they are computationally expensive and thus are not amenable to real-time operation on lower-end mobile devices. We present work in this area to move towards achieving real-time tracking and mapping, presenting results from lab and simulated fire trials.
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Ultimate Navigation Chip (uNavChip): Chip-Scale Personal Navigation System
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ANDREI M. SHKEL
ZAK KASSAS
SOLMAZ KIA
UNIVERSITY OF CALIFORNIA IRVINE
CLICK TO PLAY ON-DEMAND SESSION
This brief is on the development of the Ultimate Navigation Chip (uNavChip) concept. Our project develops a Chip-Scale Personal Navigation System to localize emergency responders, assets, and people indoors and in covered outdoor environments, where GPS signals are unusable. We will talk about the Micro-Electro-Mechanical Systems (MEMS) technology that we are developing within this project, groups' latest analytical and modeling results, and in-field test and evaluation. Our technical approach is based on simultaneous integration of Deterministic, Probabilistic, and Cooperative Localization. The Deterministic Navigation is based on foot-mounted sensors and motion models providing zero-velocity updates, constituting a unique, self-contained, and high accuracy dead reckoning capability. Signals of Opportunity are turned into our own "dedicated pseudolites" for position fixing and augmentation. We are exploiting cellular signals (CDMA, LTE, and 5G) to navigate within building infrastructure to an unprecedented level of accuracy (about 2 meters). Cooperative Localization is utilized by a team of mobile agents equipped with the uNavChip, with communication and computational capabilities, jointly processing a relative measurement between any two agents leading to an increase in localization accuracy.
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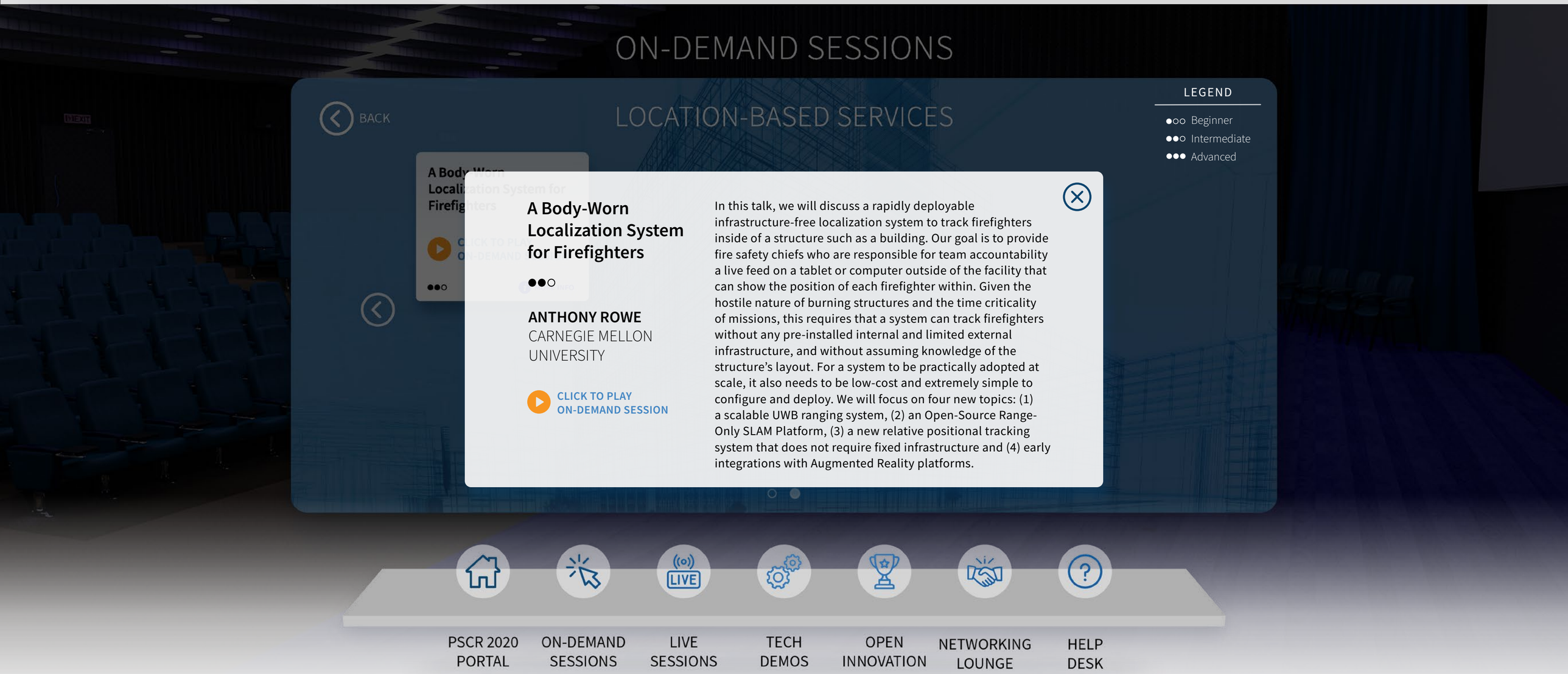
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A Body-Worn Localization System for Firefighters
●●○
ANTHONY ROWE
CARNEGIE MELLON UNIVERSITY
CLICK TO PLAY ON-DEMAND SESSION
In this talk, we will discuss a rapidly deployable infrastructure-free localization system to track firefighters inside of a structure such as a building. Our goal is to provide fire safety chiefs who are responsible for team accountability a live feed on a tablet or computer outside of the facility that can show the position of each firefighter within. Given the hostile nature of burning structures and the time criticality of missions, this requires that a system can track firefighters without any pre-installed internal and limited external infrastructure, and without assuming knowledge of the structure's layout. For a system to be practically adopted at scale, it also needs to be low-cost and extremely simple to configure and deploy. We will focus on four new topics: (1) a scalable UWB ranging system, (2) an Open-Source Range-Only SLAM Platform, (3) a new relative positional tracking system that does not require fixed infrastructure and (4) early integrations with Augmented Reality platforms.
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Expanding the SIM Card Use Prize Challenge Overview
CLICK TO PLAY ON-DEMAND SESSION
●●○ MORE INFO

ICAM - Critical Topics and New NIST Documents
CLICK TO PLAY ON-DEMAND SESSION
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Mobile Fingerprint Capture for First Responders
CLICK TO PLAY ON-DEMAND SESSION
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5G Security - Evolution not Revolution
CLICK TO PLAY ON-DEMAND SESSION
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3GPP Standards Status Update
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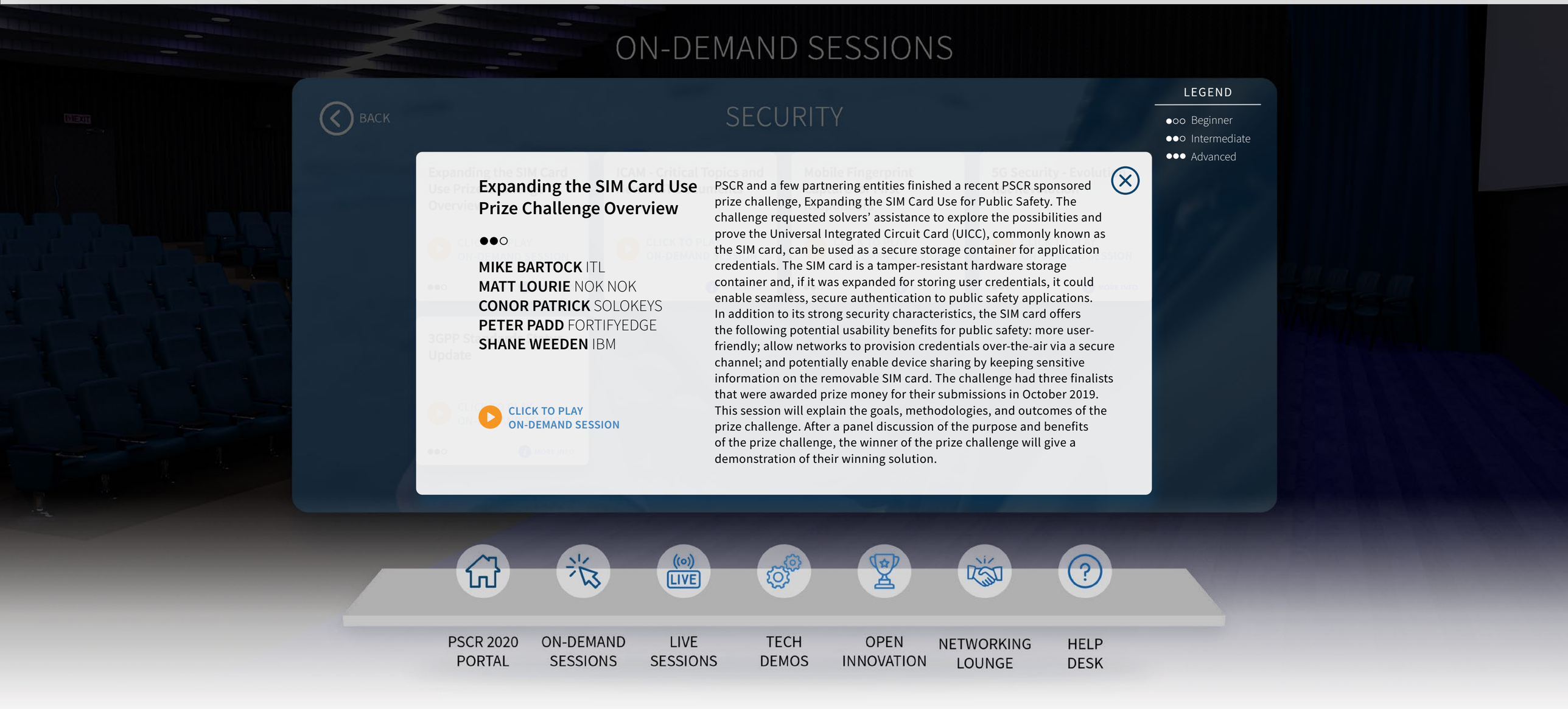
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Expanding the SIM Card Use Prize Challenge Overview
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MIKE BARTOCK ITL
MATT LOURIE NOK NOK
CONOR PATRICK SOLOKEYS
PETER PADD FORTIFYEDGE
SHANE WEEDEN IBM
CLICK TO PLAY ON-DEMAND SESSION
PSCR and a few partnering entities finished a recent PSCR sponsored prize challenge, Expanding the SIM Card Use for Public Safety. The challenge requested solvers' assistance to explore the possibilities and prove the Universal Integrated Circuit Card (UICC), commonly known as the SIM card, can be used as a secure storage container for application credentials. The SIM card is a tamper-resistant hardware storage container and, if it was expanded for storing user credentials, it could enable seamless, secure authentication to public safety applications. In addition to its strong security characteristics, the SIM card offers the following potential usability benefits for public safety: more user-friendly; allow networks to provision credentials over-the-air via a secure channel; and potentially enable device sharing by keeping sensitive information on the removable SIM card. The challenge had three finalists that were awarded prize money for their submissions in October 2019. This session will explain the goals, methodologies, and outcomes of the prize challenge. After a panel discussion of the purpose and benefits of the prize challenge, the winner of the prize challenge will give a demonstration of their winning solution.
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PUBLIC SAFETY COMMUNICATIONS RESEARCH
PSCR

PSCR 2020: THE DIGITAL EXPERIENCE

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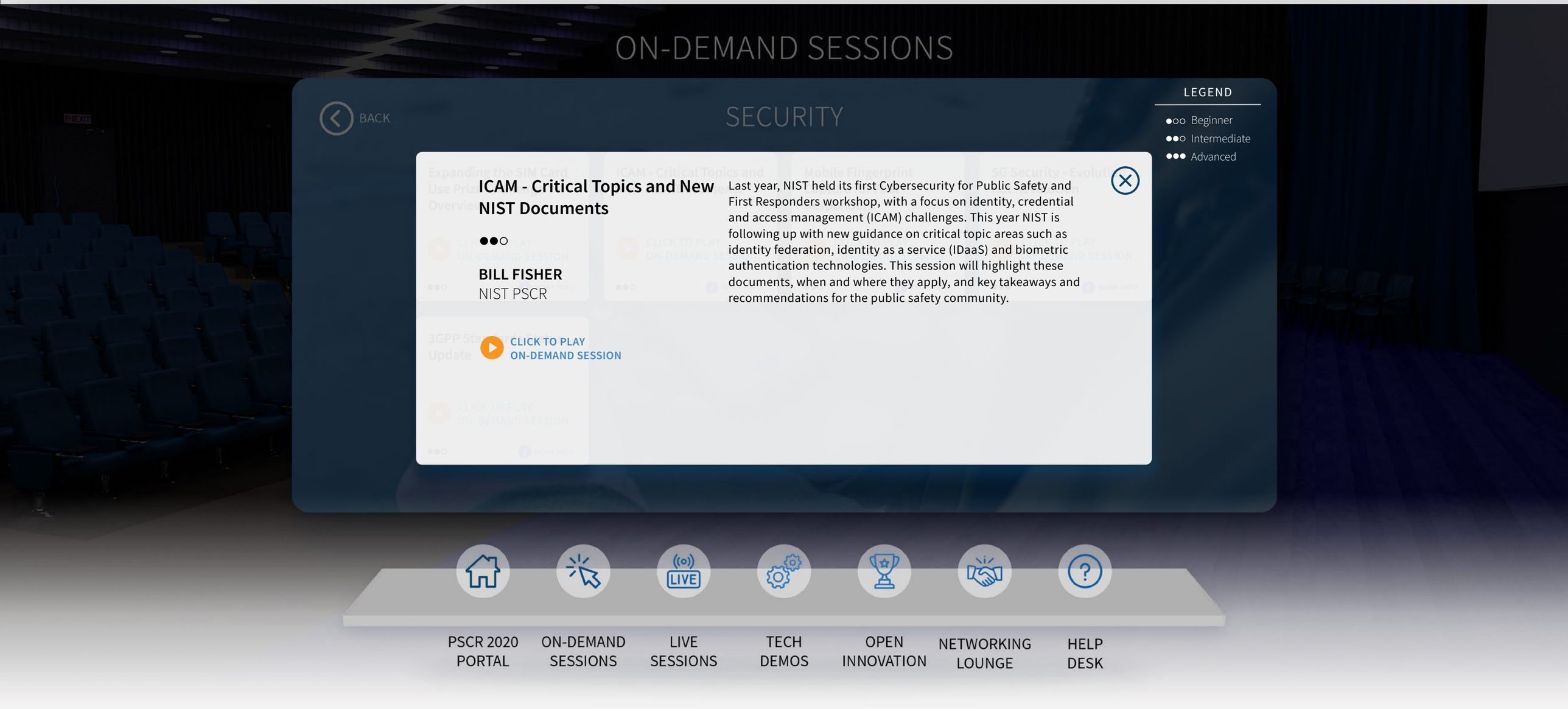

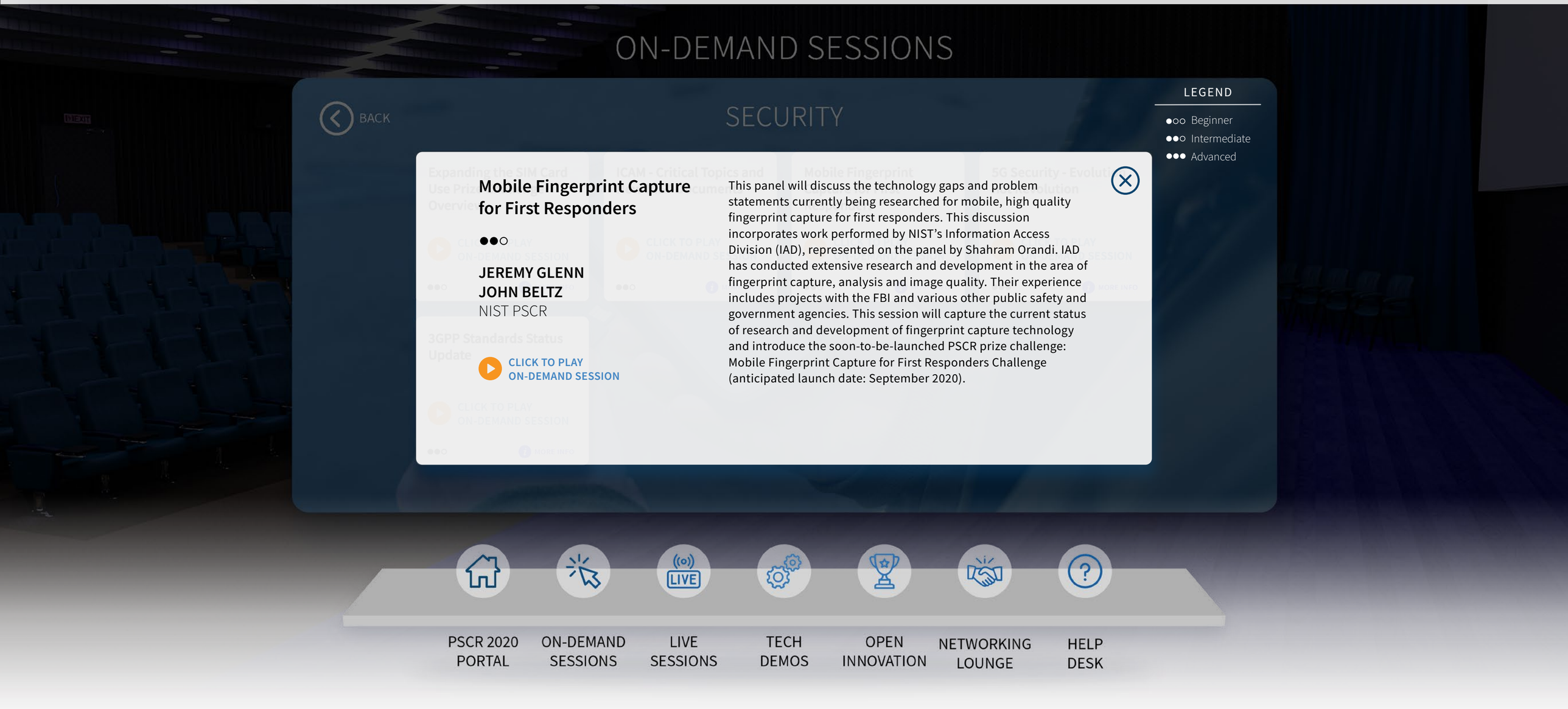
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Mobile Fingerprint Capture for First Responders
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JEREMY GLENN
JOHN BELTZ
NIST PSCR
CLICK TO PLAY ON-DEMAND SESSION
This panel will discuss the technology gaps and problem statements currently being researched for mobile, high quality fingerprint capture for first responders. This discussion incorporates work performed by NIST's Information Access Division (IAD), represented on the panel by Shahram Orandi. IAD has conducted extensive research and development in the area of fingerprint capture, analysis and image quality. Their experience includes projects with the FBI and various other public safety and government agencies. This session will capture the current status of research and development of fingerprint capture technology and introduce the soon-to-be-launched PSCR prize challenge: Mobile Fingerprint Capture for First Responders Challenge (anticipated launch date: September 2020).
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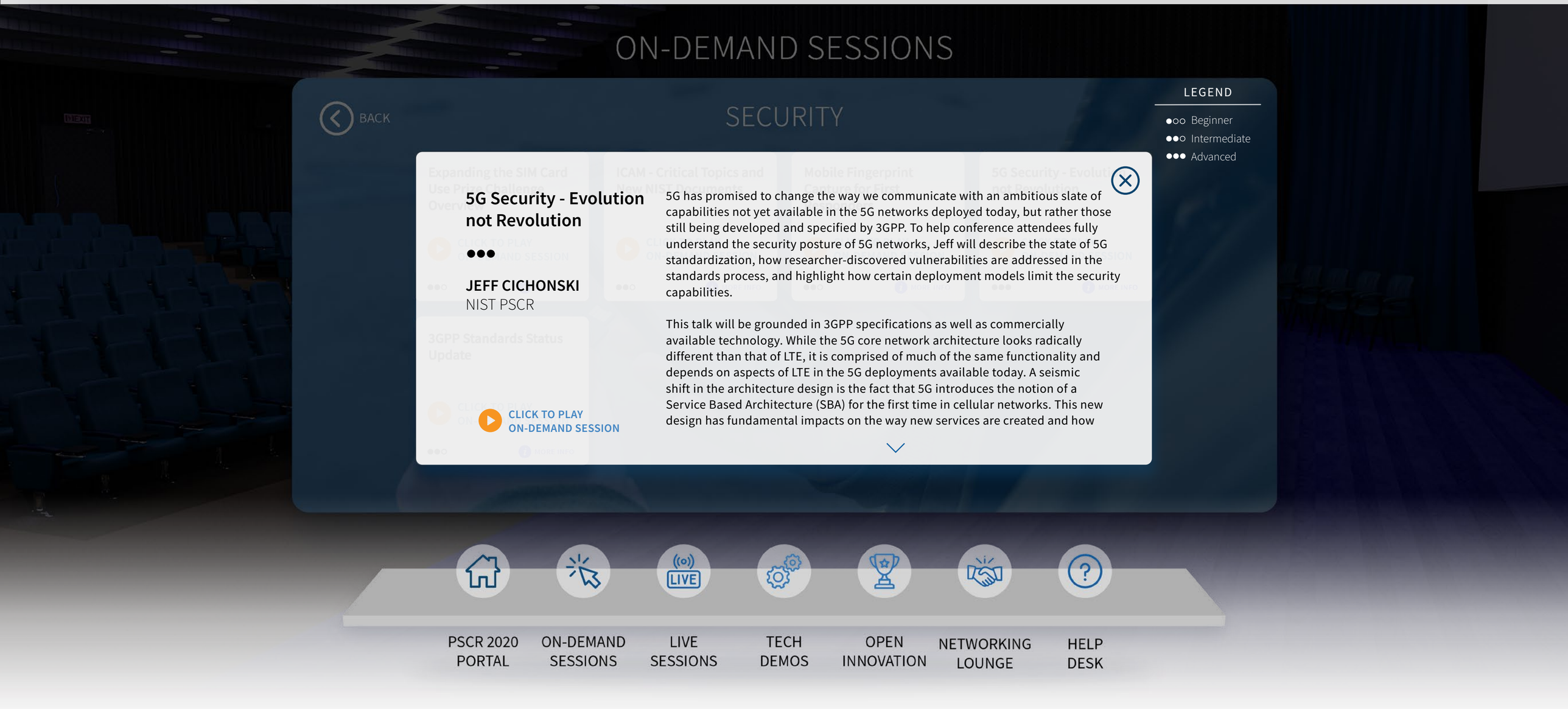
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5G Security - Evolution not Revolution
JEFF CICHONSKI
NIST PSCR
CLICK TO PLAY ON-DEMAND SESSION
5G has promised to change the way we communicate with an ambitious slate of capabilities not yet available in the 5G networks deployed today, but rather those still being developed and specified by 3GPP. To help conference attendees fully understand the security posture of 5G networks, Jeff will describe the state of 5G standardization, how researcher-discovered vulnerabilities are addressed in the standards process, and highlight how certain deployment models limit the security capabilities.
This talk will be grounded in 3GPP specifications as well as commercially available technology. While the 5G core network architecture looks radically different than that of LTE, it is comprised of much of the same functionality and depends on aspects of LTE in the 5G deployments available today. A seismic shift in the architecture design is the fact that 5G introduces the notion of a Service Based Architecture (SBA) for the first time in cellular networks. This new design has fundamental impacts on the way new services are created and how
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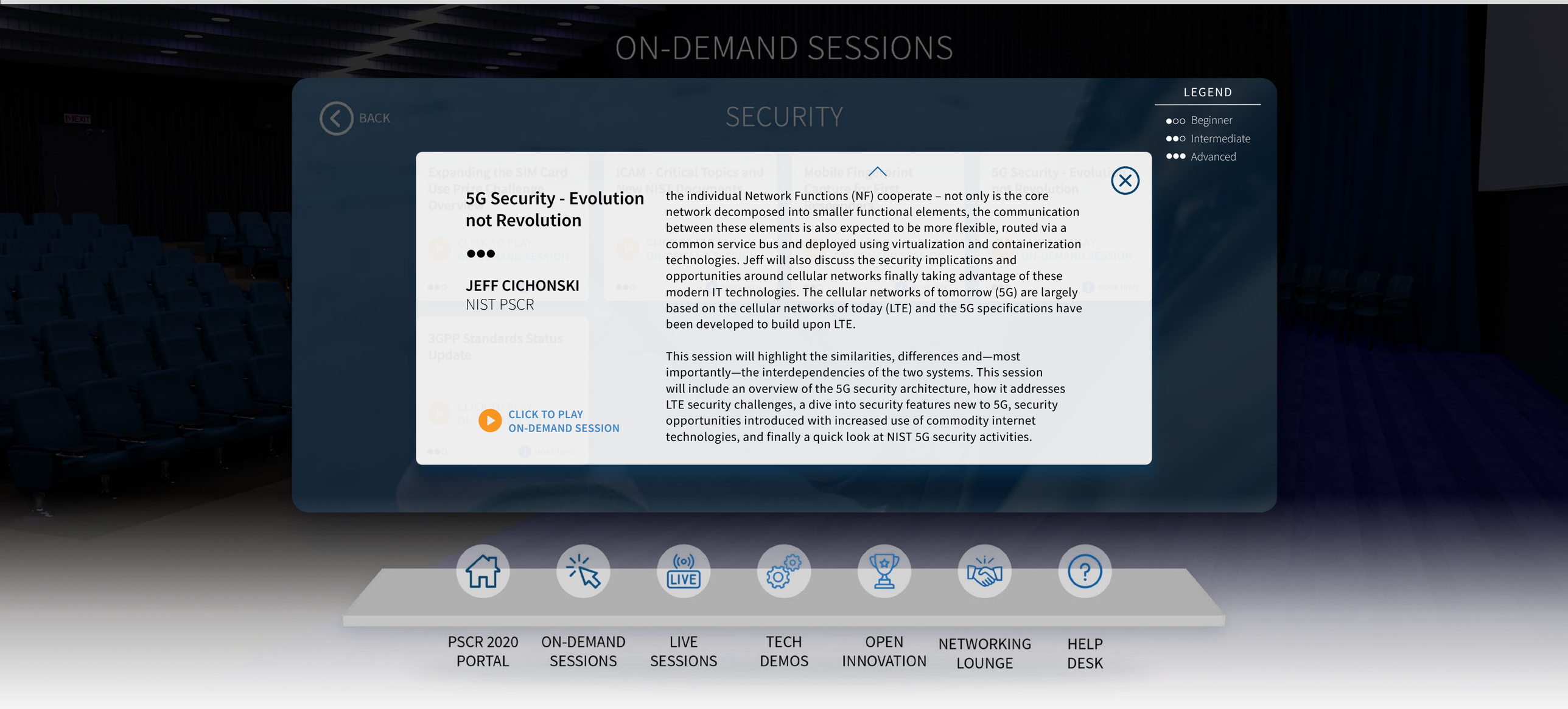
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5G Security - Evolution not Revolution
JEFF CICHONSKI
NIST PSCR
CLICK TO PLAY ON-DEMAND SESSION
the individual Network Functions (NF) cooperate – not only is the core network decomposed into smaller functional elements, the communication between these elements is also expected to be more flexible, routed via a common service bus and deployed using virtualization and containerization technologies. Jeff will also discuss the security implications and opportunities around cellular networks finally taking advantage of these modern IT technologies. The cellular networks of tomorrow (5G) are largely based on the cellular networks of today (LTE) and the 5G specifications have been developed to build upon LTE.
This session will highlight the similarities, differences and—most importantly—the interdependencies of the two systems. This session will include an overview of the 5G security architecture, how it addresses LTE security challenges, a dive into security features new to 5G, security opportunities introduced with increased use of commodity internet technologies, and finally a quick look at NIST 5G security activities.
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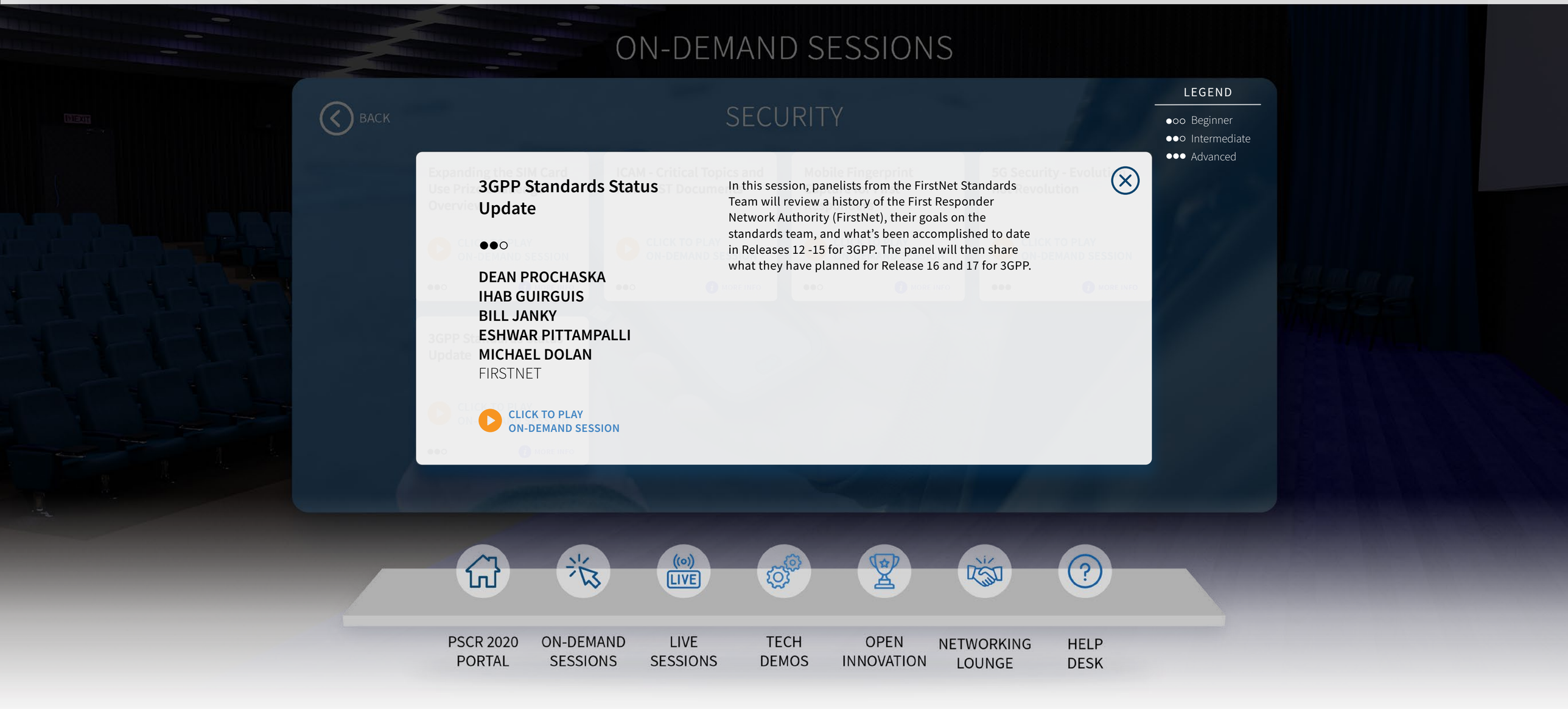
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3GPP Standards Status Update
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DEAN PROCHASKA
IHAB GUIRGUIS
BILL JANKY
ESHWAR PITTAMPALLI
MICHAEL DOLAN
FIRSTNET
CLICK TO PLAY ON-DEMAND SESSION
In this session, panelists from the FirstNet Standards Team will review a history of the First Responder Network Authority (FirstNet), their goals on the standards team, and what's been accomplished to date in Releases 12 -15 for 3GPP. The panel will then share what they have planned for Release 16 and 17 for 3GPP.
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Tech to Protect - Year in Review
CLICK TO PLAY ON-DEMAND SESSION
●○○ MORE INFO

PSCR's Follow on Funding Opportunity
CLICK TO PLAY ON-DEMAND SESSION
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Steps You Can Take When Partnering with Public Safety Agencies to Develop and Test Technologies
CLICK TO PLAY ON-DEMAND SESSION
●○○ MORE INFO

Making an Impact: Experiences of PSCR's Awardees
CLICK TO PLAY ON-DEMAND SESSION
●○○ MORE INFO

For Technology Innovators, What Should You Know About Public Safety Agencies' Procurement Process?
CLICK TO PLAY ON-DEMAND SESSION
●○○ MORE INFO

Connecting Innovators to Small Business Resources
CLICK TO PLAY ON-DEMAND SESSION
●○○ MORE INFO

ON-DEMAND SESSIONS

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Tech to Protect - Year in Review

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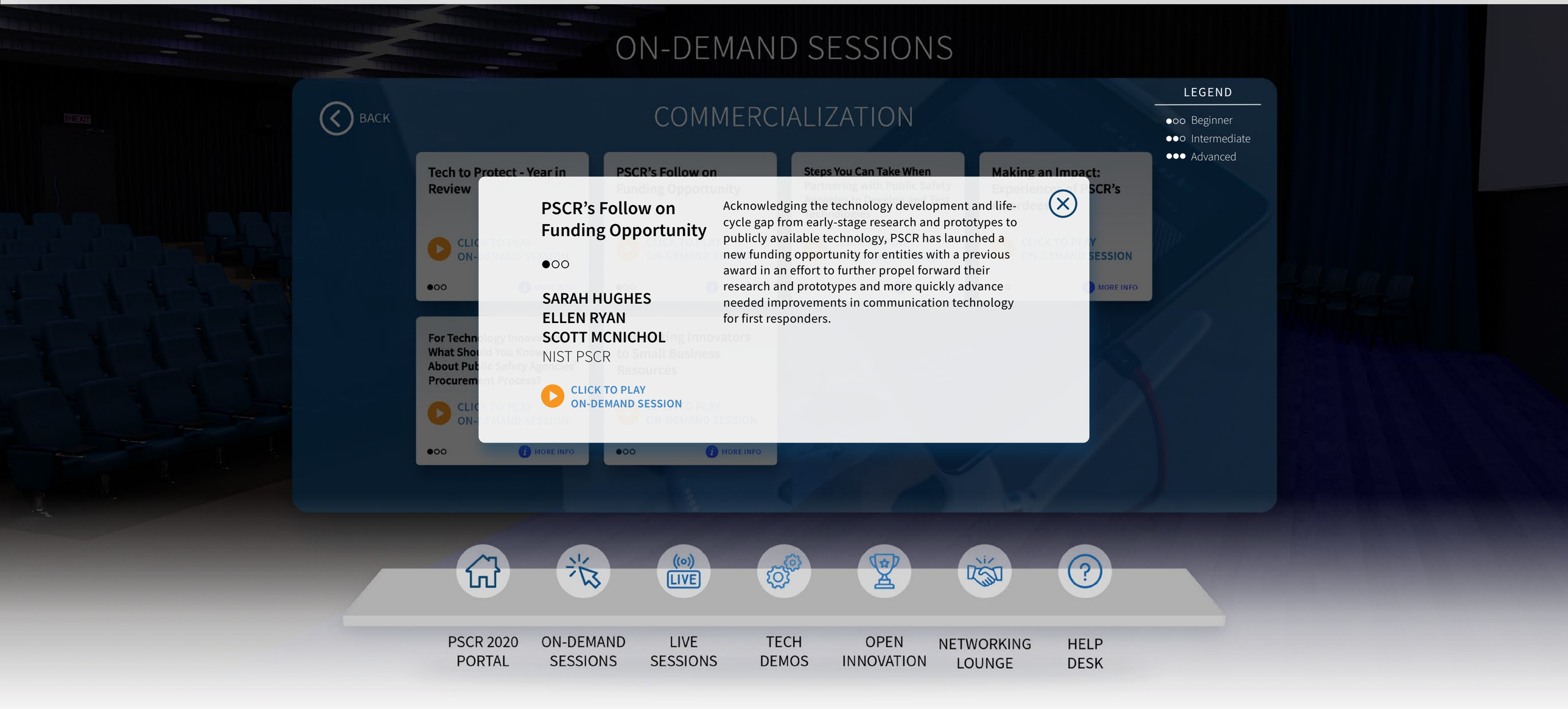
CRAIG CONNELLY, PSCR; **MARGARET PINSON,** NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION; **BILL SCHRIER,** FIRST RESPONDER NETWORK AUTHORITY; **JASON KAHN,** PSCR; **CHARLES GARDNETT,** FIRST RESPONDER NETWORK AUTHORITY; **GARY HOWARTH,** PSCR; **ZACH BRAUN,** FIREHUD; **LAUREN SCLUZAS,** BIO1 SYSTEMS; **AUSTIN S. HANDLE,** APOLLO AI; **LEVIS ADISSI,** AR EXTRICATION ASSIST - AREA

CLICK TO PLAY ON-DEMAND SESSION

Launched in April 2019, the Tech to Protect Challenge is over one year old. This session will look back at the progress to date, highlight recent national award winners, and share the next steps for participants moving forward.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PSCR's Follow on Funding Opportunity
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SARAH HUGHES
ELLEN RYAN
SCOTT MCNICHOL
NIST PSCR
CLICK TO PLAY ON-DEMAND SESSION
Acknowledging the technology development and life-cycle gap from early-stage research and prototypes to publicly available technology, PSCR has launched a new funding opportunity for entities with a previous award in an effort to further propel forward their research and prototypes and more quickly advance needed improvements in communication technology for first responders.
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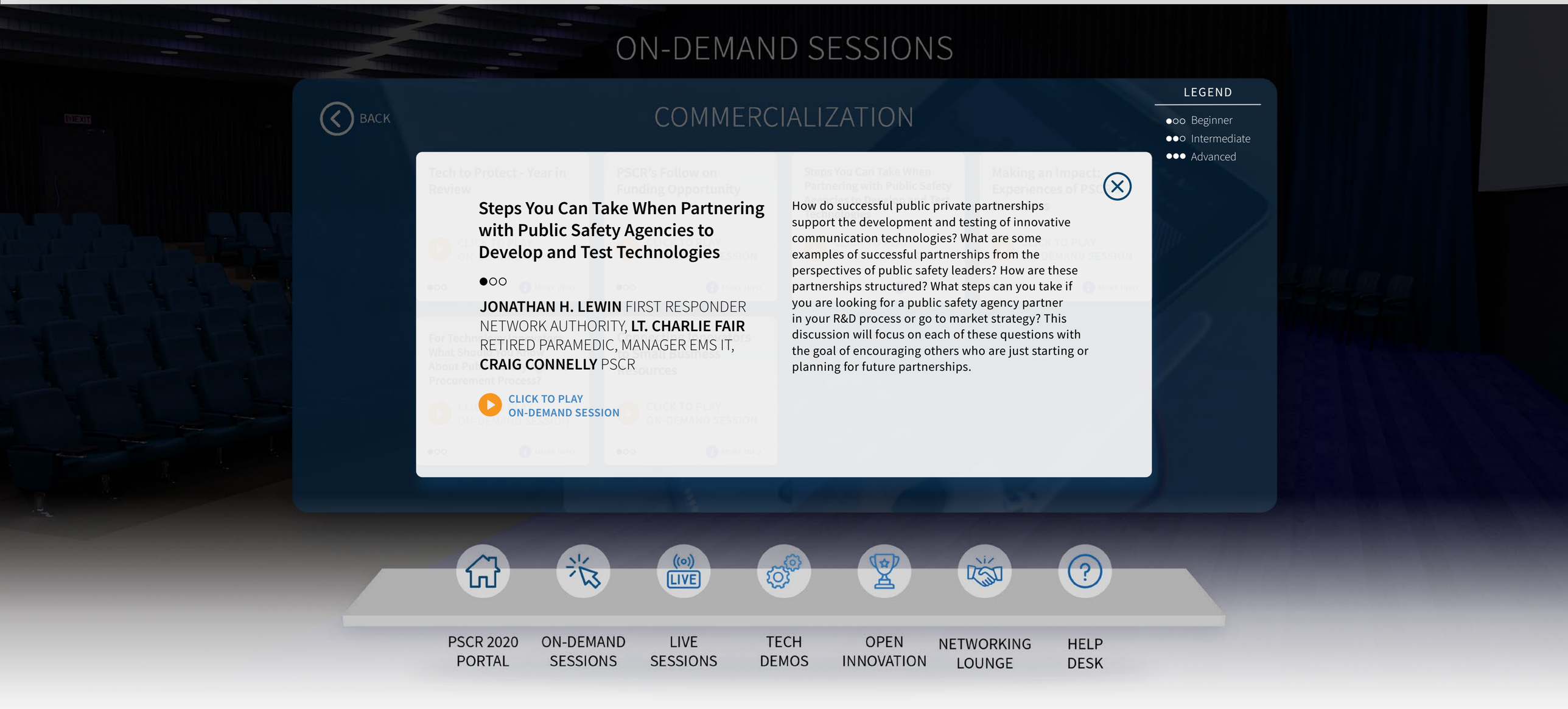
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Steps You Can Take When Partnering with Public Safety Agencies to Develop and Test Technologies
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JONATHAN H. LEWIN FIRST RESPONDER NETWORK AUTHORITY, LT. CHARLIE FAIR RETIRED PARAMEDIC, MANAGER EMS IT, CRAIG CONNELLY PSCR
CLICK TO PLAY ON-DEMAND SESSION
How do successful public private partnerships support the development and testing of innovative communication technologies? What are some examples of successful partnerships from the perspectives of public safety leaders? How are these partnerships structured? What steps can you take if you are looking for a public safety agency partner in your R&D process or go to market strategy? This discussion will focus on each of these questions with the goal of encouraging others who are just starting or planning for future partnerships.
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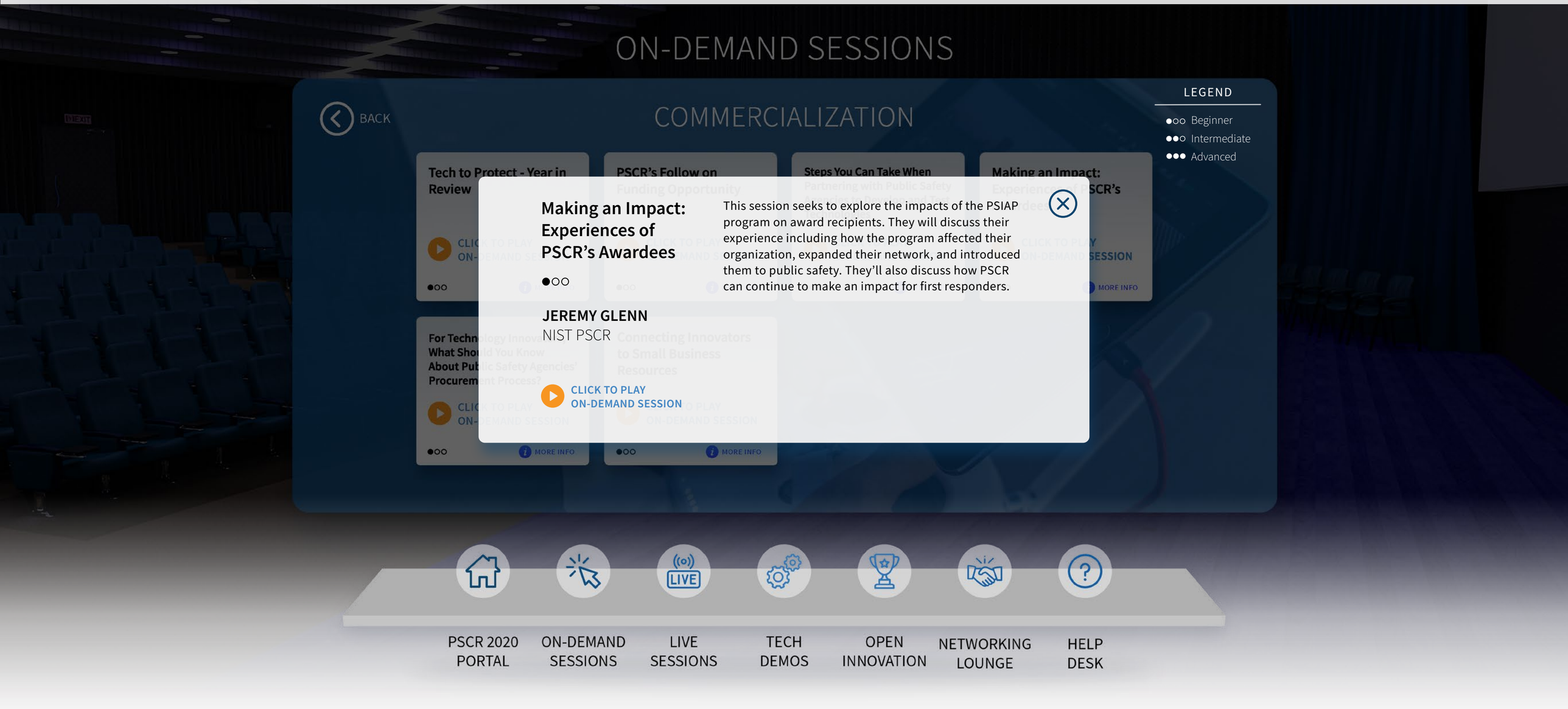
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Making an Impact: Experiences of PSCR's
For Technology Innovators: What Should You Know About Public Safety Agencies' Procurement Process?
Connecting Innovators to Small Business Resources
MORE INFO
Making an Impact: Experiences of PSCR's Awardees
●○○
JEREMY GLENN
NIST PSCR
This session seeks to explore the impacts of the PSIAP program on award recipients. They will discuss their experience including how the program affected their organization, expanded their network, and introduced them to public safety. They'll also discuss how PSCR can continue to make an impact for first responders.
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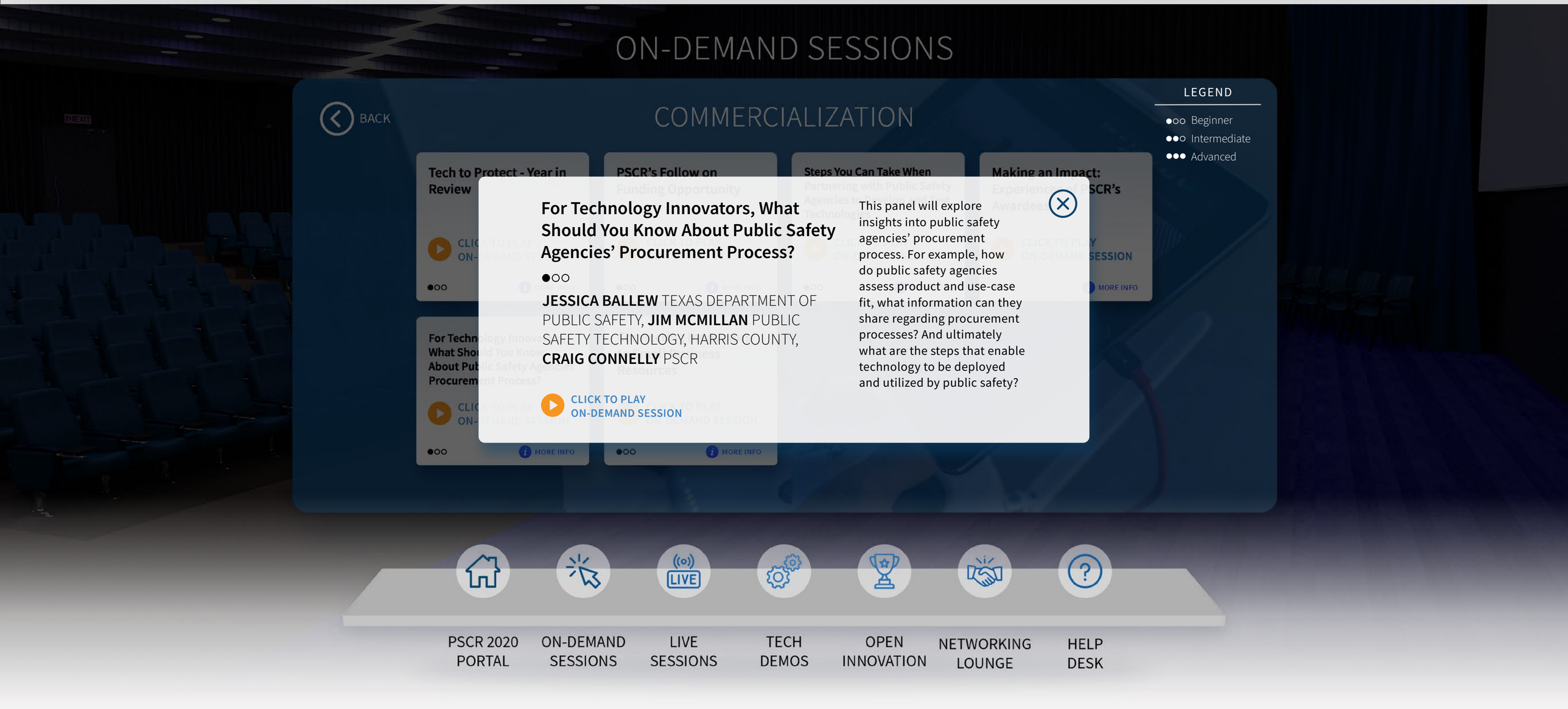
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Tech to Protect - Year in Review
PSCR's Follow on Funding Opportunity
Steps You Can Take When Partnering with Public Safety Agencies
Making an Impact: Experiences of PSCR's Awardees
For Technology Innovators, What Should You Know About Public Safety Agencies' Procurement Process?
●○○
JESSICA BALLEW TEXAS DEPARTMENT OF PUBLIC SAFETY, JIM MCMILLAN PUBLIC SAFETY TECHNOLOGY, HARRIS COUNTY, CRAIG CONNELLY PSCR
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This panel will explore insights into public safety agencies' procurement process. For example, how do public safety agencies assess product and use-case fit, what information can they share regarding procurement processes? And ultimately what are the steps that enable technology to be deployed and utilized by public safety?
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Connecting Innovators to Small Business Resources

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FRANCES PADILLA U.S. SMALL BUSINESS ADMINISTRATION, **SHARON KING** SMALL BUSINESS DEVELOPMENT CENTER, **SHARON KING** FEDERAL AND STATE TECHNOLOGY (FAST) PARTNERSHIP PROGRAM, **JIM PUCKETT** IBM SECURITY, **MATTHEW LOURIE** NOKK NOK LABS, **SUZETTE MCLEOD** FIRSTNET, BUILT WITH AT&T, **DAVID STIEREN** NIST MANUFACTURING EXTENSION PARTNERSHIP, **BRIAN HOBSON** FIRST RESPONDER NETWORK AUTHORITY

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Steps You Can Take When Partnering with Public Safety Agencies to Develop and Test Technologies
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Tech to Protect - Year in Review

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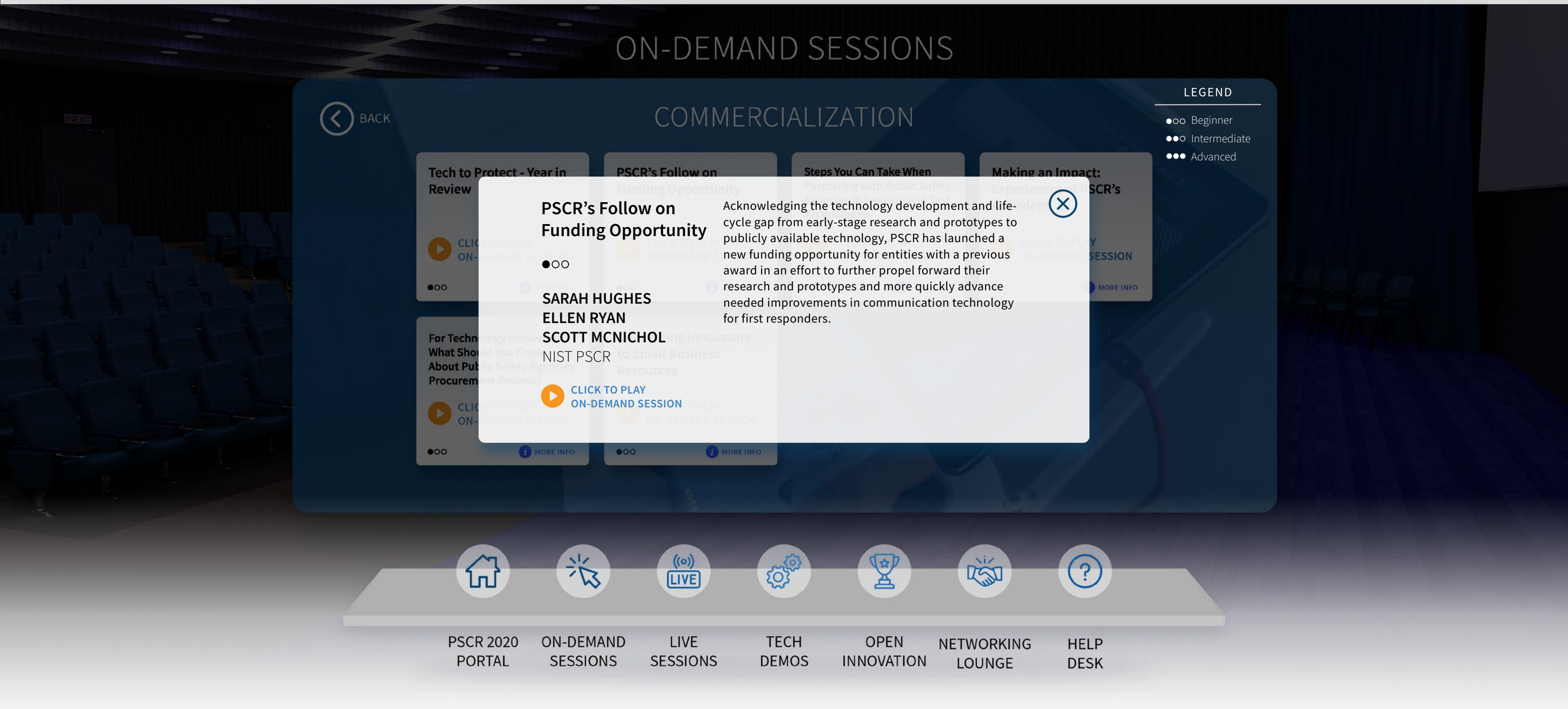
CRAIG CONNELLY, PSCR; **MARGARET PINSON,** NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION; **BILL SCHRIER,** FIRST RESPONDER NETWORK AUTHORITY; **JASON KAHN,** PSCR; **CHARLES GARDNETT,** FIRST RESPONDER NETWORK AUTHORITY; **GARY HOWARTH,** PSCR; **ZACH BRAUN,** FIREHUD; **LAUREN SCLUZAS,** BIO1 SYSTEMS; **AUSTIN S. HANDLE,** APOLLO AI; **LEVIS ADISSI,** AR EXTRICATION ASSIST - AREA

CLICK TO PLAY ON-DEMAND SESSION

Launched in April 2019, the Tech to Protect Challenge is over one year old. This session will look back at the progress to date, highlight recent national award winners, and share the next steps for participants moving forward.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SARAH HUGHES
ELLEN RYAN
SCOTT MCNICHOL
NIST PSCR
CLICK TO PLAY ON-DEMAND SESSION
Acknowledging the technology development and life-cycle gap from early-stage research and prototypes to publicly available technology, PSCR has launched a new funding opportunity for entities with a previous award in an effort to further propel forward their research and prototypes and more quickly advance needed improvements in communication technology for first responders.
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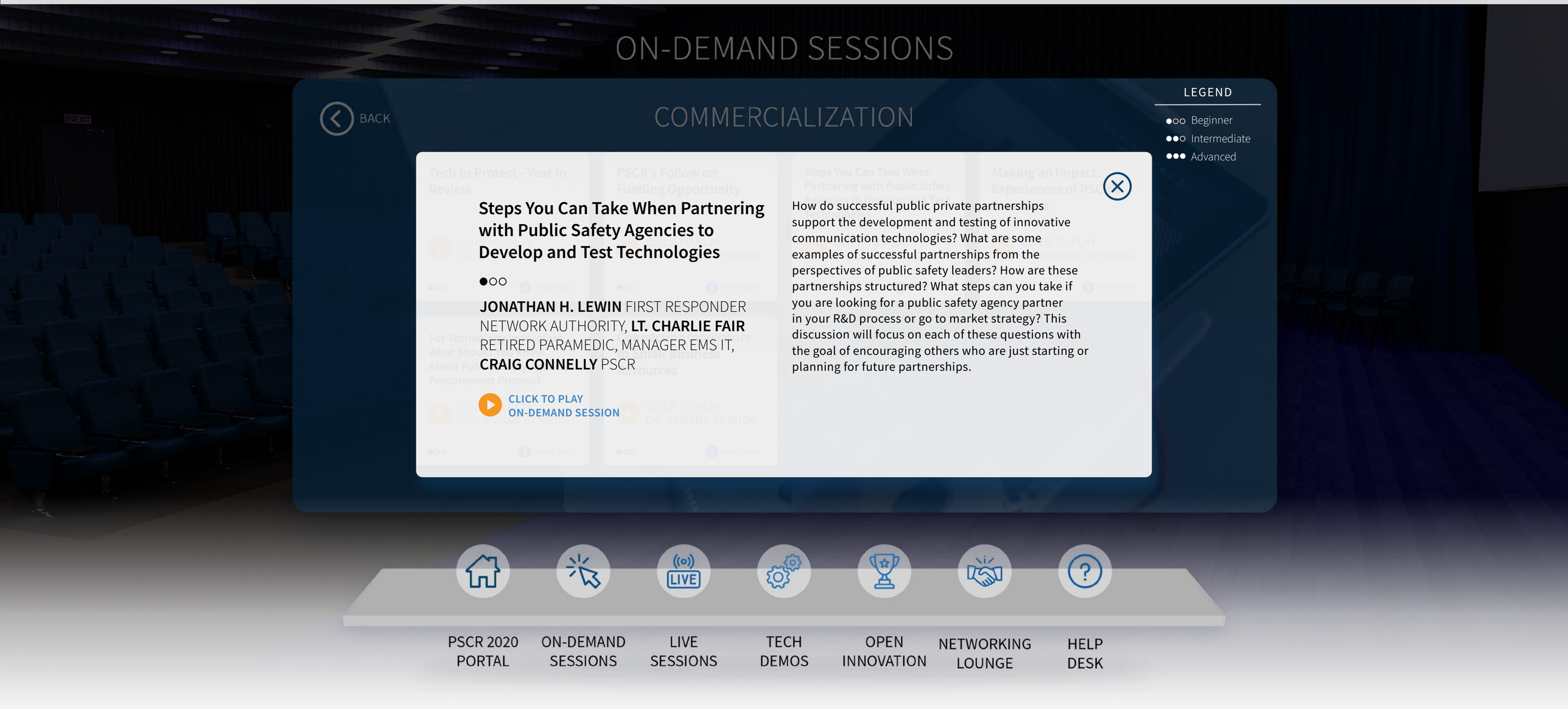
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Steps You Can Take When Partnering with Public Safety Agencies to Develop and Test Technologies
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JONATHAN H. LEWIN FIRST RESPONDER NETWORK AUTHORITY, LT. CHARLIE FAIR RETIRED PARAMEDIC, MANAGER EMS IT, CRAIG CONNELLY PSCR
CLICK TO PLAY ON-DEMAND SESSION
How do successful public private partnerships support the development and testing of innovative communication technologies? What are some examples of successful partnerships from the perspectives of public safety leaders? How are these partnerships structured? What steps can you take if you are looking for a public safety agency partner in your R&D process or go to market strategy? This discussion will focus on each of these questions with the goal of encouraging others who are just starting or planning for future partnerships.
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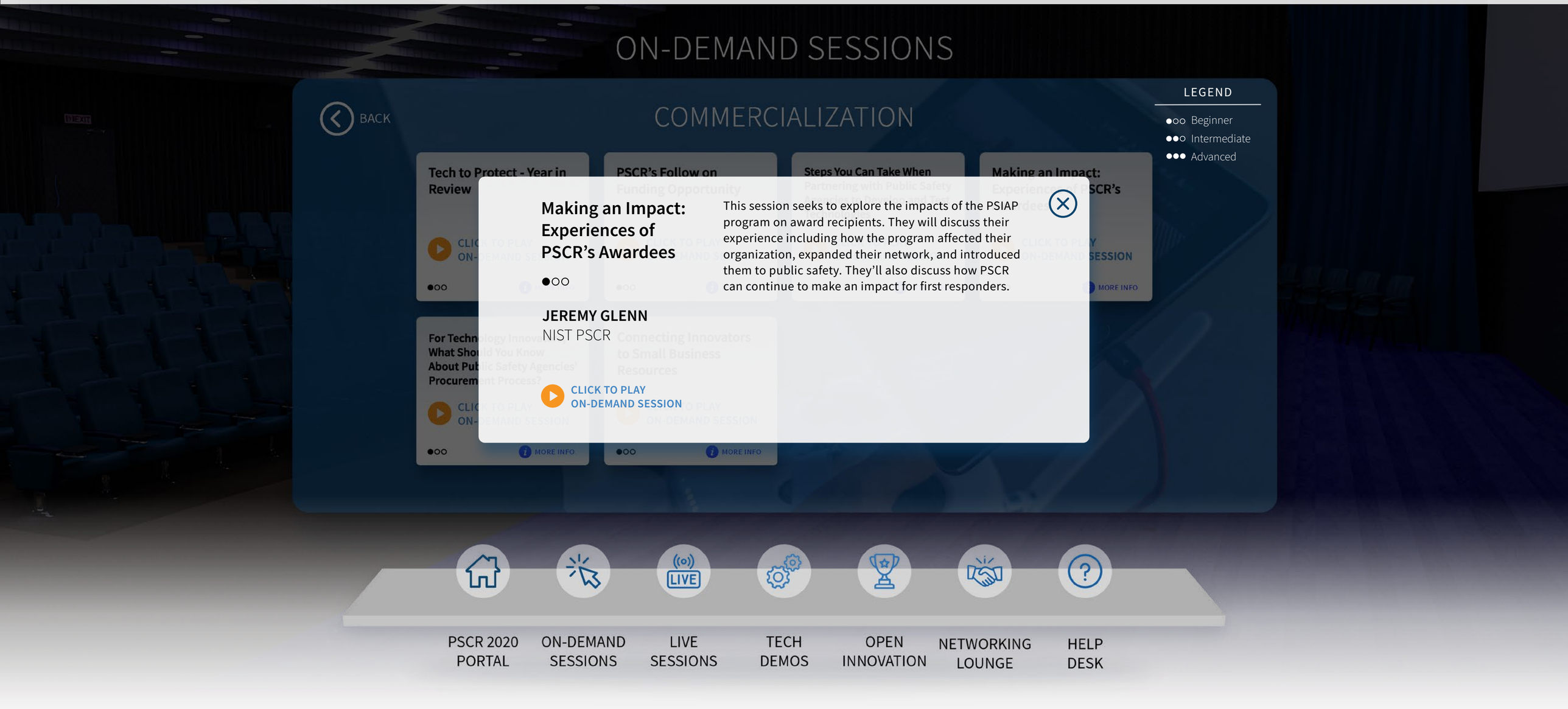
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Making an Impact: Experiences of PSCR's Awardees
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JEREMY GLENN
NIST PSCR
This session seeks to explore the impacts of the PSIAP program on award recipients. They will discuss their experience including how the program affected their organization, expanded their network, and introduced them to public safety. They'll also discuss how PSCR can continue to make an impact for first responders.
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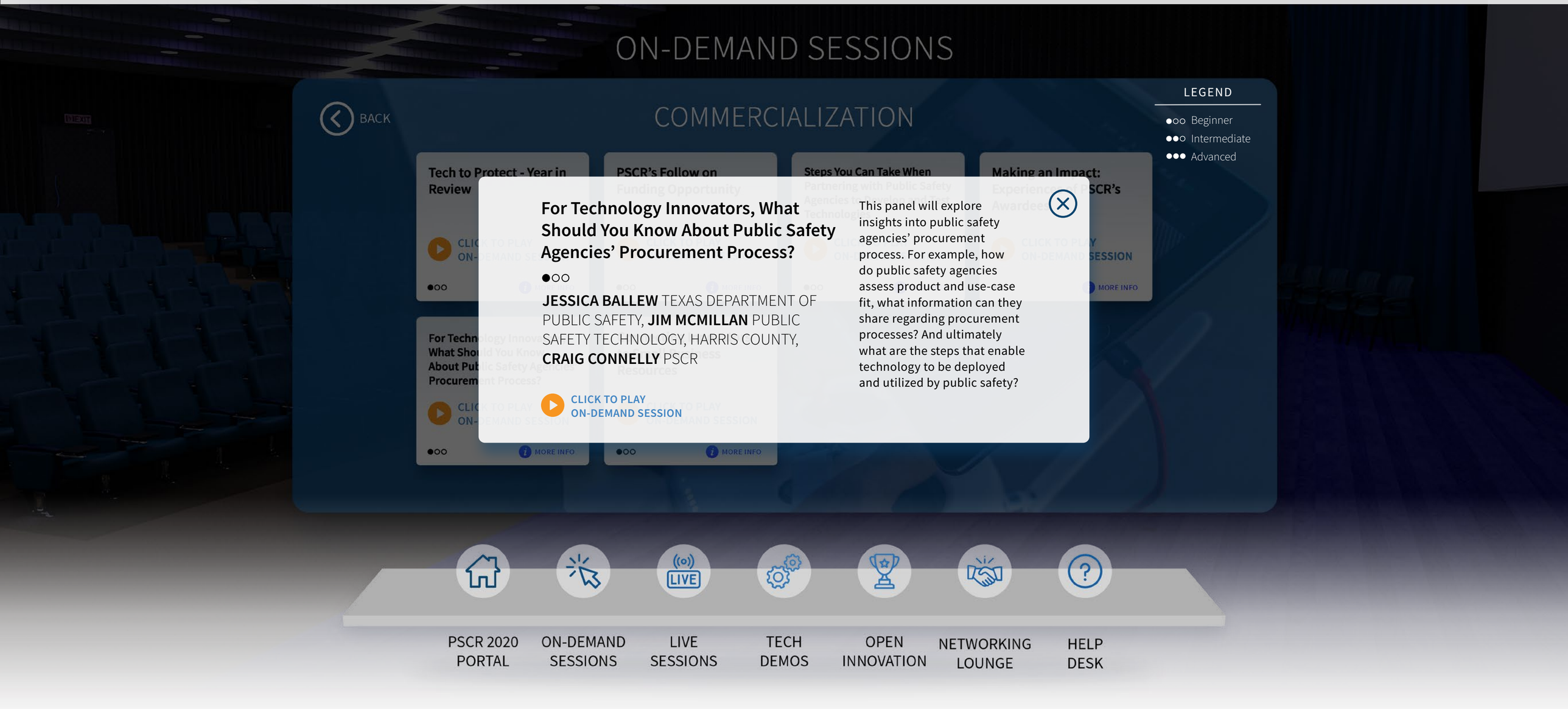
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Connecting Innovators to Small Business Resources

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MCV Portfolio Strategy CLICK TO PLAY ON-DEMAND SESSION ●○○ MORE INFO	**MCV Quality of Experience Measurement Methods** CLICK TO PLAY ON-DEMAND SESSION ●●○ MORE INFO	**LMR to LTE** CLICK TO PLAY ON-DEMAND SESSION ●●○ MORE INFO	**Access Driven Modified Rhyme Test Intelligibility** CLICK TO PLAY ON-DEMAND SESSION ●●○ MORE INFO
The Evolution of Direct Mode in 3GPP CLICK TO PLAY ON-DEMAND SESSION ●●● MORE INFO	**Multicast and Unicast in Serving Public Safety Traffic** CLICK TO PLAY ON-DEMAND SESSION ●●● MORE INFO	**LMR Data Collection for Traffic Modeling** CLICK TO PLAY ON-DEMAND SESSION ●●○ MORE INFO	**Towards 5G mmWave Wireless Connectivity for First Responders** CLICK TO PLAY ON-DEMAND SESSION ●●● MORE INFO

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Analysis and Simulation of Migration of PTT Services to 4G LTE
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QUARC: Implementation of a Real-Time Adjustable Degraded Communications System
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Propagation Channel Models & System Performance
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An Executable MCX 3GPP Conformance Tester to Ensure Device Compliance
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The Testing-as-a-Service Approach: An Enabler of Flexible MCS Certification
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Mission Critical Communication UE Certification Test Tool Development: Plan & Progress
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Emulating and Evaluating Public Safety Voice Quality in a Carry-On
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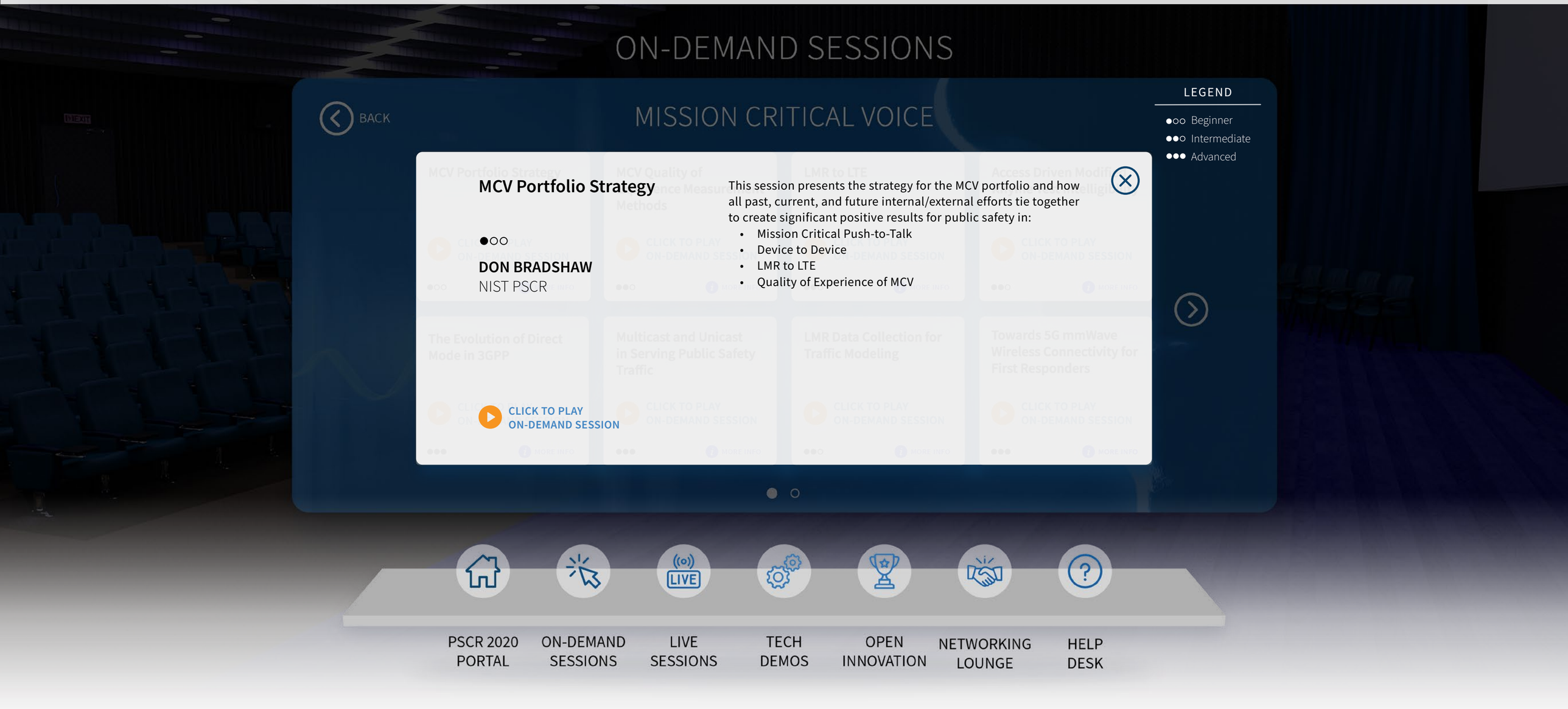
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MCV Portfolio Strategy
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DON BRADSHAW
NIST PSCR
This session presents the strategy for the MCV portfolio and how all past, current, and future internal/external efforts tie together to create significant positive results for public safety in:
• Mission Critical Push-to-Talk
• Device to Device
• LMR to LTE
• Quality of Experience of MCV
CLICK TO PLAY ON-DEMAND SESSION
The Evolution of Direct Mode in 3GPP
Multicast and Unicast in Serving Public Safety Traffic
LMR Data Collection for Traffic Modeling
Towards 5G mmWave Wireless Connectivity for First Responders
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PSCR 2020: THE DIGITAL EXPERIENCE

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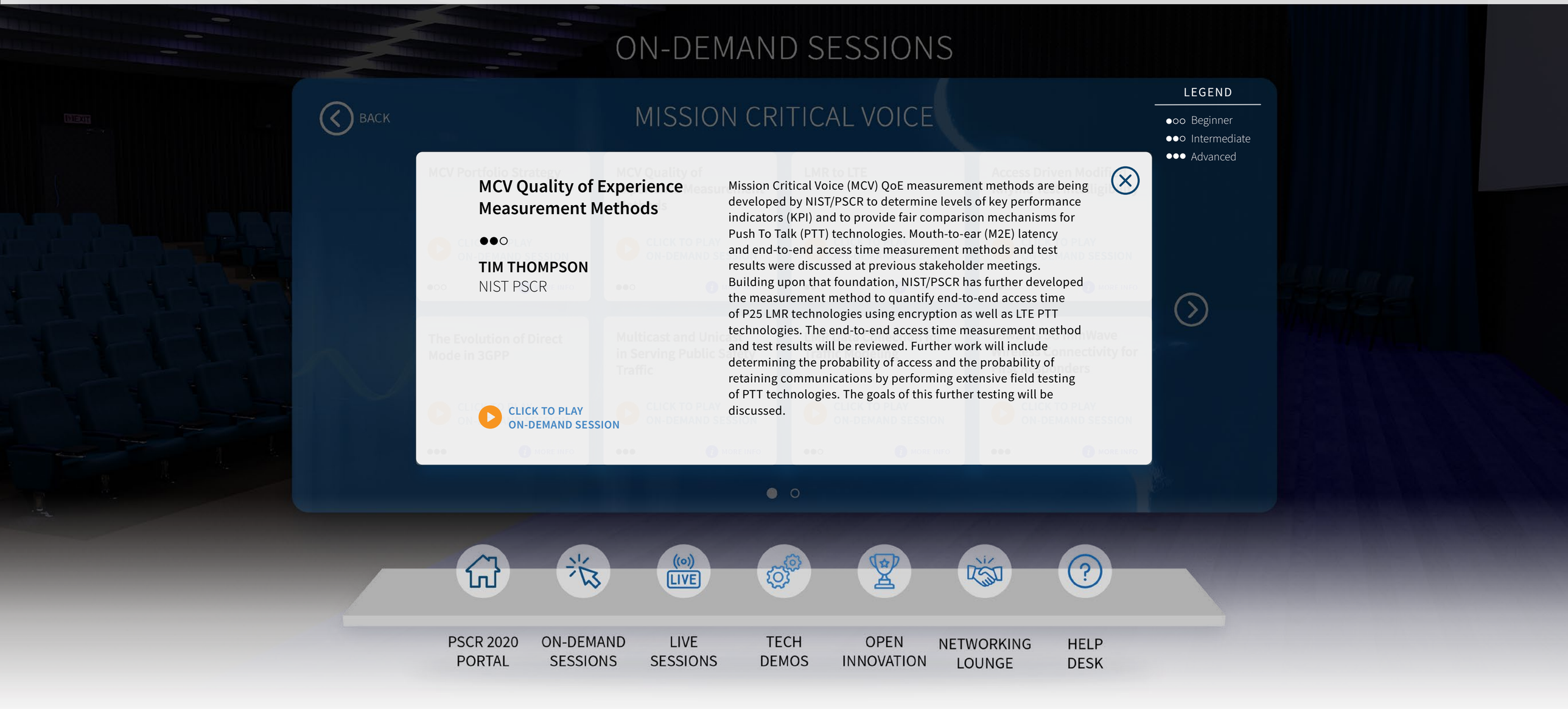

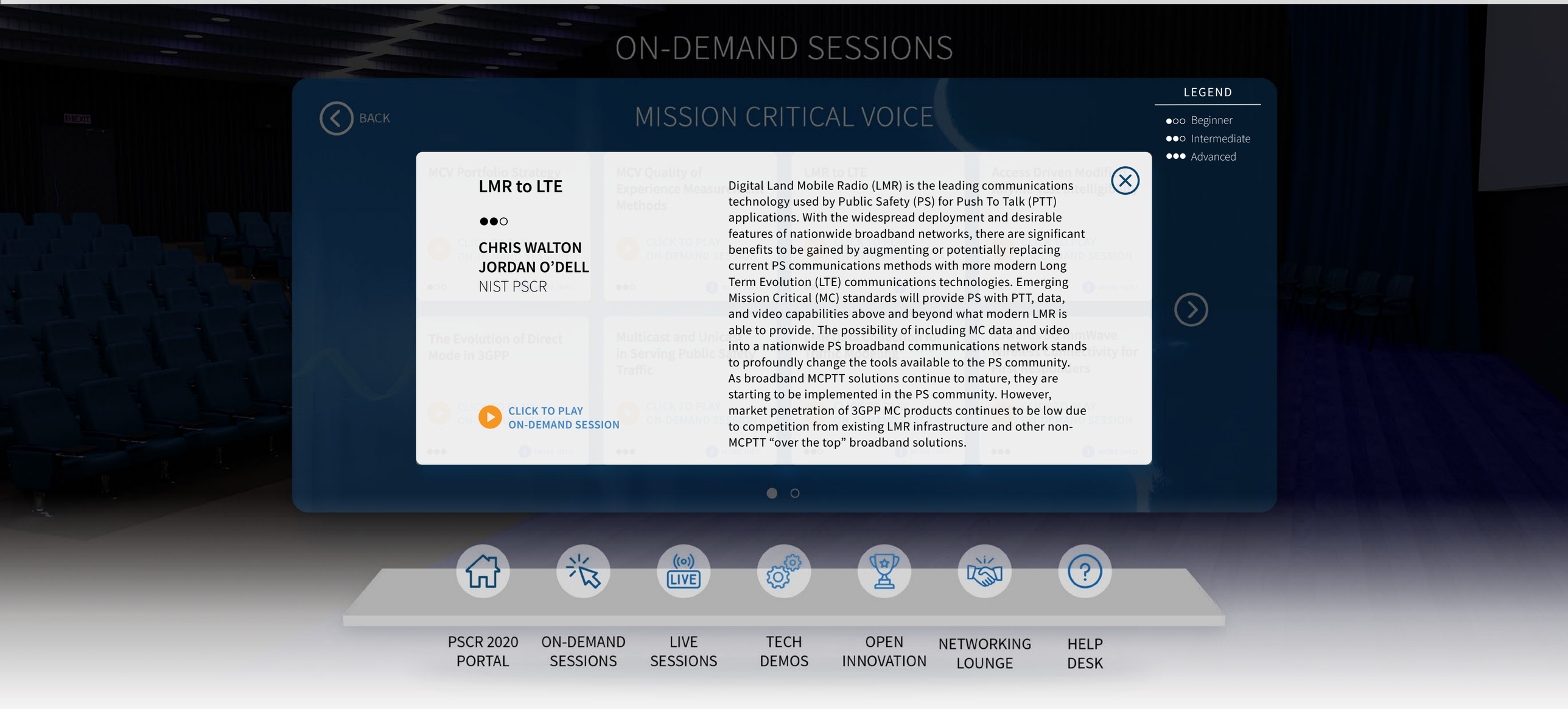
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LMR to LTE
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CHRIS WALTON
JORDAN O'DELL
NIST PSCR
Digital Land Mobile Radio (LMR) is the leading communications technology used by Public Safety (PS) for Push To Talk (PTT) applications. With the widespread deployment and desirable features of nationwide broadband networks, there are significant benefits to be gained by augmenting or potentially replacing current PS communications methods with more modern Long Term Evolution (LTE) communications technologies. Emerging Mission Critical (MC) standards will provide PS with PTT, data, and video capabilities above and beyond what modern LMR is able to provide. The possibility of including MC data and video into a nationwide PS broadband communications network stands to profoundly change the tools available to the PS community. As broadband MCPTT solutions continue to mature, they are starting to be implemented in the PS community. However, market penetration of 3GPP MC products continues to be low due to competition from existing LMR infrastructure and other non-MCPTT "over the top" broadband solutions.
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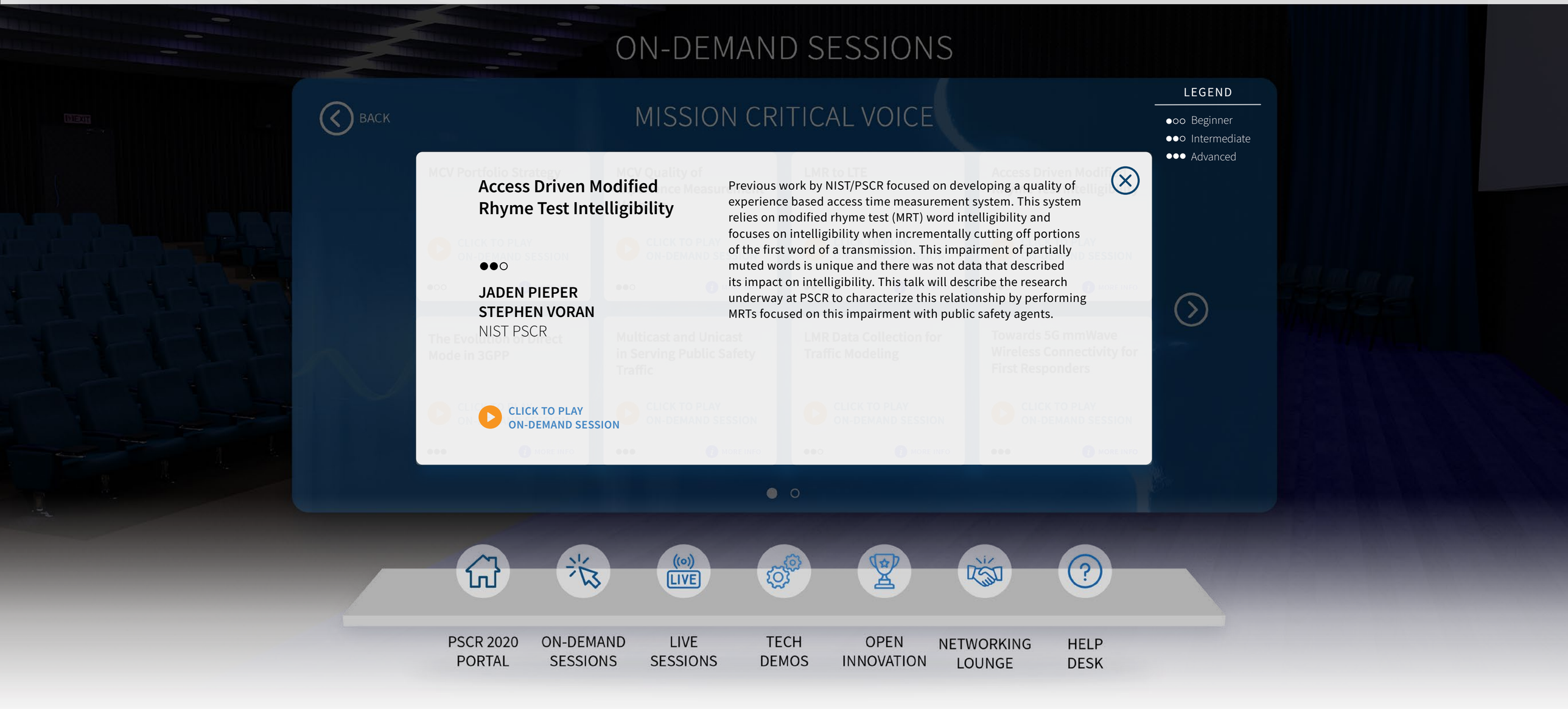
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Access Driven Modified Rhyme Test Intelligibility
●●○
JADEN PIEPER
STEPHEN VORAN
NIST PSCR
Previous work by NIST/PSCR focused on developing a quality of experience based access time measurement system. This system relies on modified rhyme test (MRT) word intelligibility and focuses on intelligibility when incrementally cutting off portions of the first word of a transmission. This impairment of partially muted words is unique and there was not data that described its impact on intelligibility. This talk will describe the research underway at PSCR to characterize this relationship by performing MRTs focused on this impairment with public safety agents.
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Multicast and Unicast in Serving Public Safety Traffic
LMR Data Collection for Traffic Modeling
Towards 5G mmWave Wireless Connectivity for First Responders
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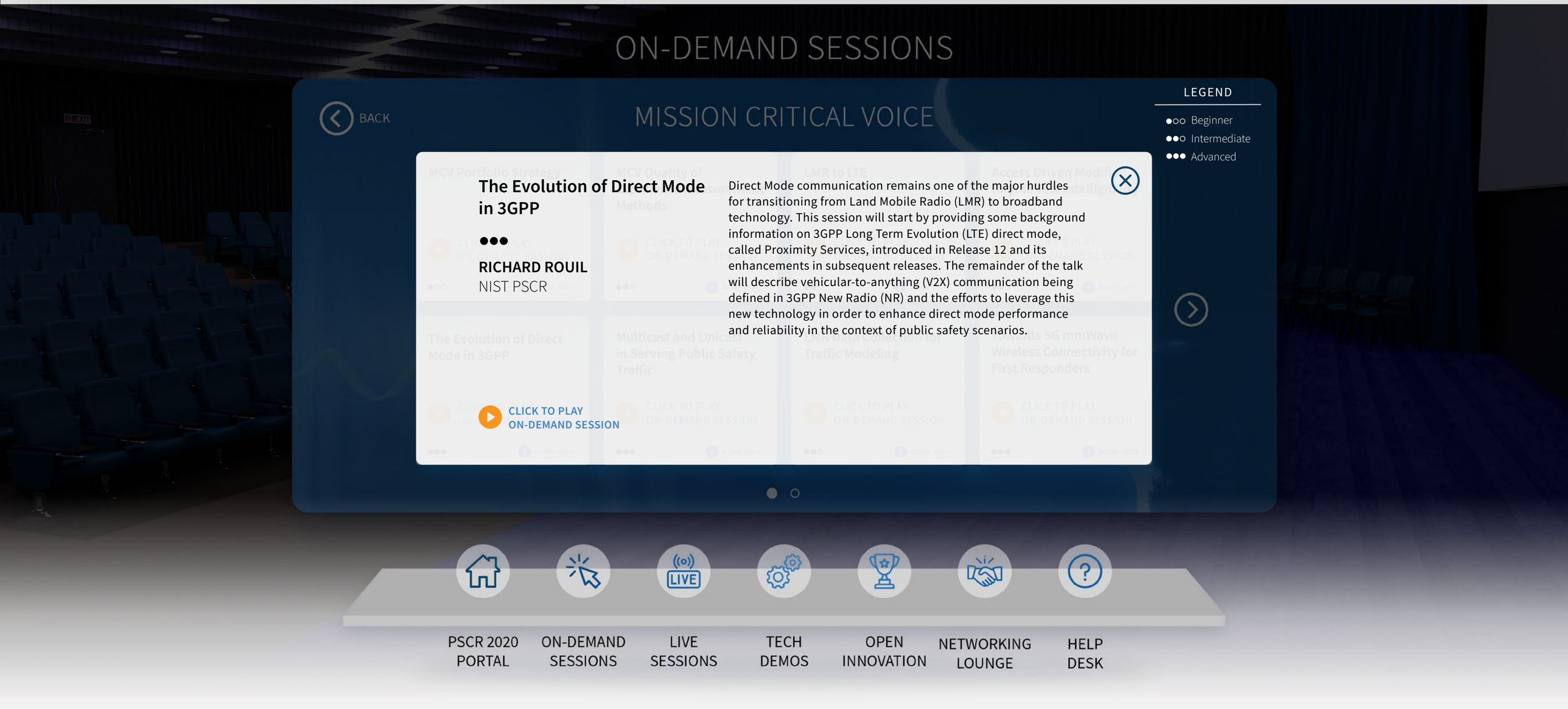
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The Evolution of Direct Mode in 3GPP
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RICHARD ROUIL
NIST PSCR
Direct Mode communication remains one of the major hurdles for transitioning from Land Mobile Radio (LMR) to broadband technology. This session will start by providing some background information on 3GPP Long Term Evolution (LTE) direct mode, called Proximity Services, introduced in Release 12 and its enhancements in subsequent releases. The remainder of the talk will describe vehicular-to-anything (V2X) communication being defined in 3GPP New Radio (NR) and the efforts to leverage this new technology in order to enhance direct mode performance and reliability in the context of public safety scenarios.
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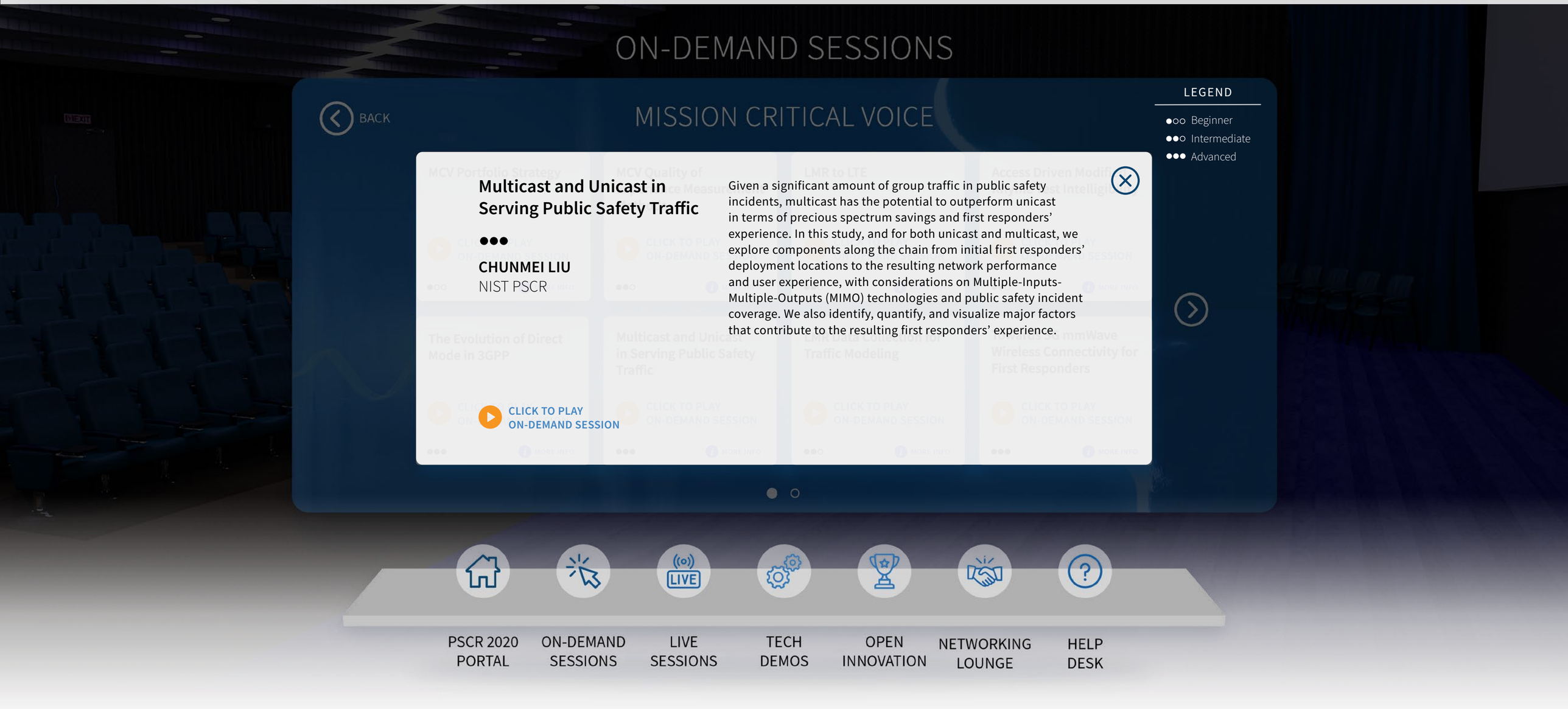
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Multicast and Unicast in Serving Public Safety Traffic
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CHUNMEI LIU
NIST PSCR
Given a significant amount of group traffic in public safety incidents, multicast has the potential to outperform unicast in terms of precious spectrum savings and first responders' experience. In this study, and for both unicast and multicast, we explore components along the chain from initial first responders' deployment locations to the resulting network performance and user experience, with considerations on Multiple-Inputs-Multiple-Outputs (MIMO) technologies and public safety incident coverage. We also identify, quantify, and visualize major factors that contribute to the resulting first responders' experience.
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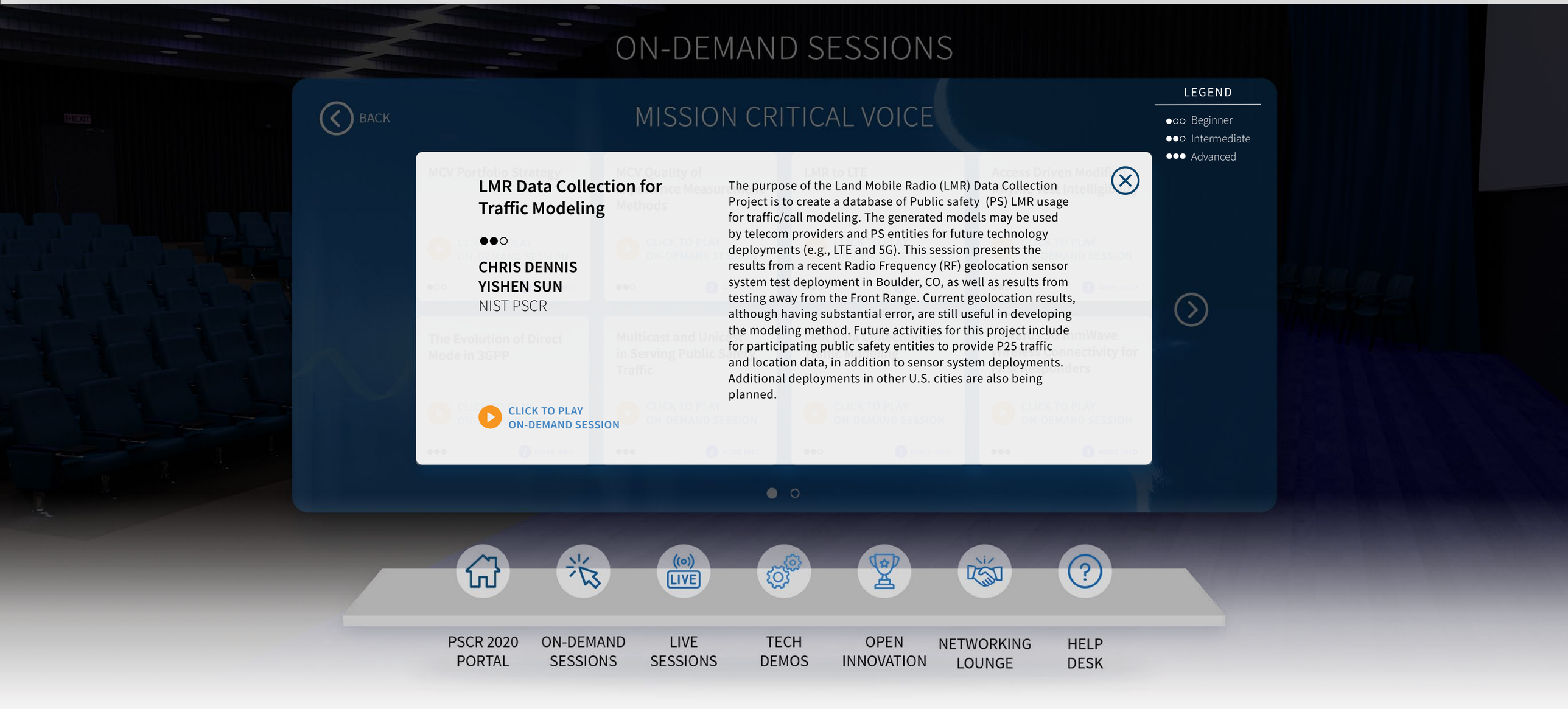
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LMR Data Collection for Traffic Modeling
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CHRIS DENNIS
YISHEN SUN
NIST PSCR
The purpose of the Land Mobile Radio (LMR) Data Collection Project is to create a database of Public safety (PS) LMR usage for traffic/call modeling. The generated models may be used by telecom providers and PS entities for future technology deployments (e.g., LTE and 5G). This session presents the results from a recent Radio Frequency (RF) geolocation sensor system test deployment in Boulder, CO, as well as results from testing away from the Front Range. Current geolocation results, although having substantial error, are still useful in developing the modeling method. Future activities for this project include for participating public safety entities to provide P25 traffic and location data, in addition to sensor system deployments. Additional deployments in other U.S. cities are also being planned.
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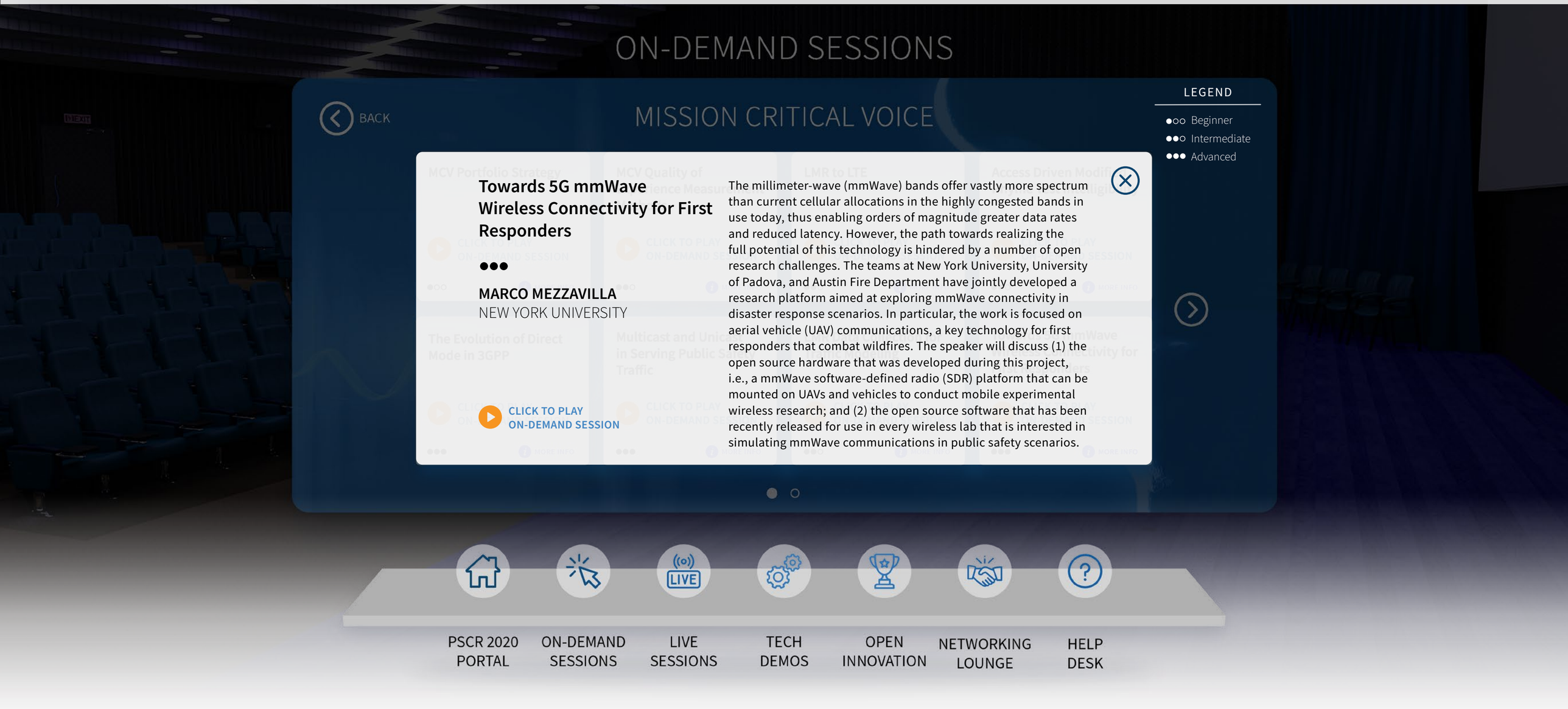
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Towards 5G mmWave Wireless Connectivity for First Responders
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MARCO MEZZAVILLA
NEW YORK UNIVERSITY
CLICK TO PLAY ON-DEMAND SESSION
The millimeter-wave (mmWave) bands offer vastly more spectrum than current cellular allocations in the highly congested bands in use today, thus enabling orders of magnitude greater data rates and reduced latency. However, the path towards realizing the full potential of this technology is hindered by a number of open research challenges. The teams at New York University, University of Padova, and Austin Fire Department have jointly developed a research platform aimed at exploring mmWave connectivity in disaster response scenarios. In particular, the work is focused on aerial vehicle (UAV) communications, a key technology for first responders that combat wildfires. The speaker will discuss (1) the open source hardware that was developed during this project, i.e., a mmWave software-defined radio (SDR) platform that can be mounted on UAVs and vehicles to conduct mobile experimental wireless research; and (2) the open source software that has been recently released for use in every wireless lab that is interested in simulating mmWave communications in public safety scenarios.
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Analysis and Simulation of Migration of PTT Services to 4G LTE

●●●

SUMIT ROY
THOMAS HENDERSON
UNIVERSITY OF WASHINGTON

CLICK TO PLAY ON-DEMAND SESSION

The performance of Mission-Critical Push-To-Talk (MCPTT) in future public safety networks based on LTE and 5G will be a key driver of operational success and safety. MCPTT is being implemented by many vendors and tested at interoperability events such as the ETSI Plugtest events, but large-scale experimentation with real equipment is often limited by factors such as equipment availability and field testing costs. For these reasons, a high-fidelity simulation model of MCPTT for the popular ns-3 discrete-event network simulation framework has been initiated by NIST Wireless Networks Division and further developed in this PSIAP-funded project. We will describe specifically how the off-network MCPTT simulation models from NIST have been extended to model on-network MCPTT operation over a simulated LTE radio access network and core, and how these models can be used in large-scale simulation experiments such as have been authored by NIST. Key performance indicators (KPIs) such as access time latency and mouth-to-ear latency are supported by performance traces from the simulation models, and the models will allow researchers to explore issues such as scheduling policies and robustness to intermittent links in a controlled, reproducible simulation environment. Simulation tests and documentation are also published as part of the open-source software dissemination of the models.

ON-DEMAND SESSIONS

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QUARC: Implementation of a Real-Time Adjustable Degraded Communications System

●●○

ALESSIO MEDDA
GEORGE TECH RESEARCH INSTITUTE

CLICK TO PLAY ON-DEMAND SESSION

Georgia Tech Research Institute (GTRI) is developing a framework for the evaluation of mission critical voice (MCV) quality of experience (QoE) for first responders operating in real field scenarios. The research team is developing a suite of software tools for the simulation, recording, and evaluation of LMR and LTE voice communication systems with the ability to concurrently vary four proposed key performance indicators (KPI) and evaluate the quality of experience for active-duty operators and first responders. Moreover, GTRI is developing a dedicated wearable digital communication system with the purpose of collecting data during real operating scenarios by measuring objective and subjective outcomes, recording data in input and output of each communication system and recording the overall scenario. Furthermore, GTRI will leverage outcomes to design, develop, and validate a model for QoE for public safety users. The GTRI ARTEMIS-QUARC project will integrate with the ARTEMIS (usability testbed for first responders), seamlessly enabling a Virtual Test Facility for the collection of real-time, objective data.

ON-DEMAND SESSIONS

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Propagation Channel Models & System Performance

●●○

ANDREAS MOLISCH
HUSSEIN HAMMOUD
UNIVERSITY OF SOUTHERN CALIFORNIA

CLICK TO PLAY ON-DEMAND SESSION

The next generation of emergency responder systems will be based on LTE, as the use of commercial off-the-shelf components will lead to a dramatic decrease in cost. However, since PSOs (Public Safety Organizations) often need to operate in areas where there is no cellular infrastructure (either by design, or because the infrastructure is nonoperative after a natural disaster), it is essential that DMO (Direct Mode Operation), also known as Device-to-Device (D2D) communication is fully operational and reliable. At the current time, the D2D mode of LTE is still under development, and no proper testing has been done yet.

A key requirement is testing in realistic channels; it is not sufficient to analyze performance with the 3GPP (or similar) channel models, as those are intended to compare different systems, not to evaluate absolute performance and reliability.

The key goal of this project is thus to perform extensive measurement campaigns for D2D channels, in particular concentrating on channels that are most important for PSOs, namely (i) channels for vehicle-to-vehicle (V2V) communications, including convoys, and (ii) indoor-to-outdoor (I2O) channels, where one mobile device is outdoors at street level, and the other indoors, possibly at a higher floor. For those scenarios, existing measurements are missing critical components such as (i) sufficient number of measurements to provide statistical viability, (ii) directional channel characteristics (which are needed to evaluate multi-antenna terminals), and (iii) evolution of channel characteristics when the device moves on a trajectory.

ON-DEMAND SESSIONS

BACK

MISSION CRITICAL VOICE

LEGEND
- ●○○ Beginner
- ●●○ Intermediate
- ●●● Advanced

An Executable MCX 3GPP Conformance Tester to Ensure Device Compliance

●●○

This presentation will provide an overview of the Valid8 MCX Conformance Tester that can be used to verify MCX Client device compliance to the 3GPP specification standards. This includes a demonstration of Mission Critical Push-to-Talk (MCPTT) test execution and result analysis.

IAN CARPENTER
VALID8

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ON-DEMAND SESSIONS

BACK

MISSION CRITICAL VOICE

LEGEND

- ●○○ Beginner
- ●●○ Intermediate
- ●●● Advanced

The Testing-as-a-Service Approach: An Enabler of Flexible MCS Certification

●●○

FIDEL LIBERAL
TJ KENNEDY (PSTA)
WALT MAGNUSSEN (TAMU) UNIVERSITY OF THE BASQUE COUNTRY

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The Mission Critical Services (MCS) Testing-as-a-Service approach aims to fulfill the needs of the mission critical and public safety community in terms of compliance testing. Our goal is to drive innovation for public safety by making compliance with open standards more accessible to all.

Developing and deploying compliance remote testing services will allow not only the industry to prove the 3GPP standards-compliance of their implementation, but will also give the public safety users and operators the confidence to buy compliant products.

Unlike traditional mobile phone testing environments in which both service -software- and hardware are bundled in the device to be tested, assembled, and certified by a single vendor, in the MCS ecosystem most of the times the device manufacturer is not the same as the MCS client provider. Then, instead of expensive testing equipment targeting markets of billions of smartphones, the flexible MCS-TaaSting approach enables cost-efficient, regular and frequent testing, re-testing, certification and re-certification of the myriad and increasing combinations of devices, operating systems, middleware and applications in the MCS ecosystem.

Furthermore, the testing service will also be made available through LTE hardware that is capable of evaluating the specific Mission Critical features from LTE including the radio interface elements.

ON-DEMAND SESSIONS

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Mission Critical Communication UE Certification Test Tool Development: Plan & Progress

●●○

SUDIPTO BISWAS
POLARIS NETWORKS

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Session will cover the following points in detail:

- Project Goal
- Scope of Work
- High Level Solution
- Project Schedule
- Dependencies
- Progress
- Next Plans
- Challenges
- Support Required

ON-DEMAND SESSIONS

BACK

MISSION CRITICAL VOICE

LEGEND
- ●○○ Beginner
- ●●○ Intermediate
- ●●● Advanced

Emulating and Evaluating Public Safety Voice Quality in a Carry-On

●●○

We describe a programmable land-mobile radio voice emulator that allows experimenters to vary all critical communication parameters, including codec (P.25 and others), delay, PTT delay, packet loss, bit error rate, and voice drop-outs. The system is integrated with an experiment management system so that experiments can be recorded and evaluated.

HENNING SCHULZRINNE,
COLUMBIA UNIVERSITY

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BACK

PUBLIC SAFETY ANALYTICS

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Social Media Incident Streams
CLICK TO PLAY ON-DEMAND SESSION
●○○ MORE INFO

Automated Streams Analytics for Public Safety
CLICK TO PLAY ON-DEMAND SESSION
●●○ MORE INFO

Speech Analytics for Public Safety
CLICK TO PLAY ON-DEMAND SESSION
●○○ MORE INFO

IoT Environments: Examining Data Foundations
CLICK TO PLAY ON-DEMAND SESSION
●○○ MORE INFO

Connecting the First Responder's Environment
CLICK TO PLAY ON-DEMAND SESSION
●●○ MORE INFO

Crisis Collaborations: Challenges for Safe Data Sharing with Differential Privacy
CLICK TO PLAY ON-DEMAND SESSION
●●○ MORE INFO

Towards Cognitive Assistant Systems for Emergency Response
CLICK TO PLAY ON-DEMAND SESSION
●●○ MORE INFO

SAFE-NET: A Computing Platform for Public Safety Applications
CLICK TO PLAY ON-DEMAND SESSION
●●○ MORE INFO

ON-DEMAND SESSIONS

BACK

PUBLIC SAFETY ANALYTICS

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User Defined Video Analytics and Integrated Alerting for Public Safety
CLICK TO PLAY ON-DEMAND SESSION
●○○ MORE INFO

Real-Time Video Analytics for Situation Awareness
CLICK TO PLAY ON-DEMAND SESSION
●○○ MORE INFO

Technical Advances in Body-Worn Camera Video Understanding
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●●● MORE INFO

Information-Driven Video Communication for Public Safety Networks
CLICK TO PLAY ON-DEMAND SESSION
●●○ MORE INFO


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Social Media Incident Streams
●○○
IAN SOBOROFF
NIST PSCR
This session will describe an effort to collect and annotate social media data for public safety. The Social Media Incident Streams project gathers tweets sent during emergencies, including earthquakes, hurricanes, wildfires, and mass shootings. The tweets are labeled by human annotators to indicate whether the information is relevant to public safety, what specific category or need it represents, and how time-critical a response is. This activity takes place within NIST's Text Retrieval Conference (TREC), a 28-year ongoing activity that builds labeled datasets for search, information retrieval, information filtering, recommendation, and other AI tasks.
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PUBLIC SAFETY ANALYTICS
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Automated Streams Analytics for Public Safety
●●○
JOHN GAROFOLO
CRAIG CONNELLY
NIST PSCR
CLICK TO PLAY ON-DEMAND SESSION
The session will introduce the audience to the new PSCR Automated Streams Analysis for Public Safety (ASAPS) prize challenge program. This unique program brings together research across the PSCR Analytics Portfolio, and provides an opportunity for participants to create prototype real-time emergency detection, analysis, alerting, visualization, and situation awareness applications for emergency operations centers. ASAPS is a multi-phase challenge to apply the state-of-the-art in AI technologies to the many live streams of data that public safety must currently monitor to automatically analyze critically important information about emergencies as they happen. ASAPS is designed to solicit innovative concepts and foster teaming and collaboration. Contestants will design and develop technology solutions to the analytic components needed to create progressively more sophisticated ASAPS system prototypes. The data that will be used to drive the R&D for the contests are collected and synchronized from staged emergency scenes viewed by many CCTV cameras and synthesized dispatch communications, situation logging, 911 calls, social media postings, responder audio and
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Automated Streams Analytics for Public Safety
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JOHN GAROFOLO
CRAIG CONNELLY
NIST PSCR
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textual communications, GPS, and sensor data. The data will be automatically streamed to contestant algorithms within a state-of-the-art integration framework simulating real-time data streaming and communications and providing common APIs to contestant-developed analytic components supporting real-time multi-modal data analysis, information representation, analytic reporting, information visualization, and user interaction. Prizes will be awarded to contestants for various aspects of their prototype solutions.
The session will feature speakers including the NIST ASAPS challenge leads John Garofolo and Craig Connelly, Keil Green, CEO of the Lafayette Group who is organizing and implementing the challenges under contract to NIST, and a public safety representative, Julie Stroup, the Public Safety Video Program Manager for the Houston Mayor's Office of Public Safety and Homeland Security. ASAPS will foster ground-breaking multidisciplinary R&D for real-time multi-modal data stream analysis, information fusion, and information delivery to help provide public safety with critical real-time emergency situation information to save lives, property, and infrastructure where every second counts!
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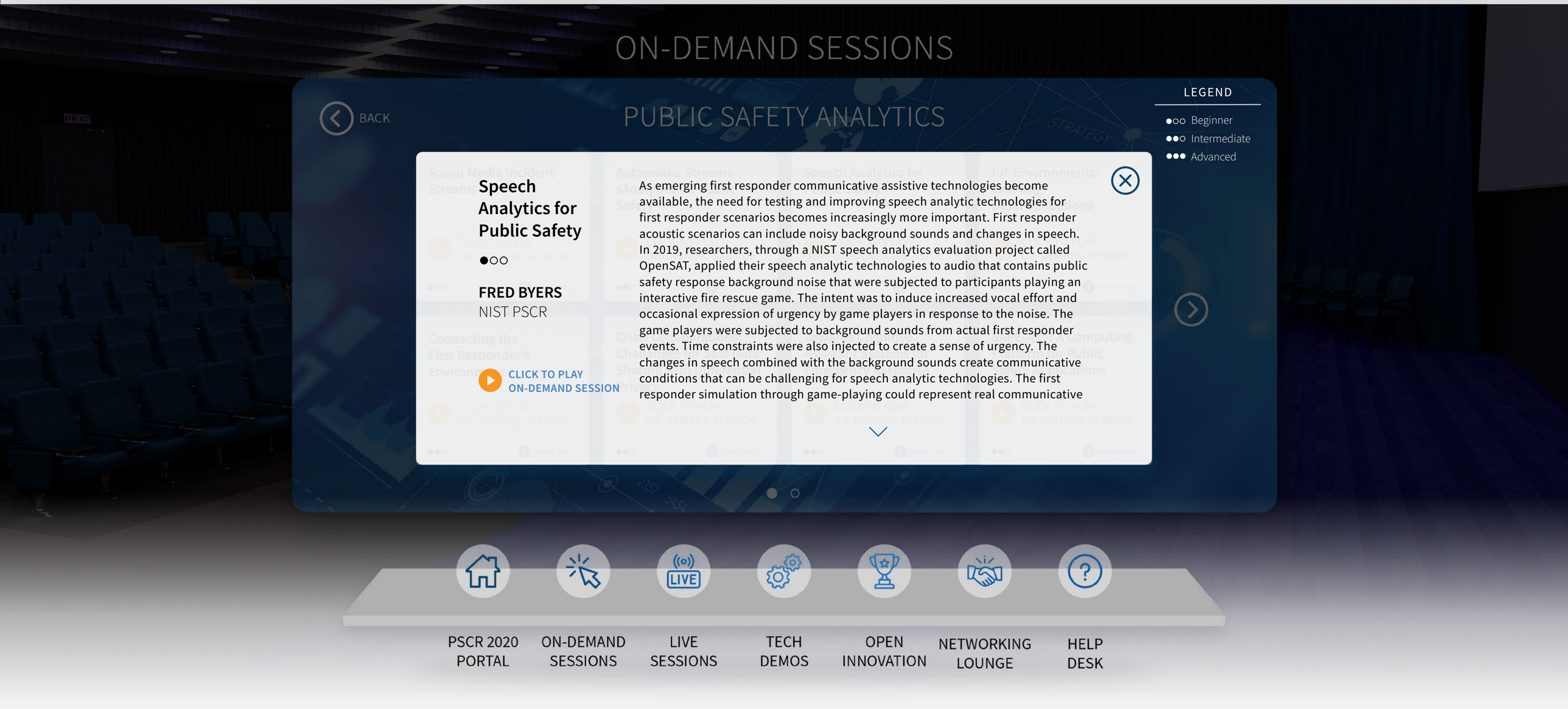
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Speech Analytics for Public Safety
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FRED BYERS
NIST PSCR
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As emerging first responder communicative assistive technologies become available, the need for testing and improving speech analytic technologies for first responder scenarios becomes increasingly more important. First responder acoustic scenarios can include noisy background sounds and changes in speech. In 2019, researchers, through a NIST speech analytics evaluation project called OpenSAT, applied their speech analytic technologies to audio that contains public safety response background noise that were subjected to participants playing an interactive fire rescue game. The intent was to induce increased vocal effort and occasional expression of urgency by game players in response to the noise. The game players were subjected to background sounds from actual first responder events. Time constraints were also injected to create a sense of urgency. The changes in speech combined with the background sounds create communicative conditions that can be challenging for speech analytic technologies. The first responder simulation through game-playing could represent real communicative
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Speech Analytics for Public Safety
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FRED BYERS
NIST PSCR
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conditions for first responders at critical times during an actual emergency.
This presentation includes evaluation results from the NIST's inaugural OpenSAT19 Evaluation that will be the baseline for tracking speech analytic technology performance improvements through annual evaluations. The speech analytic technologies that are currently being tracked include automated speech-to-text, speech activity detection, and keyword search. The OpenSAT20 Evaluation is currently in process.
DHS sponsored this effort by PSCR to create an audio dataset and to test and evaluate state of the art speech analytic systems with conditions challenging for speech analytics as mentioned above.
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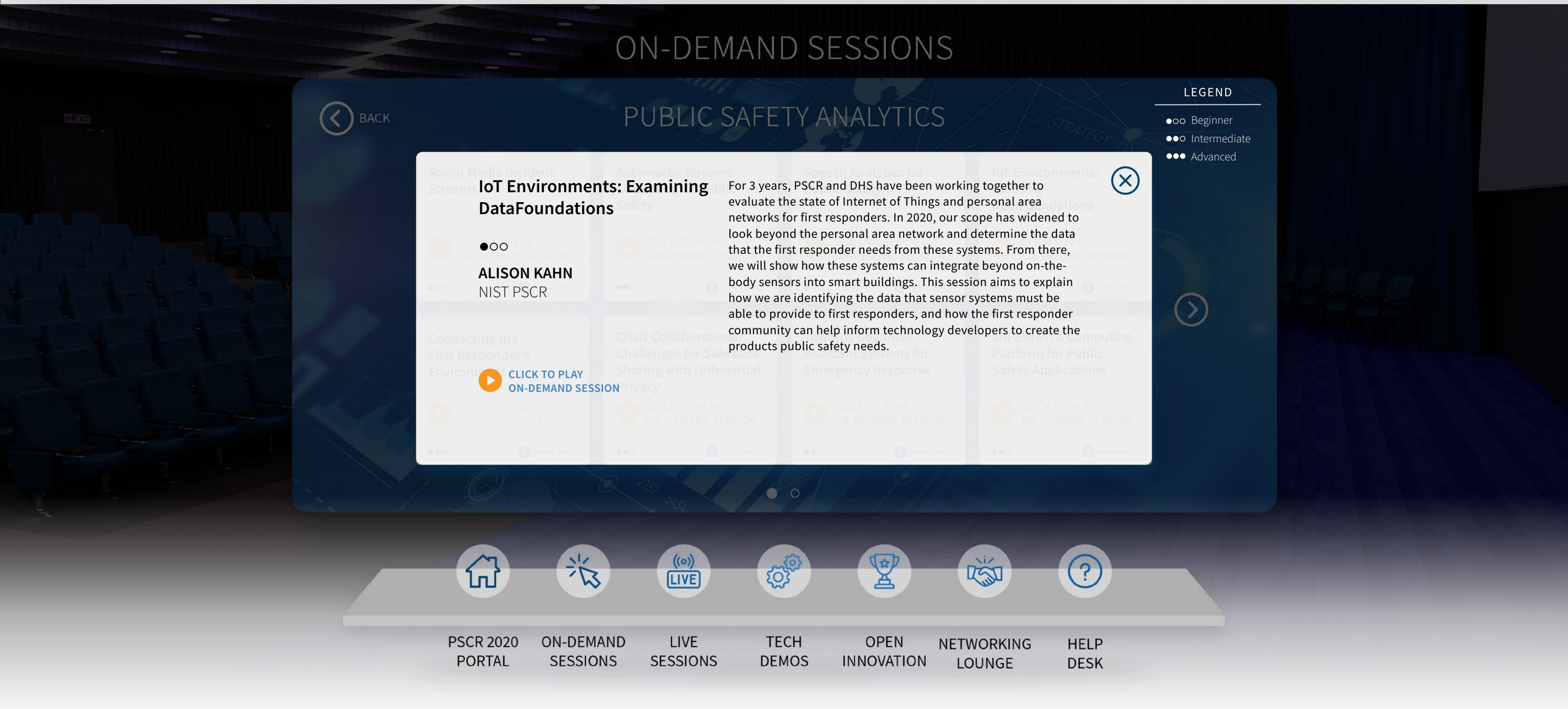
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IoT Environments: Examining DataFoundations
●○○
ALISON KAHN
NIST PSCR
For 3 years, PSCR and DHS have been working together to evaluate the state of Internet of Things and personal area networks for first responders. In 2020, our scope has widened to look beyond the personal area network and determine the data that the first responder needs from these systems. From there, we will show how these systems can integrate beyond on-the-body sensors into smart buildings. This session aims to explain how we are identifying the data that sensor systems must be able to provide to first responders, and how the first responder community can help inform technology developers to create the products public safety needs.
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PUBLIC SAFETY COMMUNICATIONS RESEARCH
PSCR

PSCR 2020: THE DIGITAL EXPERIENCE

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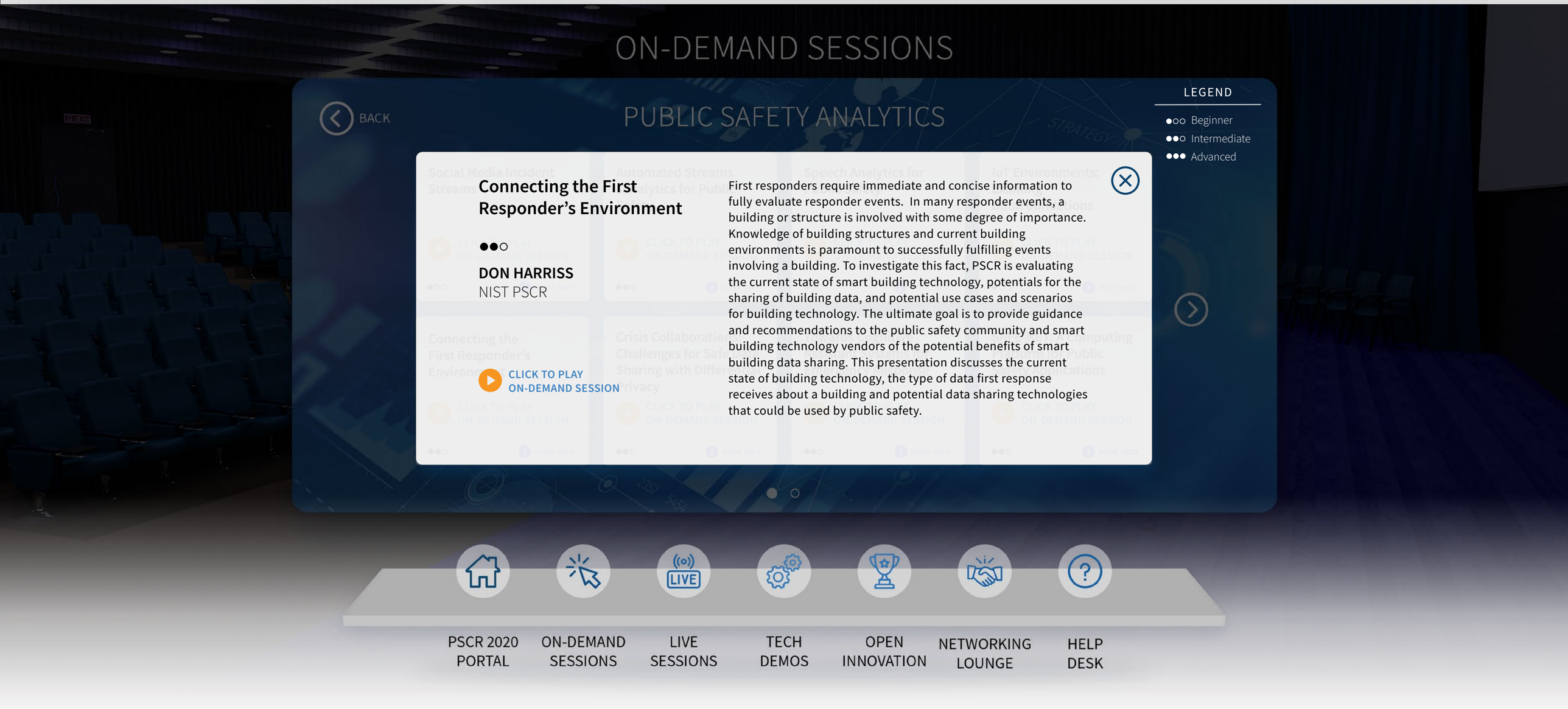

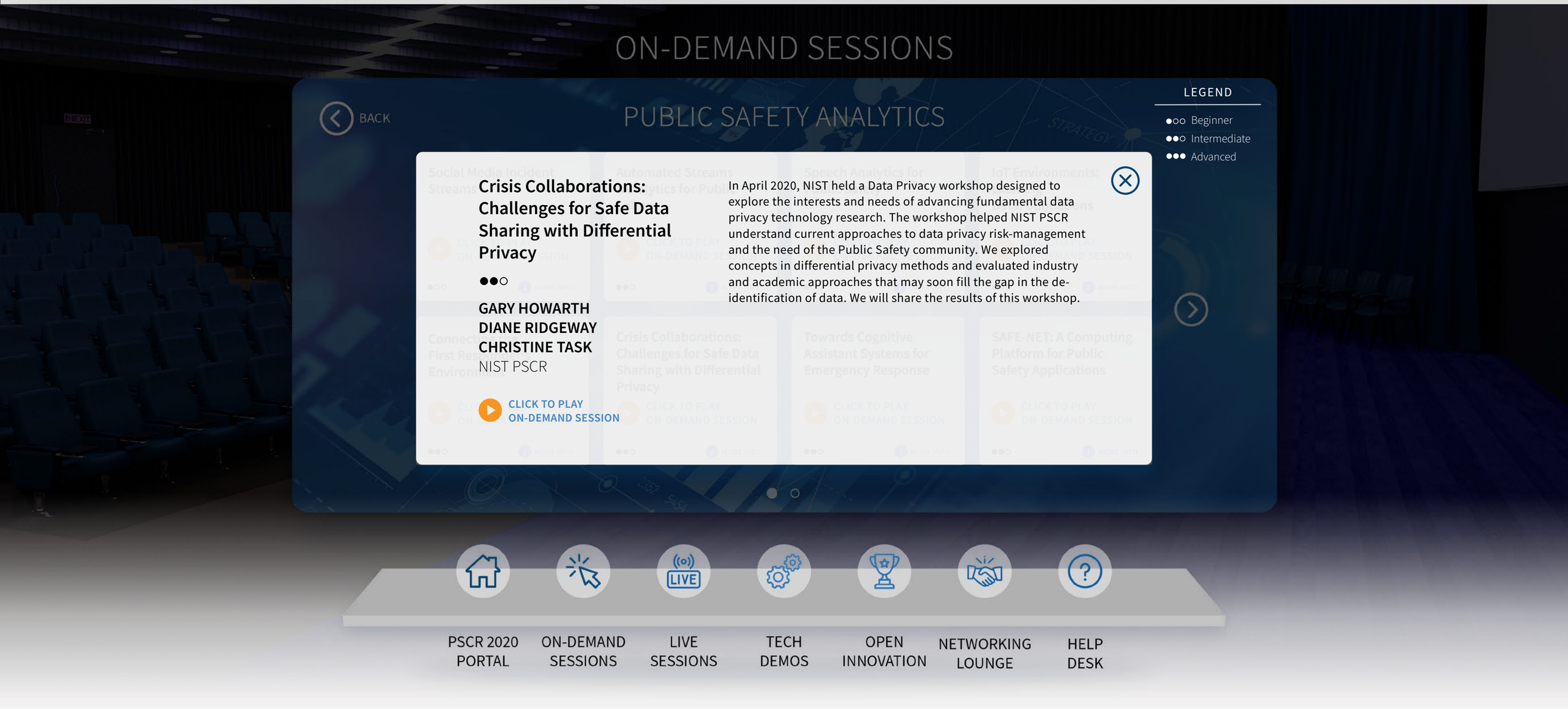
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Crisis Collaborations: Challenges for Safe Data Sharing with Differential Privacy
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GARY HOWARTH
DIANE RIDGEWAY
CHRISTINE TASK
NIST PSCR
CLICK TO PLAY ON-DEMAND SESSION
In April 2020, NIST held a Data Privacy workshop designed to explore the interests and needs of advancing fundamental data privacy technology research. The workshop helped NIST PSCR understand current approaches to data privacy risk-management and the need of the Public Safety community. We explored concepts in differential privacy methods and evaluated industry and academic approaches that may soon fill the gap in the de-identification of data. We will share the results of this workshop.
Towards Cognitive Assistant Systems for Emergency Response
SAFE-NET: A Computing Platform for Public Safety Applications
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Towards Cognitive Assistant Systems for Emergency Response
●●○
SARAH MASUD PREUM
UNIVERSITY OF VIRGINIA
This project can potentially make a significant impact on improving health outcomes and first responders' safety by promoting evidence-based emergency response decision making. Automated incident monitoring and data collection will benefit first responders by reducing cognitive burden and response time to incidents and focusing on more important tasks. The collected data and analytic results can be shared with the public safety community and other researchers and further used for responders' performance assessment, identifying most critical emergency scenarios and response actions, and designing more effective training modules.
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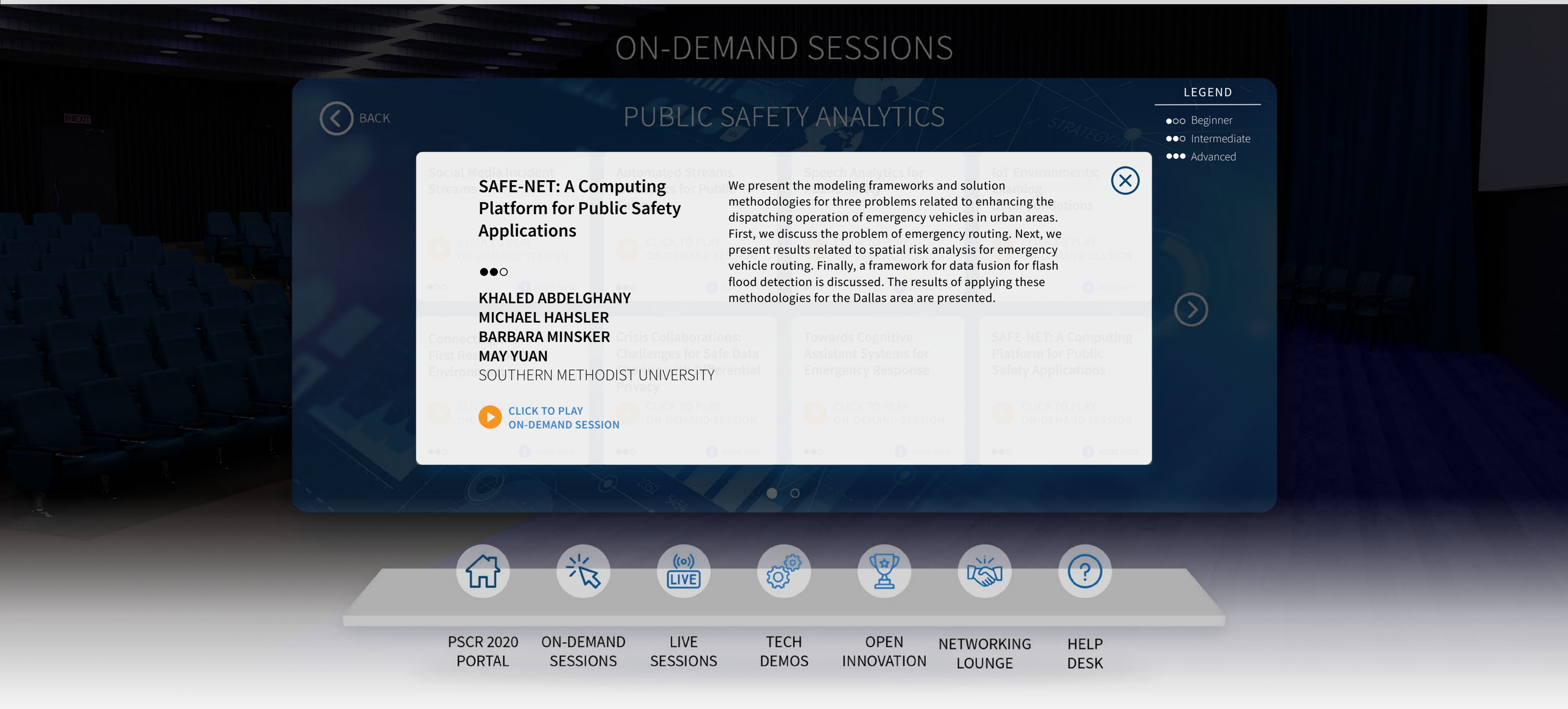
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SAFE-NET: A Computing Platform for Public Safety Applications
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KHALED ABDELGHANY
MICHAEL HAHSLER
BARBARA MINSKER
MAY YUAN
SOUTHERN METHODIST UNIVERSITY
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We present the modeling frameworks and solution methodologies for three problems related to enhancing the dispatching operation of emergency vehicles in urban areas. First, we discuss the problem of emergency routing. Next, we present results related to spatial risk analysis for emergency vehicle routing. Finally, a framework for data fusion for flash flood detection is discussed. The results of applying these methodologies for the Dallas area are presented.
Social Media Incident Streams
Automated Streams
Speech Analytics for
IoT Environments:
Crisis Collaborations: Challenges for Safe Data
Towards Cognitive Assistant Systems for Emergency Response
SAFE-NET: A Computing Platform for Public Safety Applications
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User Defined Video Analytics and Integrated Alerting for Public Safety
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JULIE STROUP
TONY WELDON
SHISHIR SHAH
UNIVERSITY OF HOUSTON
CLICK TO PLAY ON-DEMAND SESSION
Use of video camera systems has become common across various public safety agencies. While the manual review of captured video can be beneficial, there are a growing number of applications that would benefit from automated analyses of captured video. In the recent past, considerable attempts have been made towards video analytics for monitoring, e.g. analytics for automatic left object (baggage) detection, or line (perimeter) crossing are common today. While more advanced and sophisticated analytics can be designed and developed, the ingestion of resulting information to facilitate communication and timely response from first responders requires the integration of video analytic methods with existing information management and communication systems. Typical video systems leverage a video management system (VMS) to record video from cameras and push event information into a public safety information management system (PSIM). The PSIM is often used as the information management and communication system to define standard operating processes for each event, which in turn facilitates planning and response. In this session, we will discuss our learnings on how video analytics can be enabled for first responders and public safety personnel.
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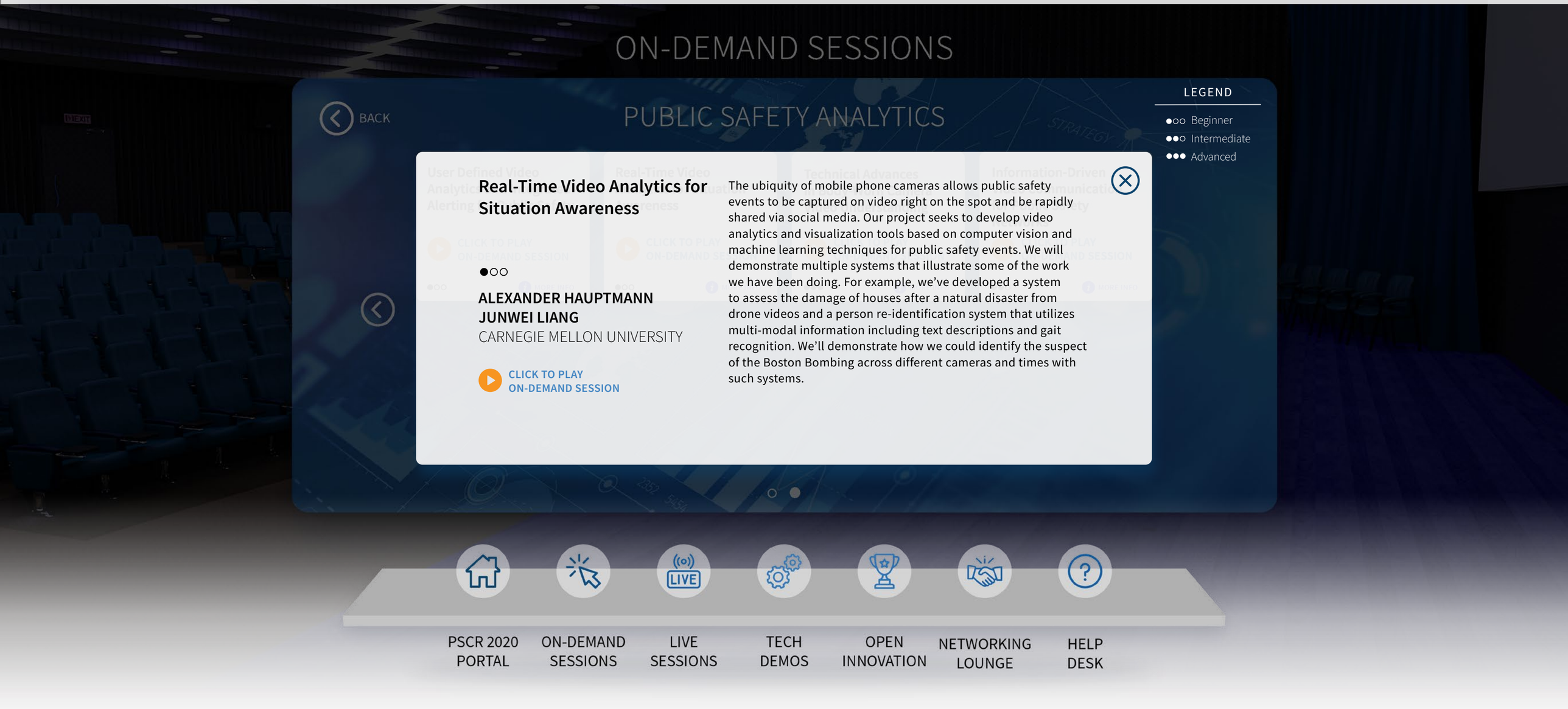
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Real-Time Video Analytics for Situation Awareness
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ALEXANDER HAUPTMANN
JUNWEI LIANG
CARNEGIE MELLON UNIVERSITY
CLICK TO PLAY ON-DEMAND SESSION
The ubiquity of mobile phone cameras allows public safety events to be captured on video right on the spot and be rapidly shared via social media. Our project seeks to develop video analytics and visualization tools based on computer vision and machine learning techniques for public safety events. We will demonstrate multiple systems that illustrate some of the work we have been doing. For example, we've developed a system to assess the damage of houses after a natural disaster from drone videos and a person re-identification system that utilizes multi-modal information including text descriptions and gait recognition. We'll demonstrate how we could identify the suspect of the Boston Bombing across different cameras and times with such systems.
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Technical Advances in Body-Worn Camera Video Understanding
●●●
JASON CORSO
CHENLIANG XO
TOM YAN
KYLE MIN
UNIVERSITY OF MICHIGAN
CLICK TO PLAY ON-DEMAND SESSION
Our project is focusing on developing a new level of analytical capability in body-worn cameras for public safety. BOCA analyzes human activity from body-worn cameras with minimum human effort for data annotation by leveraging available regularity in the data as well as preexisting labeled data from third-person fixed-camera-view scenarios; it adapts ideas from transfer learning and multi-task clustering to overcome the following key challenges to realizing state-of-the-art body-worn camera analytics in public safety. This talk will present our recent finding on transfer learning for activity understanding in body-worn cameras, it will discuss mechanisms for leveraging attention in understanding body-worn cameras and it will discuss the challenge of scene understanding from body-worn cameras.
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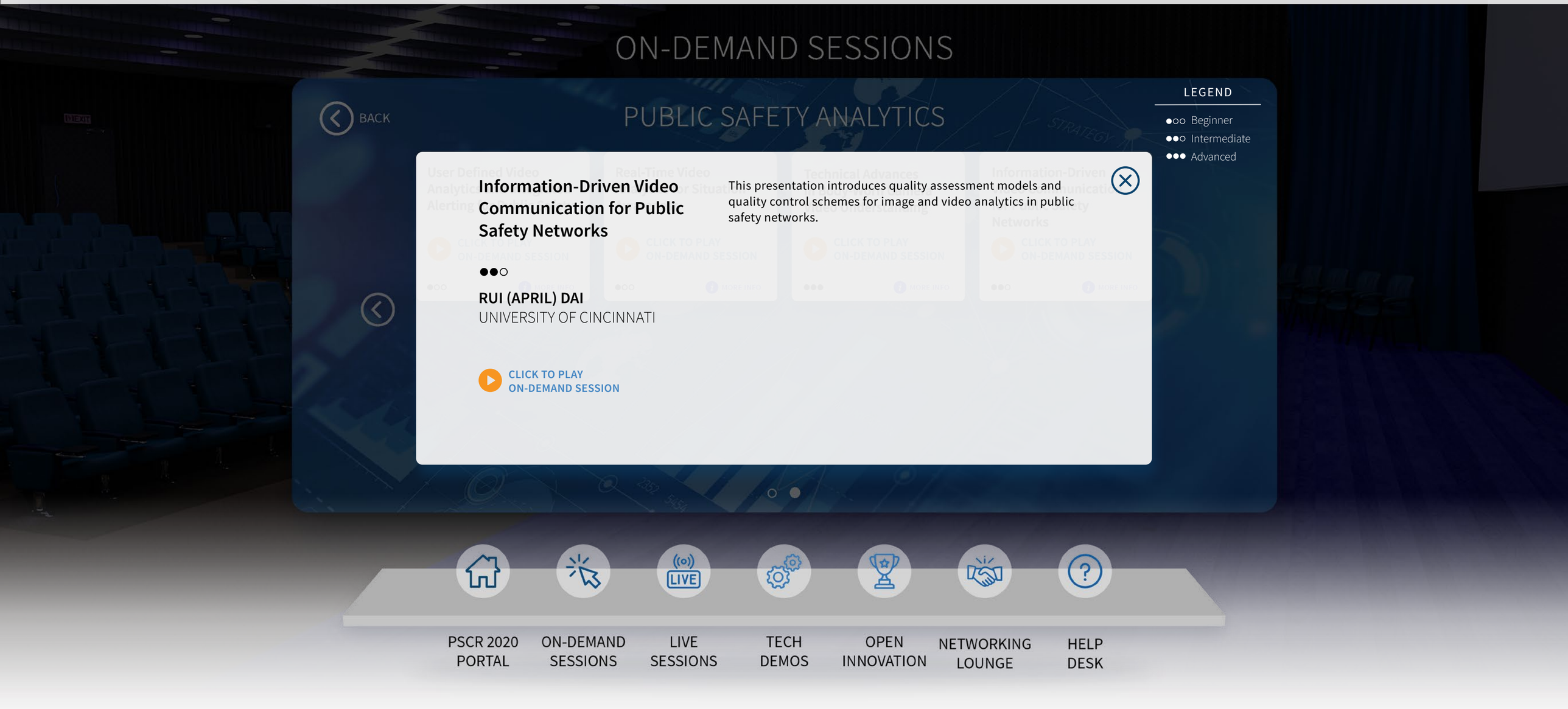
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Information-Driven Video Communication for Public Safety Networks
●●○
RUI (APRIL) DAI
UNIVERSITY OF CINCINNATI
This presentation introduces quality assessment models and quality control schemes for image and video analytics in public safety networks.
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ON-DEMAND SESSIONS

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RESILIENT SYSTEMS

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Resilient Communication Network Platforms Research: A New Direction for Deployable Communications
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●○○ MORE INFO

Innovating on Drone Technology to Support First Responder Missions
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●○○ MORE INFO

UAS Test Methods
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●●○ MORE INFO

Broadband Wireless Access Technologies for Deployable Systems: Where are they?
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●○○ MORE INFO

DistressNet-NG: Resilient Mobile Broadband Communication and Edge Computing
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ReDiCom: Resilient Communications for Dynamic First Responder Teams in Disasters
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Tamperproof Storage and Communication for Adversarial IoT Networks
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Data on the Edge: Development of the Wildland-Fire Data Logistics Network (WDNL)
CLICK TO PLAY ON-DEMAND SESSION
●●○ MORE INFO

ON-DEMAND SESSIONS

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RESILIENT SYSTEMS

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Client-Driven Multipath TCP for Improved Network Performance and Reliability

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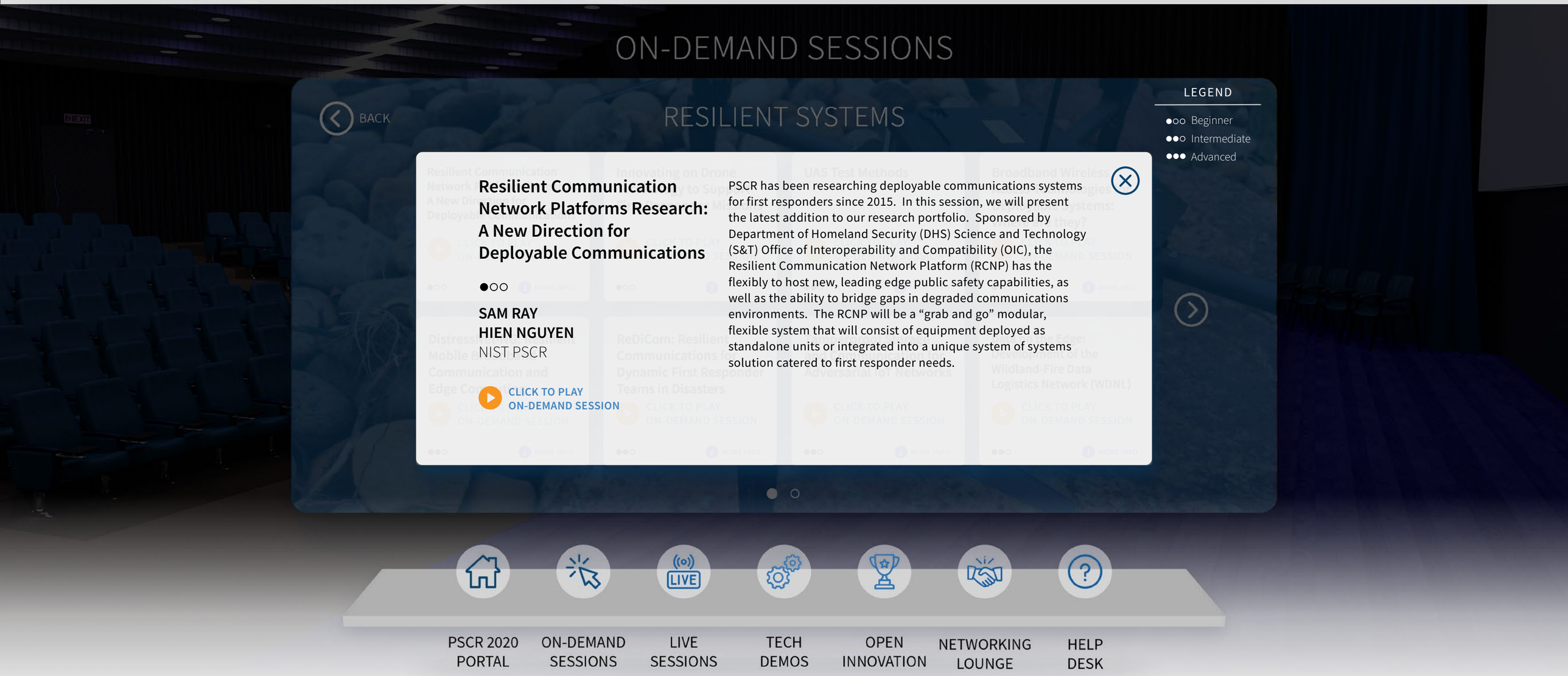
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Resilient Communication Network Platforms Research: A New Direction for Deployable Communications
●○○
SAM RAY
HIEN NGUYEN
NIST PSCR
CLICK TO PLAY ON-DEMAND SESSION
PSCR has been researching deployable communications systems for first responders since 2015. In this session, we will present the latest addition to our research portfolio. Sponsored by Department of Homeland Security (DHS) Science and Technology (S&T) Office of Interoperability and Compatibility (OIC), the Resilient Communication Network Platform (RCNP) has the flexibly to host new, leading edge public safety capabilities, as well as the ability to bridge gaps in degraded communications environments. The RCNP will be a “grab and go” modular, flexible system that will consist of equipment deployed as standalone units or integrated into a unique system of systems solution catered to first responder needs.
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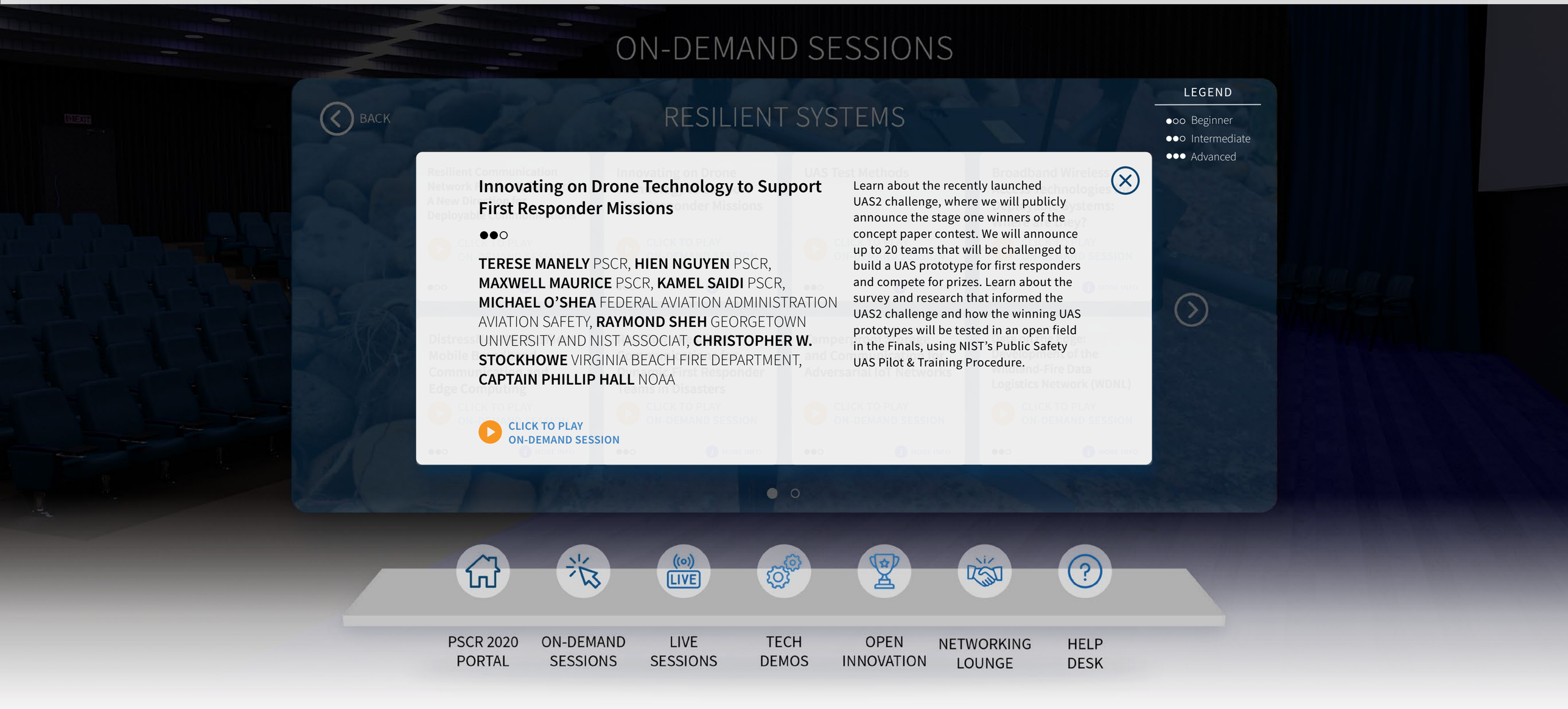
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Innovating on Drone Technology to Support First Responder Missions
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TERESE MANELY PSCR, HIEN NGUYEN PSCR, MAXWELL MAURICE PSCR, KAMEL SAIDI PSCR, MICHAEL O'SHEA FEDERAL AVIATION ADMINISTRATION AVIATION SAFETY, RAYMOND SHEH GEORGETOWN UNIVERSITY AND NIST ASSOCIAT, CHRISTOPHER W. STOCKHOWE VIRGINIA BEACH FIRE DEPARTMENT, CAPTAIN PHILLIP HALL NOAA
CLICK TO PLAY ON-DEMAND SESSION
Learn about the recently launched UAS2 challenge, where we will publicly announce the stage one winners of the concept paper contest. We will announce up to 20 teams that will be challenged to build a UAS prototype for first responders and compete for prizes. Learn about the survey and research that informed the UAS2 challenge and how the winning UAS prototypes will be tested in an open field in the Finals, using NIST's Public Safety UAS Pilot & Training Procedure.
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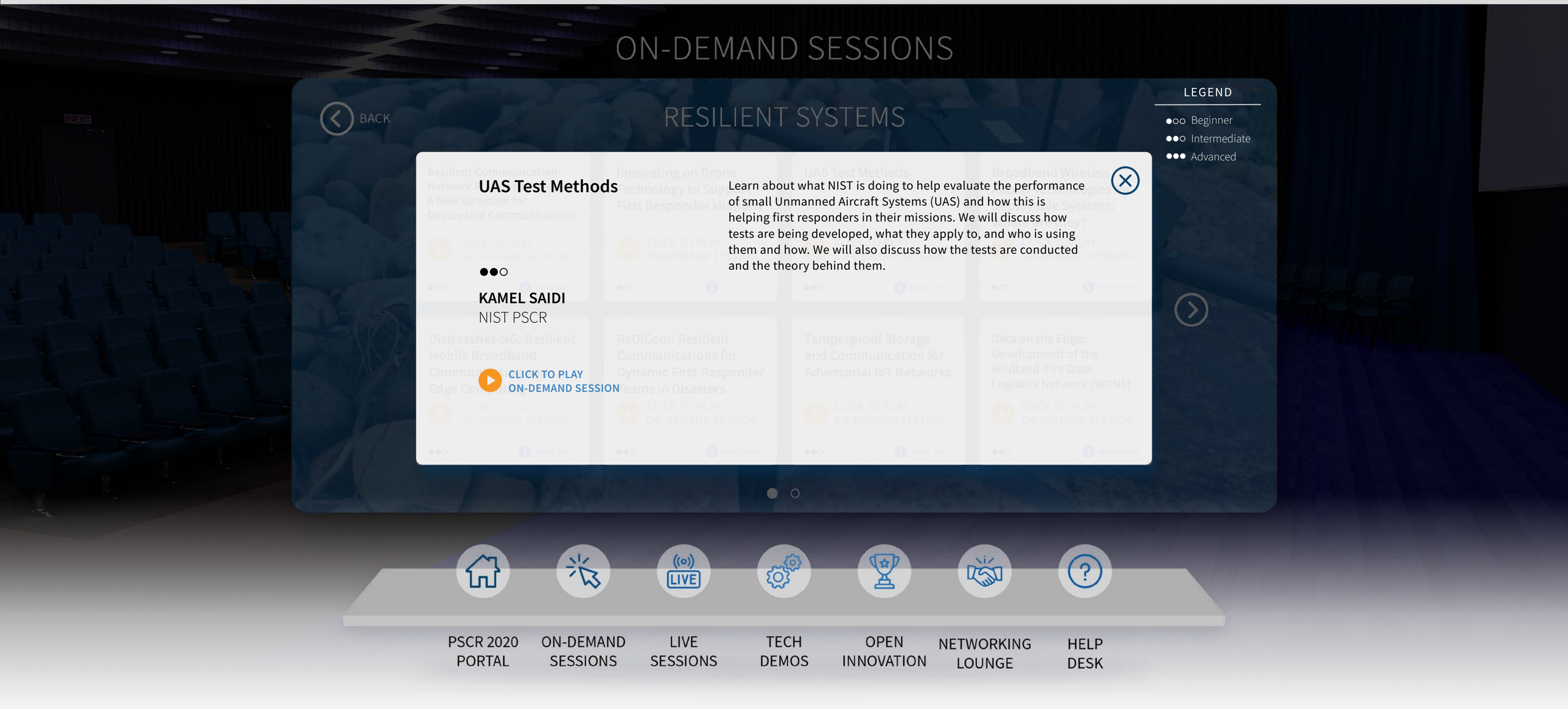
ON-DEMAND SESSIONS
BACK
RESILIENT SYSTEMS
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UAS Test Methods
Learn about what NIST is doing to help evaluate the performance of small Unmanned Aircraft Systems (UAS) and how this is helping first responders in their missions. We will discuss how tests are being developed, what they apply to, and who is using them and how. We will also discuss how the tests are conducted and the theory behind them.
●●○
KAMEL SAIDI
NIST PSCR
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ON-DEMAND SESSIONS
LIVE SESSIONS
TECH DEMOS
OPEN INNOVATION
NETWORKING LOUNGE
HELP DESK

ON-DEMAND SESSIONS

BACK

RESILIENT SYSTEMS

LEGEND
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- ●●○ Intermediate
- ●●● Advanced

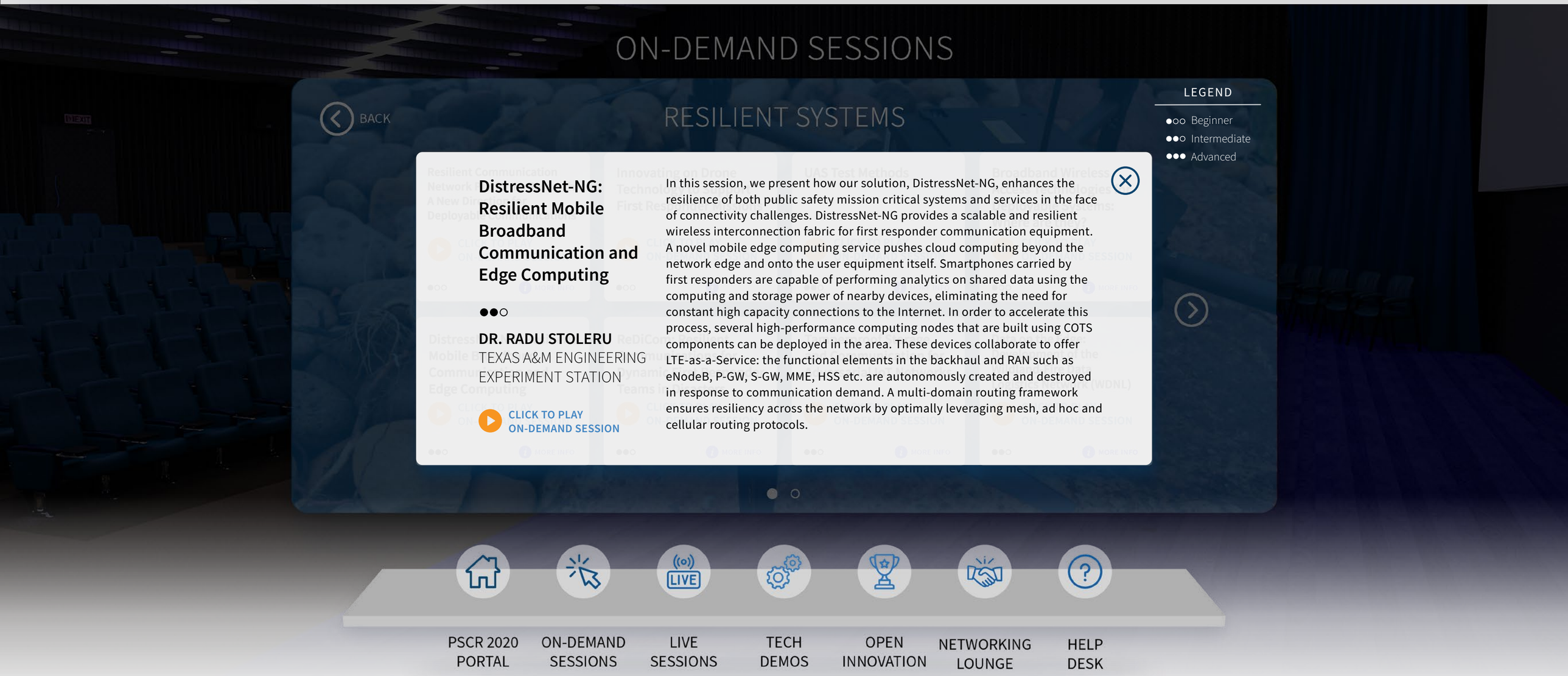
Broadband Wireless Access Technologies for Deployable Systems: Where are they?

●○○

MAX MAURICE
NIST PSCR

CLICK TO PLAY ON-DEMAND SESSION

Maintaining broadband services during an emergency is still an open issue for the public safety community. In disaster events where telecommunications equipment is knocked out or when emergencies happen in the middle of nowhere, first responders are left out in the open for the first initial hours without their broadband tools. PSCR's Highly Mobile Deployed Networks project, sponsored by DHS, has been working over the past four years at investigating solutions to this challenge. The broad scope of the projects has led to key insights into how to employ today's technology to provide broadband communications as first responders arrive on scene. In this session, PSCR will discuss why deployable systems for public safety have not yet taken off, and possible solutions to the communications equipment for public safety.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DistressNet-NG: Resilient Mobile Broadband Communication and Edge Computing
●●○
DR. RADU STOLERU
TEXAS A&M ENGINEERING EXPERIMENT STATION
CLICK TO PLAY ON-DEMAND SESSION
In this session, we present how our solution, DistressNet-NG, enhances the resilience of both public safety mission critical systems and services in the face of connectivity challenges. DistressNet-NG provides a scalable and resilient wireless interconnection fabric for first responder communication equipment. A novel mobile edge computing service pushes cloud computing beyond the network edge and onto the user equipment itself. Smartphones carried by first responders are capable of performing analytics on shared data using the computing and storage power of nearby devices, eliminating the need for constant high capacity connections to the Internet. In order to accelerate this process, several high-performance computing nodes that are built using COTS components can be deployed in the area. These devices collaborate to offer LTE-as-a-Service: the functional elements in the backhaul and RAN such as eNodeB, P-GW, S-GW, MME, HSS etc. are autonomously created and destroyed in response to communication demand. A multi-domain routing framework ensures resiliency across the network by optimally leveraging mesh, ad hoc and cellular routing protocols.
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ReDiCom: Resilient Communications for Dynamic First Responder Teams in Disasters
●●○
DR. K.K. RAMAKRISHNAN
DR. MURAT YUKSEL
DR. HULYA SEFEROGLU
DR. JIACHEN CHEN
UNIVERSITY OF CALIFORNIA - RIVERSIDE
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Effective communication among first responders during and in the aftermath of a disaster can affect outcomes dramatically. We are building a resilient architecture that allows first responders to communicate even with: (i) damage to infrastructure – civilian and/or specialized communication facilities may be damaged by the disaster, (ii) congested channels – because affected people report something about the disaster, and these messages may be broadcast, (iii) dynamically formed groups – first responder teams may be formed dynamically in response to a disaster and team member addresses (e.g., phone numbers) may not be known to one another, (iv) impediments to communication – because the new command chain to manage the disaster may be different from the original organizational hierarchy, (v) poor interoperability – each sub-team might use different communication facilities, and (vi) security attacks – disaster situations are often vulnerable to attacks, requiring authentication and authorization as well as establishing data integrity and provenance.
We have developed a resilient network architecture that allows efficient communication among first responders during and after a disaster. We support dynamically formed groups for incident response, allowing first responders to securely and conveniently communicate based on roles (names), rather than network addresses. The architecture addresses the needs identified above
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TECH DEMOS
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HELP DESK


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ReDiCom: Resilient Communications for Dynamic First Responder Teams in Disasters
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DR. K.K. RAMAKRISHNAN
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DR. JIACHEN CHEN
UNIVERSITY OF CALIFORNIA - RIVERSIDE
CLICK TO PLAY ON-DEMAND SESSION
for communication in disasters by (i) building resilience into the framework across all the layers, (ii) creating a framework that allows communication by role and identity, rather than addresses, (iii) supporting multiple modalities (data, voice, video) for communication among dynamically formed first responder teams, and (iv) providing robust and resilient communication and computing even when facilities are error- and disruption-prone.
In this session, we will focus on the progress we have made in the last year, which includes 1) scalable namespace propagation across fragmented and disconnected networks; 2) the design and implementation of an approach for first responders to update the current situation on offline maps on their (potentially disconnected devices) and a protocol to ensure delivery and consistency of the data across multiple users; 3) design and implementation of a dynamic routing protocol that can work with heterogeneous device-to-device (D2D) communication links and tolerate disconnections and partitions in the underlying wireless network topology, 4) modeling and analysis of public crowdsourced data to predict the potential impact of disasters on the cellular communication infrastructure, 5) the design of secure coded computation in adverse environments, 6) robust and resilient communication over intermittently connected D2D communication links with infrastructure support, 7) design and implementation of the new ReDiCom modularized architecture, 8) a new map functionality to help first responders communicate and mark based on geo-locations, and 9) text-to-speech capability to further improve the communication efficiency in ReDiCom.
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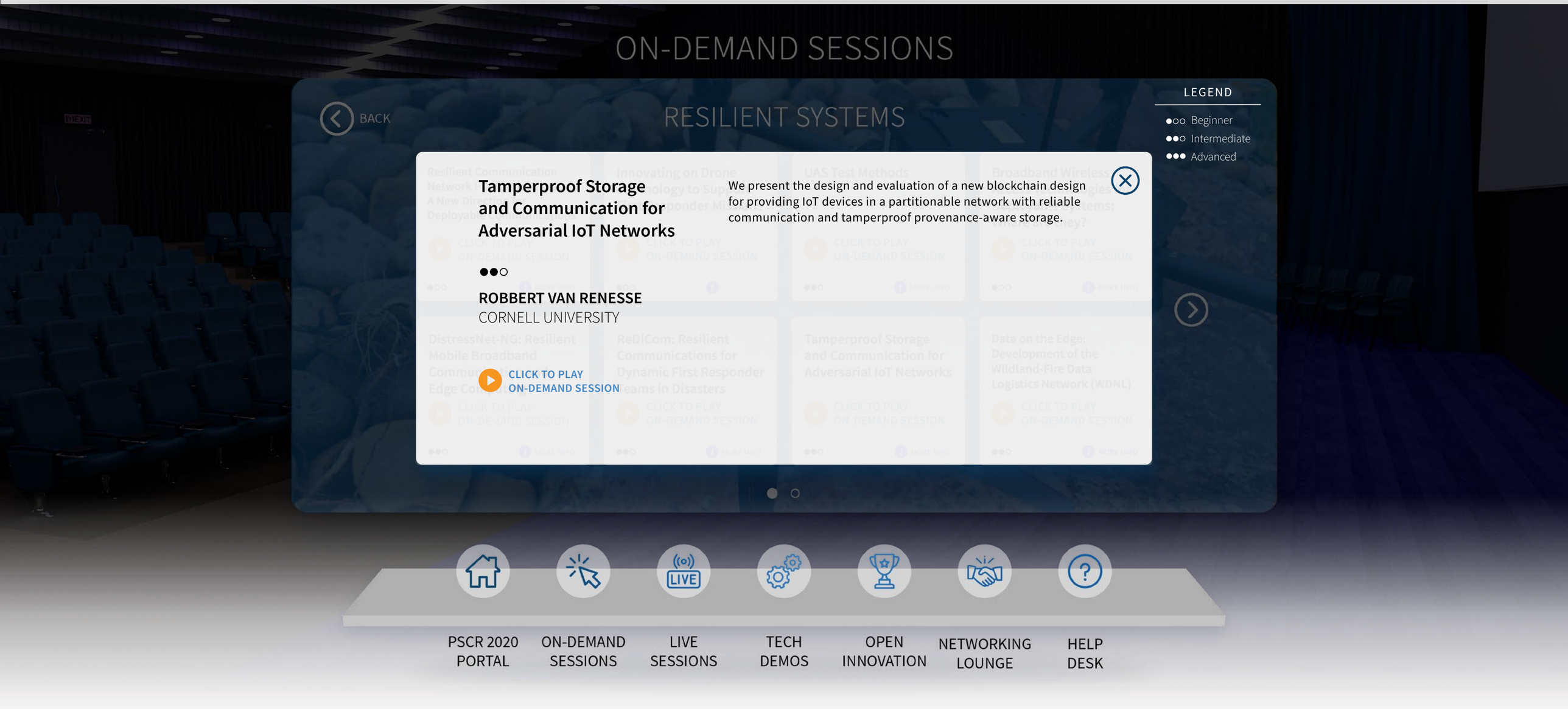
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Tamperproof Storage and Communication for Adversarial IoT Networks
We present the design and evaluation of a new blockchain design for providing IoT devices in a partitionable network with reliable communication and tamperproof provenance-aware storage.
●●○
ROBBERT VAN RENESSE
CORNELL UNIVERSITY
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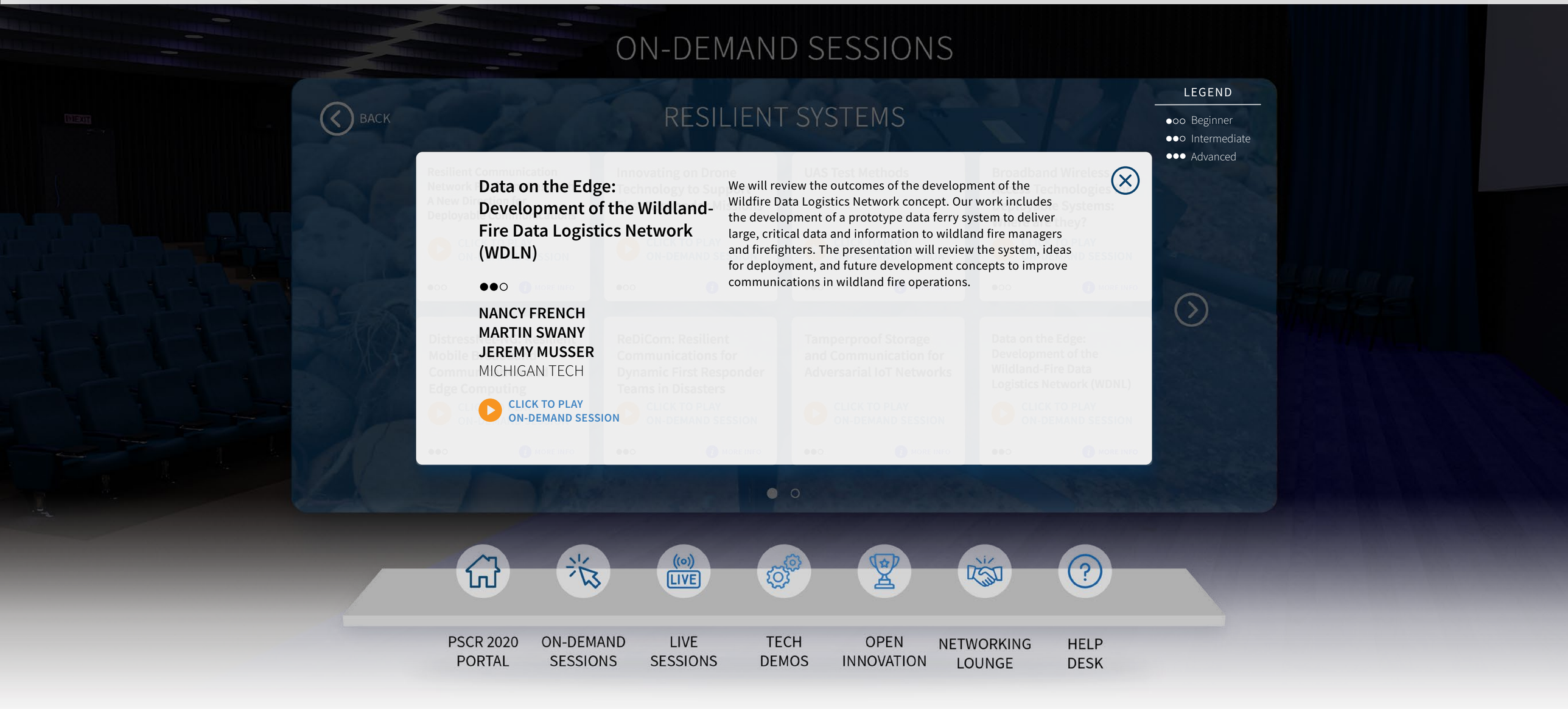
HELP DESK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Data on the Edge: Development of the Wildland-Fire Data Logistics Network (WDLN)
●●○
We will review the outcomes of the development of the Wildfire Data Logistics Network concept. Our work includes the development of a prototype data ferry system to deliver large, critical data and information to wildland fire managers and firefighters. The presentation will review the system, ideas for deployment, and future development concepts to improve communications in wildland fire operations.
NANCY FRENCH
MARTIN SWANY
JEREMY MUSSER
MICHIGAN TECH
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TECH DEMOS
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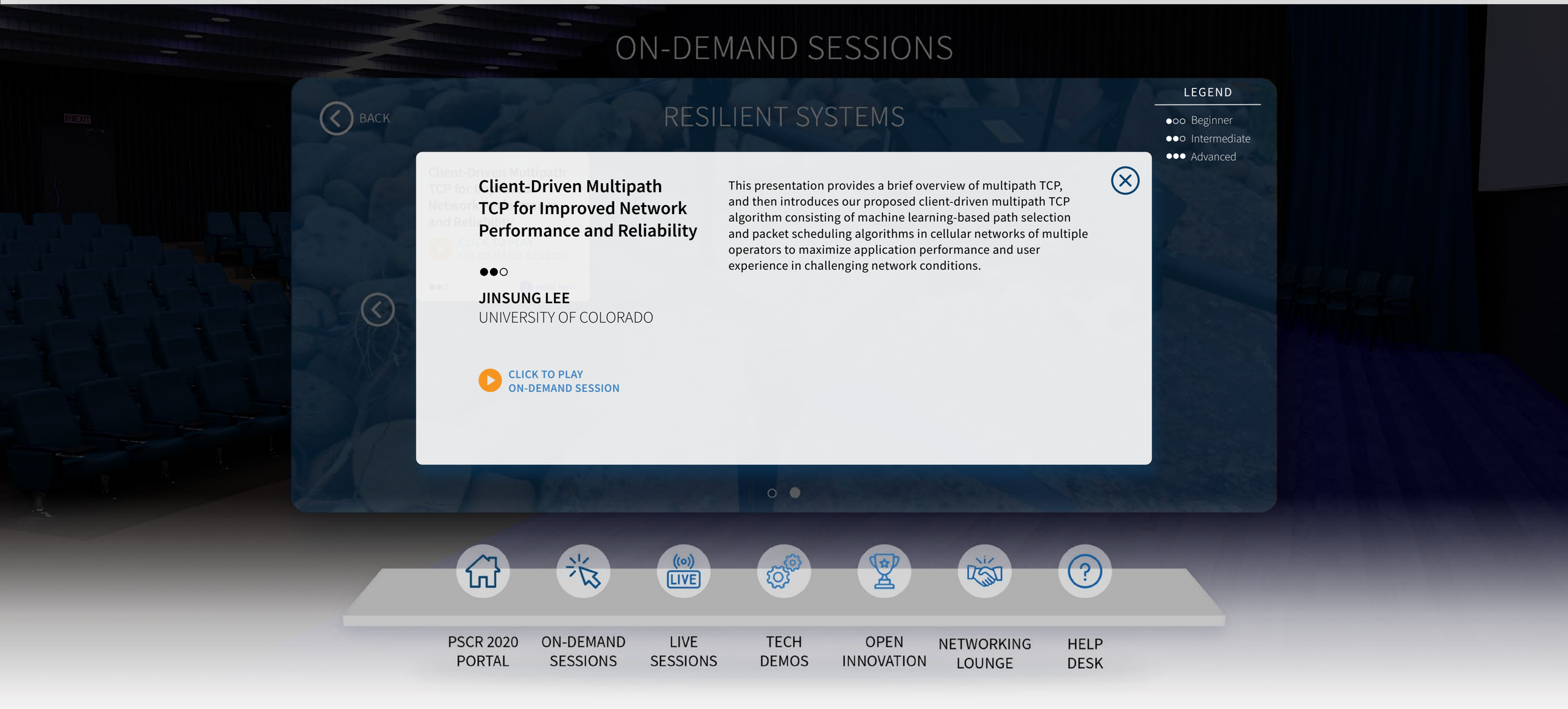
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Client-Driven Multipath TCP for Improved Network Performance and Reliability
●●○
JINSUNG LEE
UNIVERSITY OF COLORADO
This presentation provides a brief overview of multipath TCP, and then introduces our proposed client-driven multipath TCP algorithm consisting of machine learning-based path selection and packet scheduling algorithms in cellular networks of multiple operators to maximize application performance and user experience in challenging network conditions.
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PUBLIC SAFETY COMMUNICATIONS RESEARCH
PSCR

PSCR 2020: THE DIGITAL EXPERIENCE

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BACK

LIVE SESSIONS

TUESDAY JULY 28TH
10:00am MST / 12:00pm EST

PSCR PROGRAM OVERVIEW

FEATURING PUBLIC SAFETY KEYNOTE

TODD EARLY, *TEXAS DEPARTMENT OF PUBLIC SAFETY*
DERECK ORR, *PSCR DIVISION CHIEF*

WATCH RECORDING

WEDNESDAY JULY 29TH
10:00am MST / 12:00pm EST

FIRESIDE CHAT

WITH FIRSTNET BOARD CHAIRMAN

DERECK ORR, *PSCR DIVISION CHIEF*
ED HOROWITZ, *FIRST RESPONDER NETWORK AUTHORITY*

WATCH RECORDING

WEDNESDAY JULY 29TH
1:00pm MST / 3:00pm EST

HAPTIC INTERFACES:

WHAT WE LEARNED BY PARTICIPATING IN A PSCR PRIZE CHALLENGE

SARAH HUGHES, *PSCR*
CAPTAIN TODD HEINL, *WEST METRO FIRE DEPARTMENT*
RYAN FIELDS-SPACK, *FIRSTNET BUILT WITH AT&T,*
FELIX DESOURDY, *HAPLY*
SEAN HACKETT, *CARNEGIE MELLON UNIVERSITY*

WATCH RECORDING

THURSDAY JULY 30TH
10:00am MST / 12:00pm EST

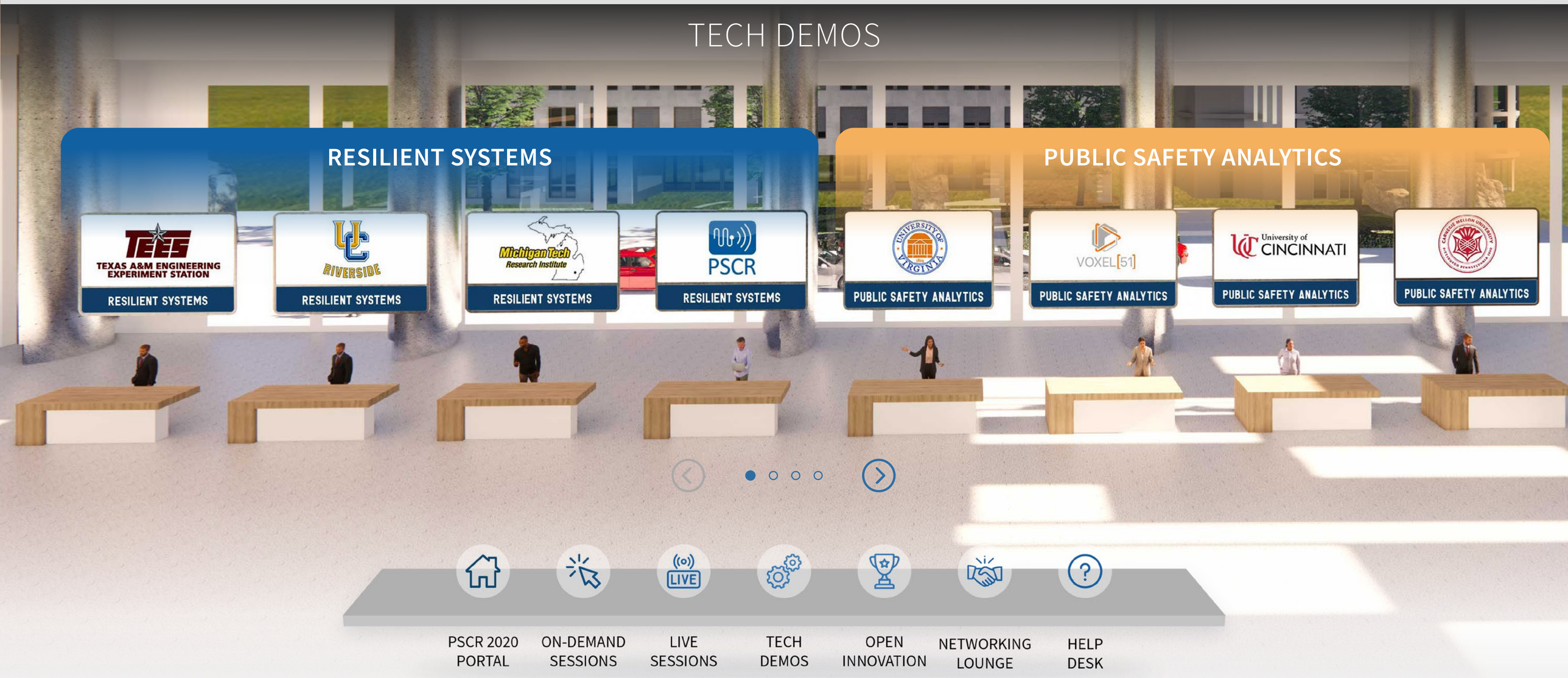
THIS IS NOT A GAME:

AR/VR FOR GOOD

STACEY TRUNNELL *(MODERATOR), CORNER ALLIANCE*
ALISON KAHN, *PSCR*
CAPTAIN KIRK MCKINZIE, *CONSUMNES FIRE DEPARTMENT*
GREG RINALDI, *MAGIC LEAP*

WATCH RECORDING

TECH DEMOS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RIVERSIDE
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Michigan Tech
Research Institute
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UNIVERSITY OF VIRGINIA
PUBLIC SAFETY ANALYTICS
VOXEL[51]
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University of CINCINNATI
PUBLIC SAFETY ANALYTICS
CARNEGIE MELLON UNIVERSITY
PUBLIC SAFETY ANALYTICS
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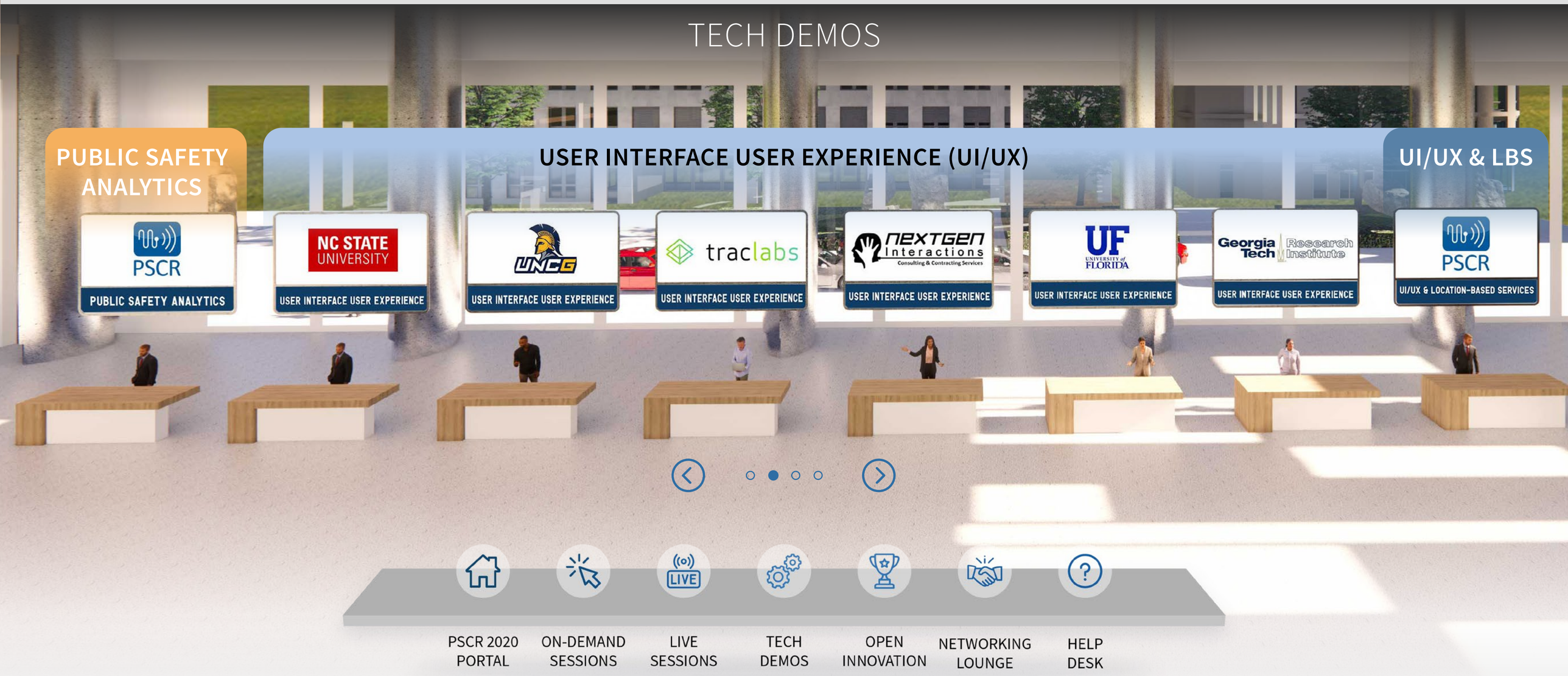
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USER INTERFACE USER EXPERIENCE (UI/UX)
UI/UX & LBS
PSCR
PUBLIC SAFETY ANALYTICS
NC STATE UNIVERSITY
USER INTERFACE USER EXPERIENCE
UNCG
USER INTERFACE USER EXPERIENCE
traclabs
USER INTERFACE USER EXPERIENCE
nextgen Interactions
Consulting & Contracting Services
USER INTERFACE USER EXPERIENCE
UF
UNIVERSITY of FLORIDA
USER INTERFACE USER EXPERIENCE
Georgia Tech Research Institute
USER INTERFACE USER EXPERIENCE
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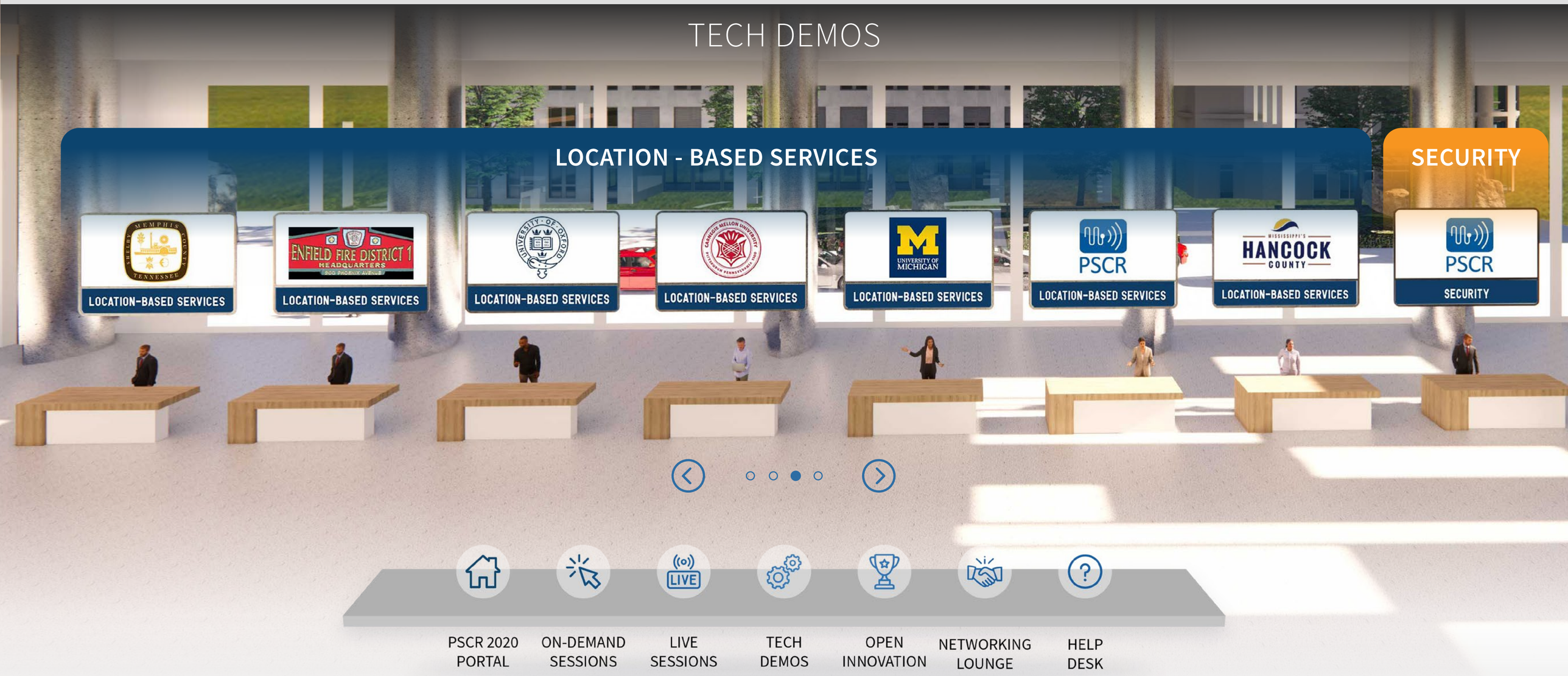
HELP DESK

TECH DEMOS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TECH DEMOS


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MISSION CRITICAL VOICE
Georgia Tech Research Institute
MISSION CRITICAL VOICE
VALID8.com
MISSION CRITICAL VOICE
Universidad del País Vasco
Euskal Herriko Unibertsitatea
MISSION CRITICAL VOICE
Polaris Networks
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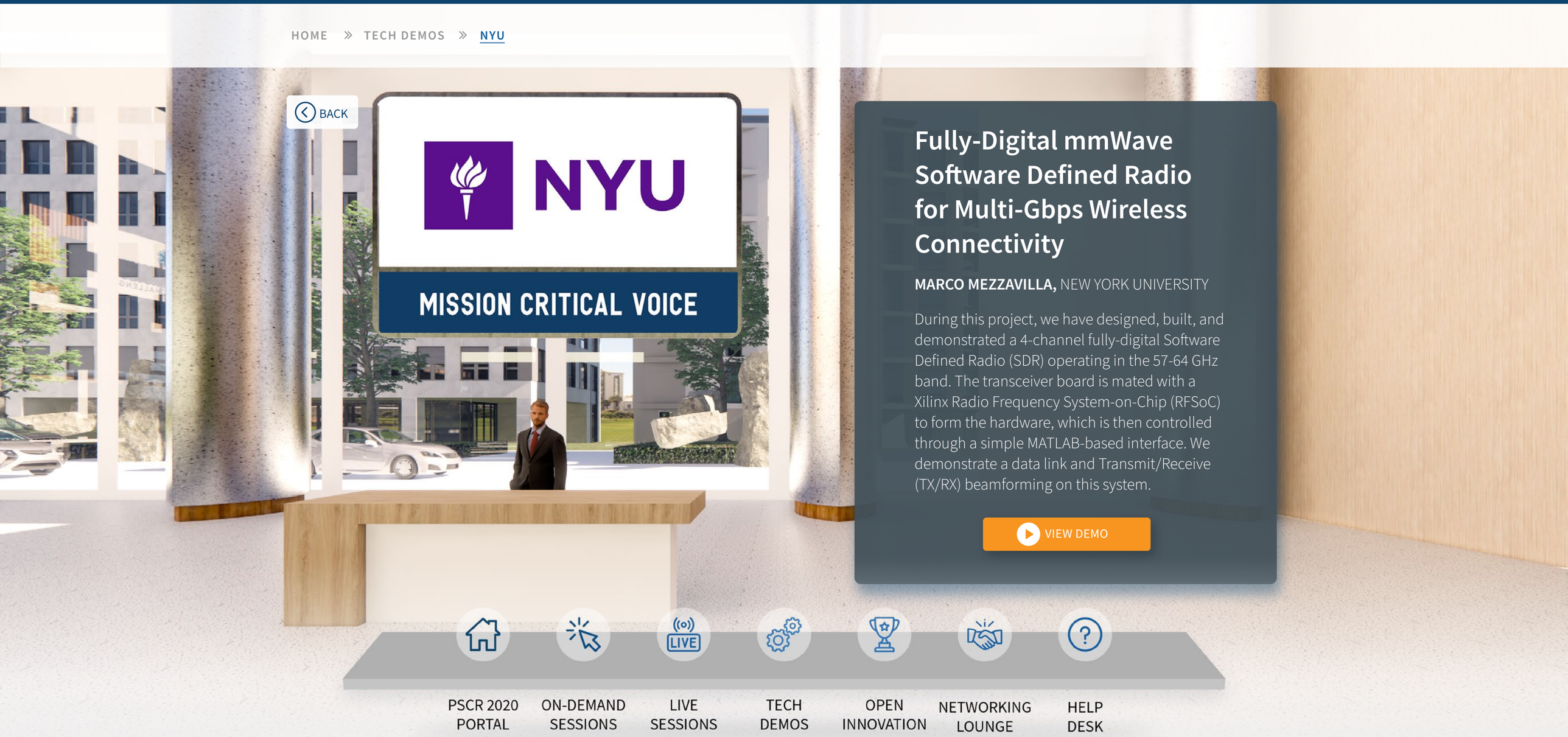


Fully-Digital mmWave Software Defined Radio for Multi-Gbps Wireless Connectivity

MARCO MEZZAVILLA, NEW YORK UNIVERSITY

During this project, we have designed, built, and demonstrated a 4-channel fully-digital Software Defined Radio (SDR) operating in the 57-64 GHz band. The transceiver board is mated with a Xilinx Radio Frequency System-on-Chip (RFSoC) to form the hardware, which is then controlled through a simple MATLAB-based interface. We demonstrate a data link and Transmit/Receive (TX/RX) beamforming on this system.

VIEW DEMO

Real-Time Voice Impairment and Evaluation for First Responder Communications

ALESSIO MEDDA, GEORGIA TECH RESEARCH INSTITUTE

The Georgia Tech Research Institute will present a demo for the real-time impairment of live voice aimed at first responders' communication systems. This demo will allow users to exercise the main key performance indicators (KPIs) related to Mission Critical Voice (MCV) Quality of Experience (QoE) in communications. These KPIs are Mouth-to-Ear Latency, End-to-End Access Time, Audio Quality and Intelligibility, and Probability of Access and Retention. A cloud-based portal will allow users to upload their voice and independently exercise the four KPIs to impair the voice segment before playing it back. The playback will show users how the KPIs influenced voice quality and intelligibility of the message. Afterwards, the team will demonstrate a communication system based on an ad-hoc network which allows users to experience the effect of the KPIs in real time. Two portable handsets will allow two users to communicate at a distance using this system; a transmitting handset will initiate a communication and the user's voice will be sent to an impairment agent that will intercept communication packets, apply the preset impairments, and send the output to the receiver, all with a minimal and controllable delay. The result is the ability to impair communication in real-time to allow a user experience the effect of common digital communication system degradations on intelligibility and voice quality.

VIEW DEMO

A Demonstration of Valid8's Executable MCPTT 3GPP Client Conformance Tester

IAN CARPENTER, VALID8

We will execute mission-critical push-to-talk (MCPTT) conformance tests from 3rd Generation Partnership Project (3GPP) Technical Specifications (TS) 36.579-2 release 14 against a MCPTT Client using the Valid8 MCPTT Client Conformance Tester Tool.

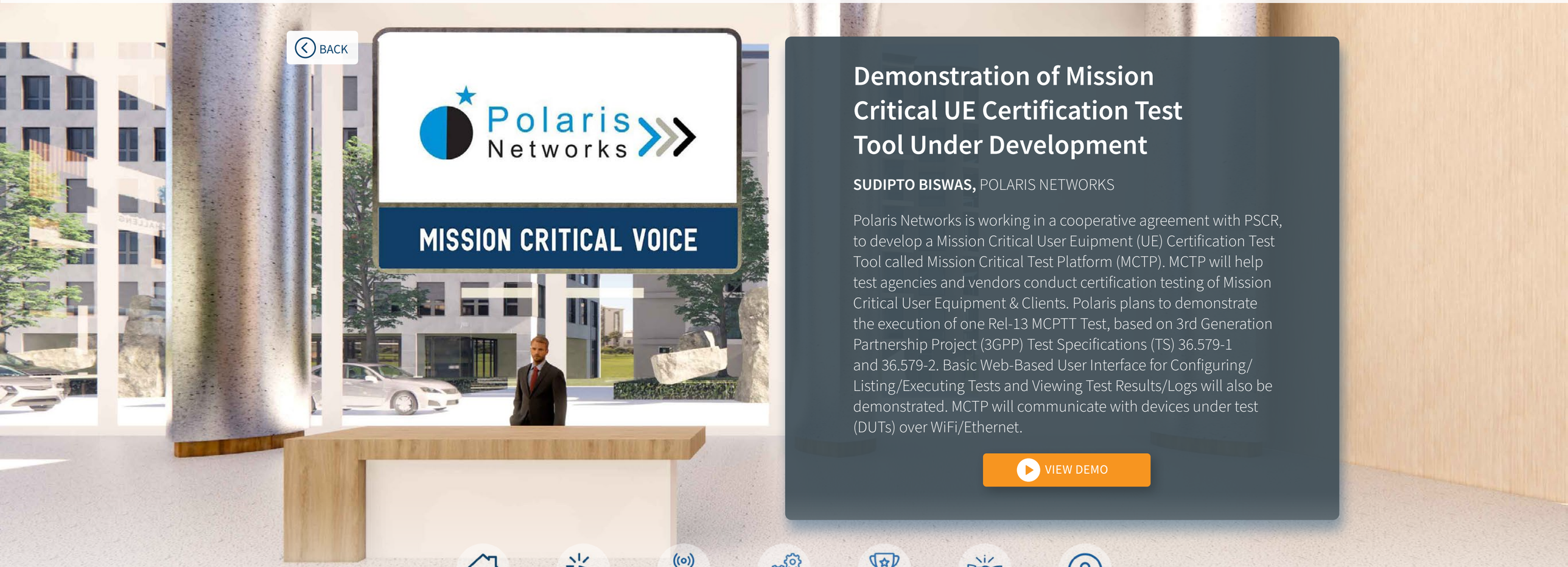
VIEW DEMO

MCS Testing as a Service - Introduction and Hands-On

FIDEL LIBERAL, TJ KENNEDY (PSTA), AND WALT MAGNUSSEN (TAMU), UNIVERSITY OF THE BASQUE COUNTRY
MICHAEL PROESTLER, GRIDGEARS

In this session you will learn about the concepts behind mission-critical services (MCS) Testing as a Service and the benefits it brings for manufactures, certification labs and end customers. In addition, you will get an early glimpse of the current development status, showing how different stakeholders can evaluate conformance of their solution to 3rd Generation Partnership Project (3GPP) standards.

VIEW DEMO



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Demonstration of Mission Critical UE Certification Test Tool Under Development

SUDIPTO BISWAS, POLARIS NETWORKS

Polaris Networks is working in a cooperative agreement with PSCR, to develop a Mission Critical User Euipment (UE) Certification Test Tool called Mission Critical Test Platform (MCTP). MCTP will help test agencies and vendors conduct certification testing of Mission Critical User Equipment & Clients. Polaris plans to demonstrate the execution of one Rel-13 MCPTT Test, based on 3rd Generation Partnership Project (3GPP) Test Specifications (TS) 36.579-1 and 36.579-2. Basic Web-Based User Interface for Configuring/ Listing/Executing Tests and Viewing Test Results/Logs will also be demonstrated. MCTP will communicate with devices under test (DUTs) over WiFi/Ethernet.

VIEW DEMO

Analog FM Interworking with MCPTT Systems

CHRIS WALTON AND JORDAN O'DELL,
NIST PSCR

This demonstration explores a low cost method to bridge analog public safety Land mobile radio (LMR) systems into a standards-based Long Term Evolution (LTE) MCPTT system. Design goals included robustness, cost, and the creation of a system that closely conforms to released and future standards. A proof of concept prototype that successfully bridges an analog LMR system with a standards-compliant LTE based MCPTT system was developed and tested.

VIEW DEMO

BACK

Simulation and Visualization of Public Safety Incidents

RICHARD ROUIL, NIST PSCR
THOMAS HENDERSON, UNIVERSITY OF WASHINGTON
EVAN BLACK, NIST WND

The Wireless Network Division (WND) under the Communication Technology Laboratory (CTL) at NIST, in collaboration with the University of Washington, has been developing network simulation models targeting public safety-specific protocols and scenarios. Using several examples of small- and large-scale incidents, we will showcase several of these models including on and off-network Mission Critical Push-to-Talk (MCPTT), Device-to-Device (D2D), UE-to-Network relays using various network deployments.

VIEW DEMO

BACK

MCV QoE Access Delay Measurement Demonstration

CHELSEA GREEN AND ZAINAB SOETAN, NIST PSCR

Mission Critical Voice (MCV) QoE measurement methods are being developed by NIST/PSCR to determine levels of key performance indicators (KPI) and to provide fair comparison mechanisms for Push To Talk (PTT) technologies. Mouth-to-ear (M2E) latency and end-to-end access time measurement methods and test results were discussed at previous stakeholder's meeting. Building upon that foundation, NIST/PSCR has further developed the measurement method to quantify end-to-end access time of P25 LMR technologies using encryption as well as LTE PTT technologies. The end-to-end access time measurement method will be demonstrated.

VIEW DEMO

Resilient Communication and Edge Computing for FirstNet

DR. RADU STOLERU, TEXAS A&M ENGINEERING EXPERIMENT STATION

This demonstration will showcase various edge computing applications (e.g., face detection, face recognition, virtual assistant, etc.) executing on mobile devices and mobile high performance computing nodes (e.g., battery-powered manpack equipped with LTE, WiFi and compute resources).

VIEW DEMO

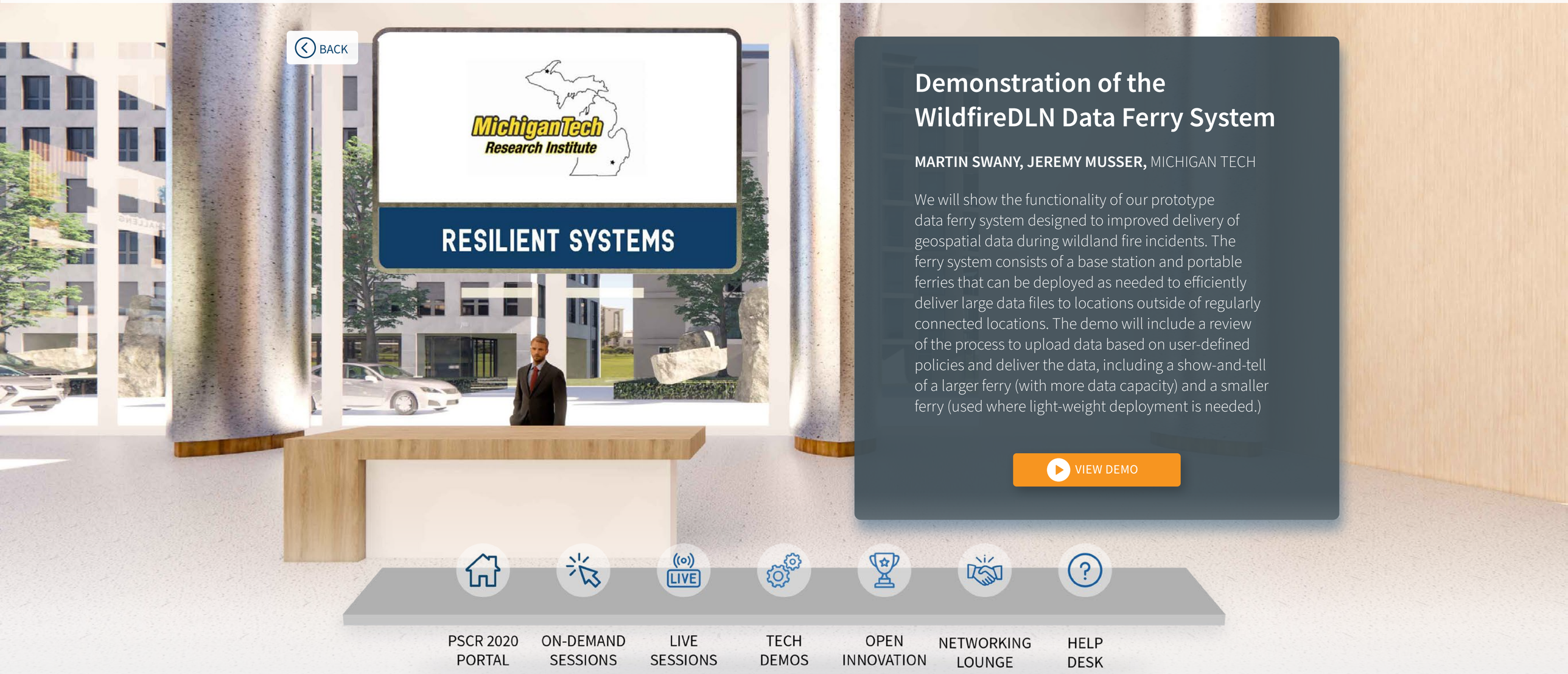
ReDiCom: Resilient Communications for Dynamic First Responder Teams in Disasters

DR. K. K. RAMAKRISHNAN, DR. MURAT YUKSEL, DR. HULYA SEFEROGLU, DR. JIACHEN CHEN, UC RIVERSIDE

Our demo of ReDiCom capabilities combines the research we have completed across the members of our team on this project, including device-to-device communication, message delivery on a graph-based namespace, text messages, push-to-talk, and work offloading. This year, our demo will include several functional enhancements:

- A map function that allows first responders to distribute tasks, mark important task location information, and communicate based on each individual's geo-location. It will use the graph-based namespace for both hierarchies (topic hierarchy and recipient hierarchy) and take advantage of a consensus protocol that seeks to achieve synchronization even with intermittent network connectivity.
- A dynamic routing protocol design and implementation that enables unicast delivery of messages between first responders as well as victims. The protocol uses heterogeneous device to device (D2D) links via Bluetooth and Wi-Fi Direct Application Programming Interfaces (APIs), and can handle disconnections causing partitions and extended delays in the underlying D2D topology.

VIEW DEMO



Demonstration of the WildfireDLN Data Ferry System

MARTIN SWANY, JEREMY MUSSER, MICHIGAN TECH

We will show the functionality of our prototype data ferry system designed to improved delivery of geospatial data during wildland fire incidents. The ferry system consists of a base station and portable ferries that can be deployed as needed to efficiently deliver large data files to locations outside of regularly connected locations. The demo will include a review of the process to upload data based on user-defined policies and deliver the data, including a show-and-tell of a larger ferry (with more data capacity) and a smaller ferry (used where light-weight deployment is needed.)

VIEW DEMO

PS Deployables for SA, PTT, Distributed Processing and Resiliency

MAX MAURICE, NIST PSCR

The Deployable systems projects within PSCR will be demonstrating the field capabilities of a mobile broadband system for public safety. The Deployable systems enable broadband connectivity using a completely isolated wireless network. The system is capable of providing broadband services such as video streaming, push-to-talk, and Situational awareness applications.

VIEW DEMO

CognitiveEMS: An Intelligent Cognitive Assistant for Emergency Medical Services

ARIF RAHMAN, UNIVERSITY OF VIRGINIA

CognitiveEMS is a decision support system that aims to improve the situational awareness of first responders at the incident scene by real-time analysis of speech data from the responders' communications and observations. With this information, the system provides smart suggestions for the best response actions or interventions to perform based on standard protocol guidelines. We will present our EMS data analytics pipeline for real-time speech recognition, natural language processing, and intervention suggestion, as well as a smart module for interacting with the responders in real-time. The smart interaction module collects critical information about different interventions performed by the responder and their timestamps, provides necessary reminders to the responder, and automatically generates an incident report.

VIEW DEMO

The Physical Distancing Index for Video Analytics

JASON CORSO, VOXEL 51

Voxel51's new web application deploys cutting-edge computer vision and machine learning technology to detect the density of human and vehicle activity from video feeds. At the heart of this technology is a metric developed by Voxel51 called the Physical Distancing Index (PDI). The PDI, originally developed as a public awareness tool to understand how the coronavirus is changing human activity in real-time around the world, is helping organizations as they plan for reopening and beyond in this new normal.

VIEW DEMO

Quality Assessment and Adjustment for Automatic Image/Video Analytics

ADEMOLA IKUSAN, UNIVERSITY OF CINCINNATI

We will demonstrate two pieces of research results from our project:

- Image Quality Assessment and Adjustment Framework: We will demonstrate how a distorted image can be scored to predict the performance of object detection algorithms and how to repair some of the distortions to improve the performance of object detection algorithms.
- Intermediate Feature Selection for Compact Feature Maps for Computer Vision Tasks: We will demonstrate how deep learning feature maps can be compressed and used for various computer vision tasks to achieve a light-weight architecture with good performance.

VIEW DEMO

Real-Time Video Analytics for Situation Awareness Demo

JUNWEI LIANG, CARNEGIE MELLON UNIVERSITY

Our project develops video analytics and visualization tools based on computer vision and machine learning techniques for public safety events. We demonstrate multiple systems that illustrate some of the work. For example, 1) we show a system using drone videos to assess the damage to houses after a natural disaster, and 2) we show a person re-identification system that utilizes multi-modal information including verbal descriptions and gait recognition. We demonstrate how this could identify the suspect of the Boston Bombing across different cameras and times. 3) We contribute to traffic safety through vehicle and pedestrian path prediction from arbitrary cameras.

VIEW DEMO

BACK

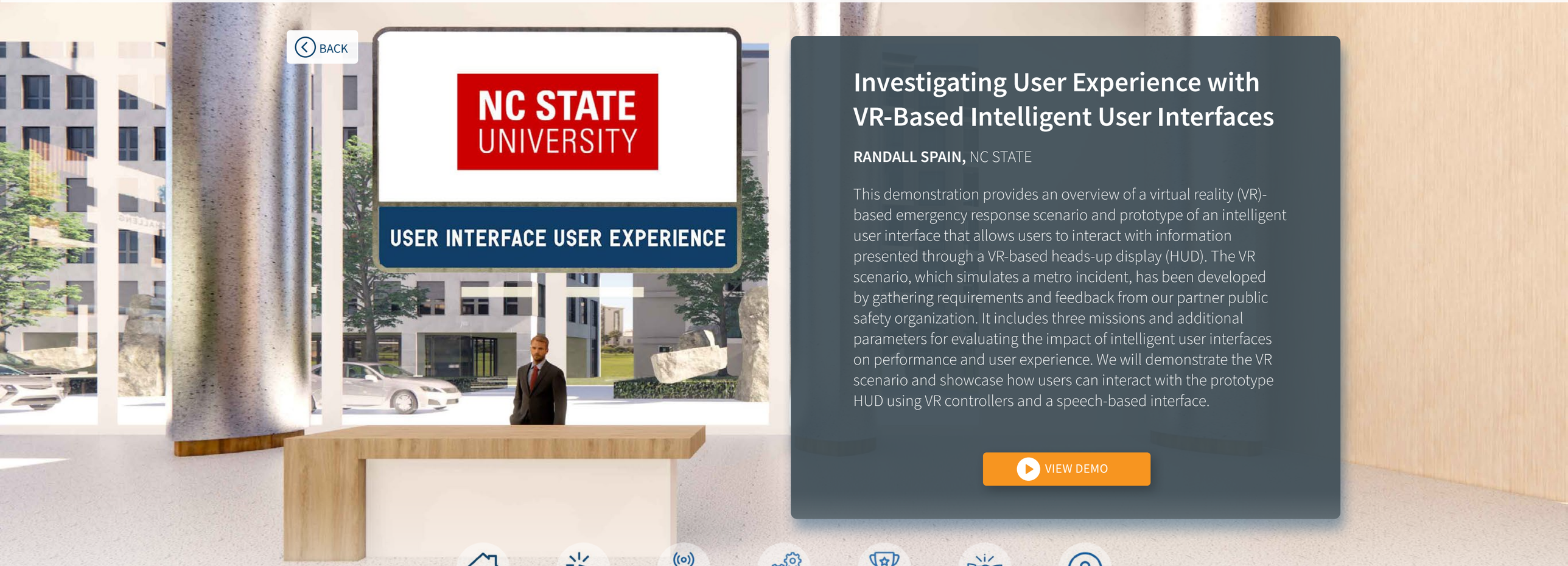
ACE: Framework for Creating, Testing, & Transitioning Analytics to Public Safety

JIM HORAN, MULTIMODAL INFORMATION GROUP
NICHOLAS BURNETT, DATA MACHINES

The demo will consist of a camera capturing live video of the demo area and streaming the feed through several object detection analytics. Playback of the video will be displayed on the screen with the results of the object detection analytics (bounding boxes, classifications, and confidence scores) overlayed on top of the video. Participants will be able to interact with the demo to change the compression used to stream the video to the analytics and observe the effect this has on their object detection performance. Detector confidence and other metrics will be recorded and displayed graphically as well.

VIEW DEMO

BACK



Investigating User Experience with VR-Based Intelligent User Interfaces

RANDALL SPAIN, NC STATE

This demonstration provides an overview of a virtual reality (VR)-based emergency response scenario and prototype of an intelligent user interface that allows users to interact with information presented through a VR-based heads-up display (HUD). The VR scenario, which simulates a metro incident, has been developed by gathering requirements and feedback from our partner public safety organization. It includes three missions and additional parameters for evaluating the impact of intelligent user interfaces on performance and user experience. We will demonstrate the VR scenario and showcase how users can interact with the prototype HUD using VR controllers and a speech-based interface.

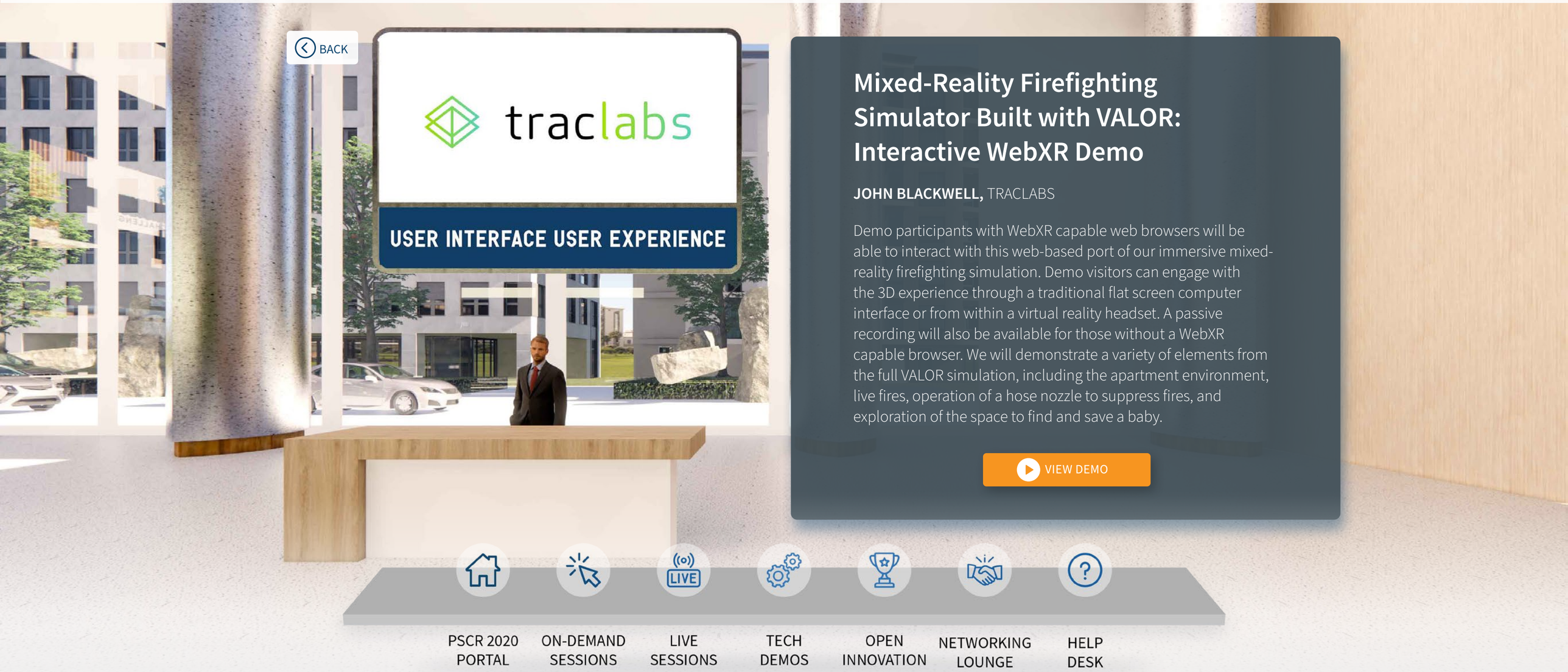
VIEW DEMO

Simulating Next-Generation Public Safety User Interfaces in VR Demo

REGIS KOPPER, JERONIMO GRANDI, UNC GREENSBORO
ZEKUN CAO, MARK OGREN, DUKE UNIVERSITY

In this demo, we showcase next-generation user interface designs for a traffic stop scenario in the law enforcement context and a burning building scenario in the firefighting context. Our goal is to simulate, in virtual reality, user interface designs that leverage next-generation technology and have the potential to increase the safety and agility practices and procedures of first responders.

VIEW DEMO

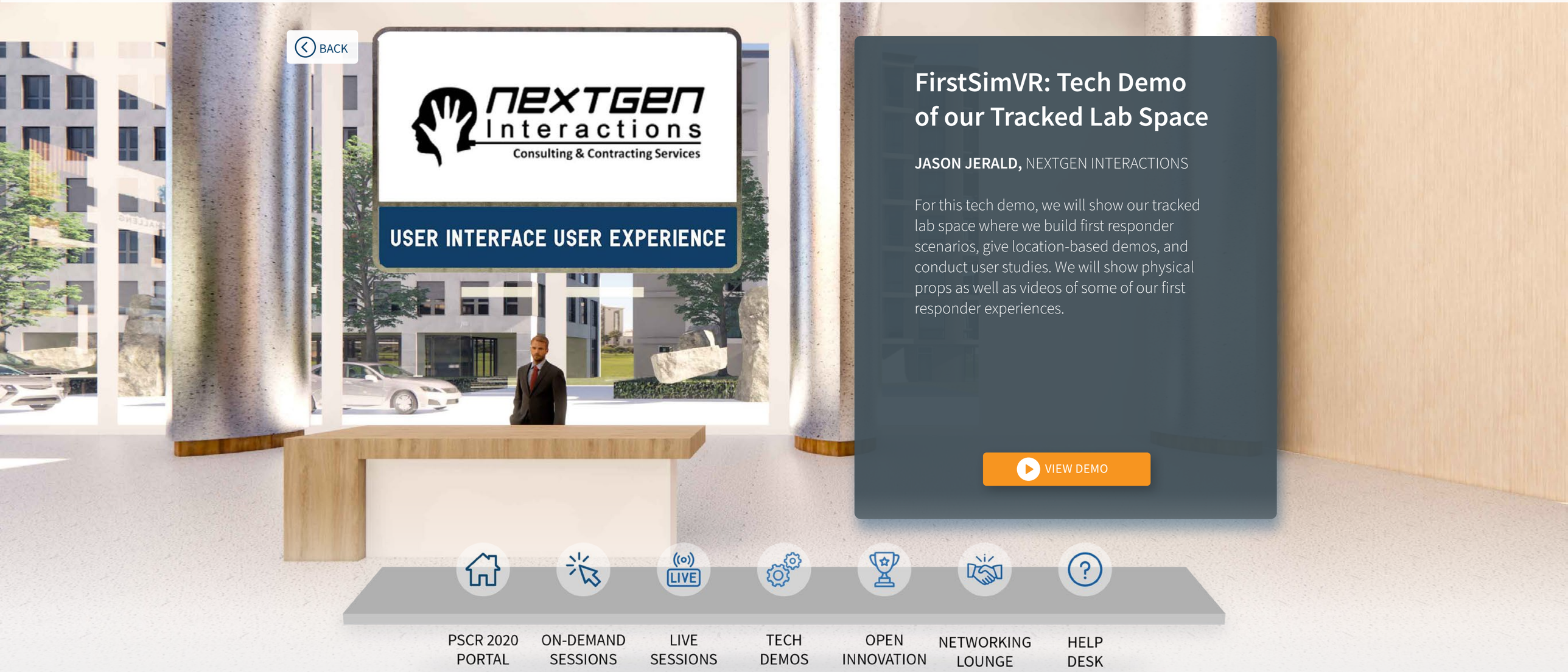


Mixed-Reality Firefighting Simulator Built with VALOR: Interactive WebXR Demo

JOHN BLACKWELL, TRACLABS

Demo participants with WebXR capable web browsers will be able to interact with this web-based port of our immersive mixed-reality firefighting simulation. Demo visitors can engage with the 3D experience through a traditional flat screen computer interface or from within a virtual reality headset. A passive recording will also be available for those without a WebXR capable browser. We will demonstrate a variety of elements from the full VALOR simulation, including the apartment environment, live fires, operation of a hose nozzle to suppress fires, and exploration of the space to find and save a baby.

VIEW DEMO



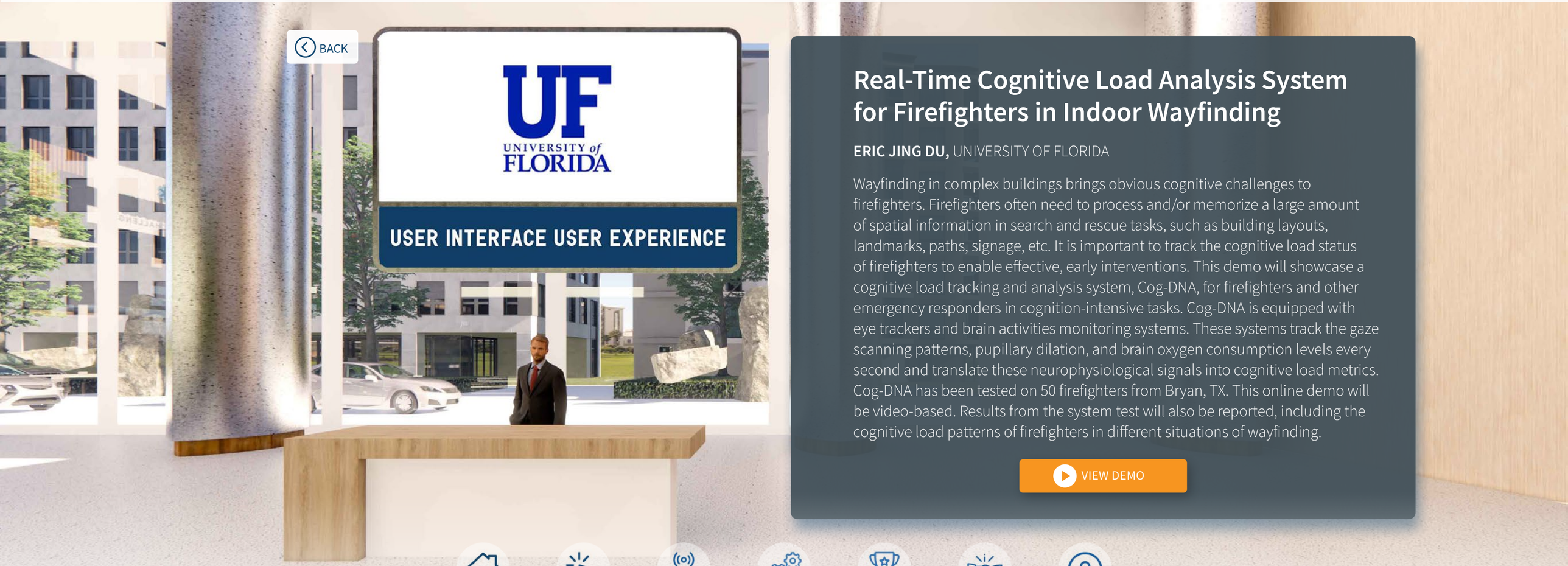
FirstSimVR: Tech Demo of our Tracked Lab Space

JASON JERALD, NEXTGEN INTERACTIONS

For this tech demo, we will show our tracked lab space where we build first responder scenarios, give location-based demos, and conduct user studies. We will show physical props as well as videos of some of our first responder experiences.

VIEW DEMO

BACK



Real-Time Cognitive Load Analysis System for Firefighters in Indoor Wayfinding

ERIC JING DU, UNIVERSITY OF FLORIDA

Wayfinding in complex buildings brings obvious cognitive challenges to firefighters. Firefighters often need to process and/or memorize a large amount of spatial information in search and rescue tasks, such as building layouts, landmarks, paths, signage, etc. It is important to track the cognitive load status of firefighters to enable effective, early interventions. This demo will showcase a cognitive load tracking and analysis system, Cog-DNA, for firefighters and other emergency responders in cognition-intensive tasks. Cog-DNA is equipped with eye trackers and brain activities monitoring systems. These systems track the gaze scanning patterns, pupillary dilation, and brain oxygen consumption levels every second and translate these neurophysiological signals into cognitive load metrics. Cog-DNA has been tested on 50 firefighters from Bryan, TX. This online demo will be video-based. Results from the system test will also be reported, including the cognitive load patterns of firefighters in different situations of wayfinding.

VIEW DEMO

Walkthrough of ARTEMIS Usability Testing Platform

SARAH FARMER, GEORGIA TECH RESEARCH INSTITUTE

The Georgia Tech Research Institute will present a demo that shows a walkthrough of the Augmented Reality Testing of Equipment in Multiple Immersive Simulations (ARTEMIS). ARTEMIS is intended for use as a virtual reality (VR)-based usability platform for use by first responders. The immersive environment of VR allows first responders to test near-future technologies in a simulated scenario. The demo will present a walkthrough of the evaluator station, including the menu screen in which the evaluator configures the scenario; the scenario playing out in real time; and the view from the evaluator station as the scenario plays out.

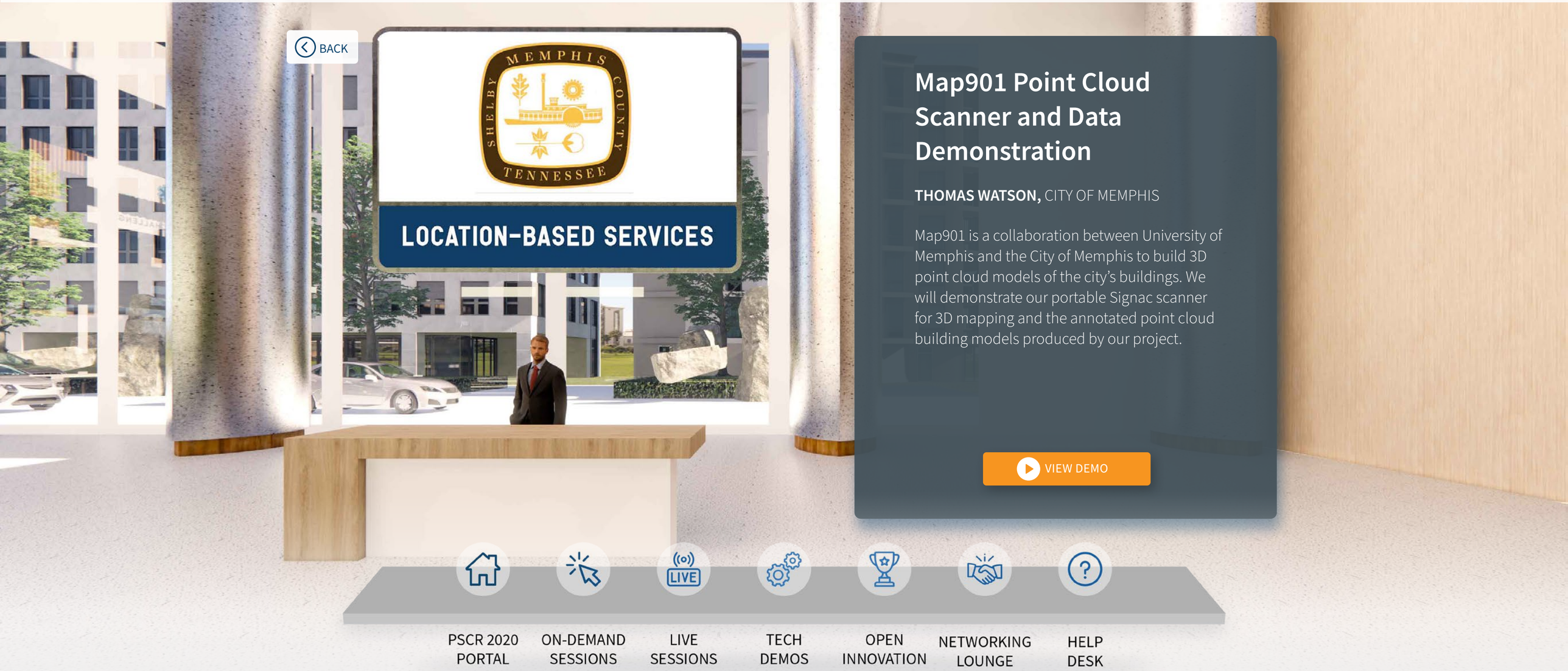
VIEW DEMO

Semi-Automated Feature Extraction of Public Safety Features from Indoor Lidar

JOEL LAWHEAD, WAYNE FRANCIS,
HANCOCK COUNTY

Hancock County mapped 10 schools using indoor lidar, and then created a workflow to mostly automate locating and identifying building features important to first responders.

VIEW DEMO



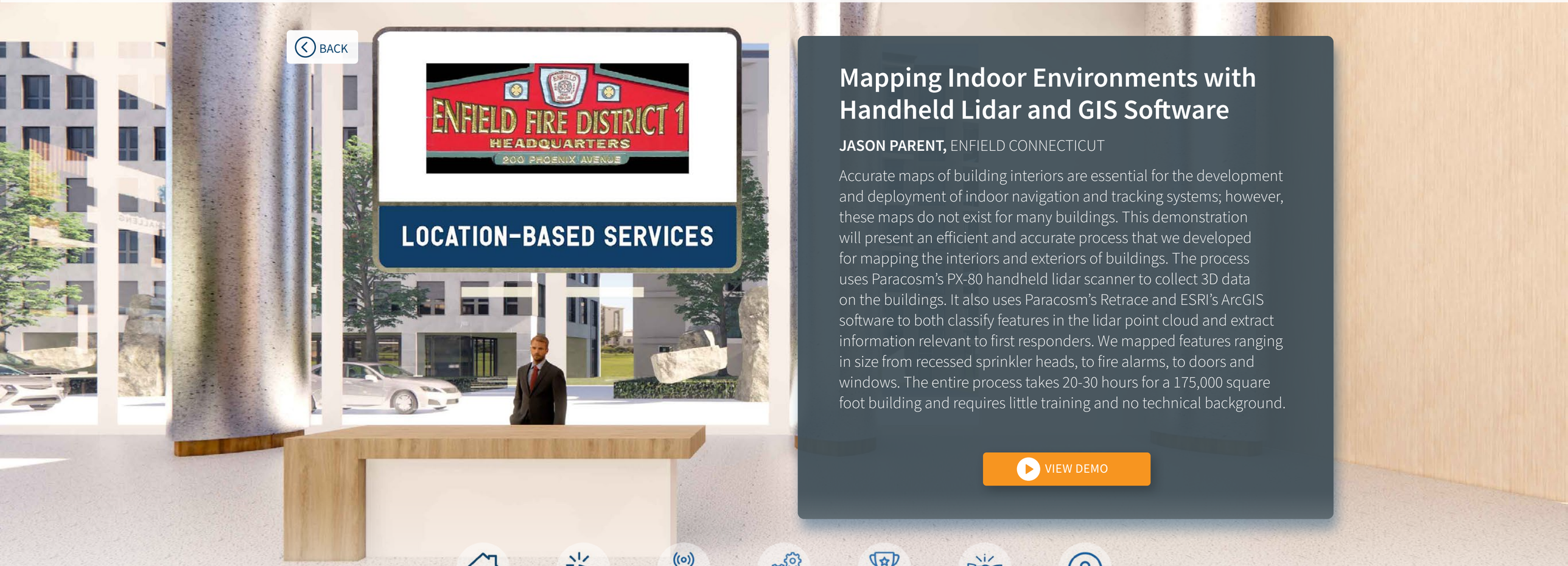
Map901 Point Cloud Scanner and Data Demonstration

THOMAS WATSON, CITY OF MEMPHIS

Map901 is a collaboration between University of Memphis and the City of Memphis to build 3D point cloud models of the city's buildings. We will demonstrate our portable Signac scanner for 3D mapping and the annotated point cloud building models produced by our project.

VIEW DEMO

BACK

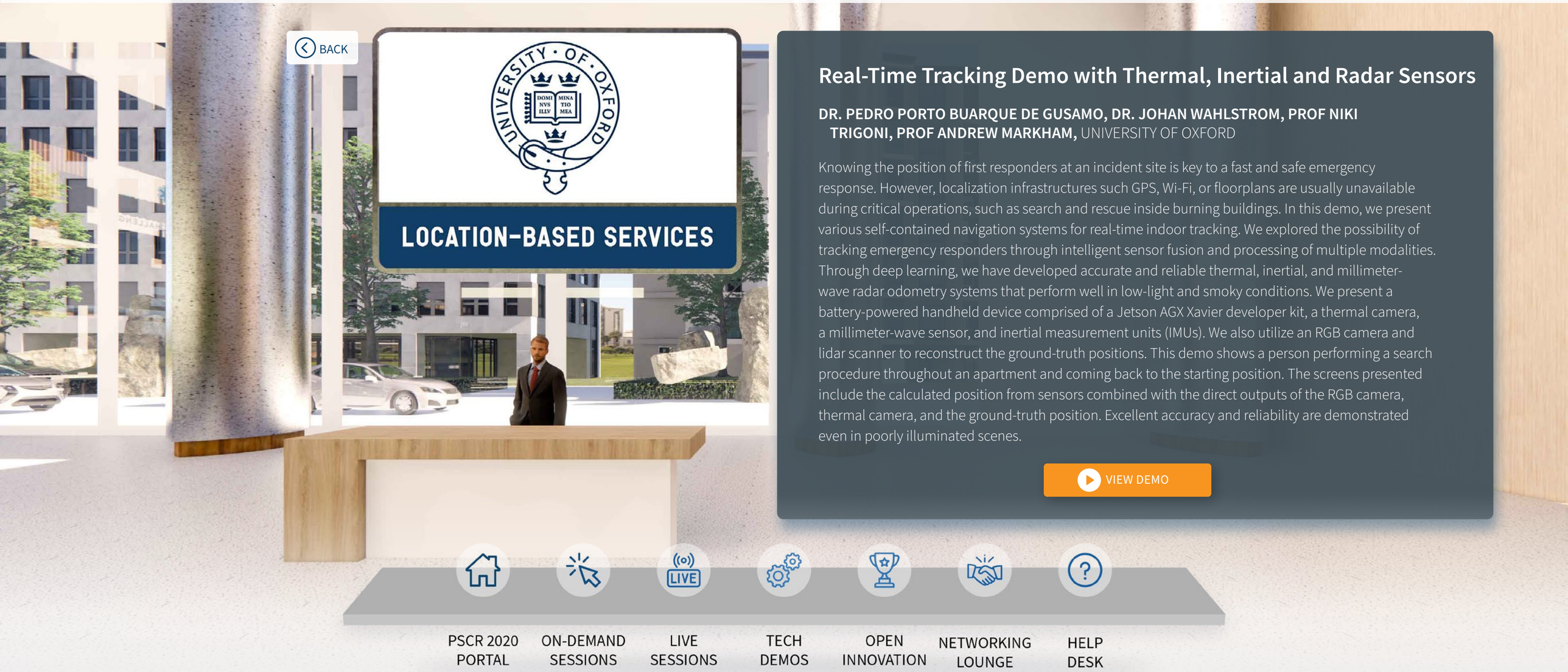


Mapping Indoor Environments with Handheld Lidar and GIS Software

JASON PARENT, ENFIELD CONNECTICUT

Accurate maps of building interiors are essential for the development and deployment of indoor navigation and tracking systems; however, these maps do not exist for many buildings. This demonstration will present an efficient and accurate process that we developed for mapping the interiors and exteriors of buildings. The process uses Paracosm's PX-80 handheld lidar scanner to collect 3D data on the buildings. It also uses Paracosm's Retrace and ESRI's ArcGIS software to both classify features in the lidar point cloud and extract information relevant to first responders. We mapped features ranging in size from recessed sprinkler heads, to fire alarms, to doors and windows. The entire process takes 20-30 hours for a 175,000 square foot building and requires little training and no technical background.

VIEW DEMO

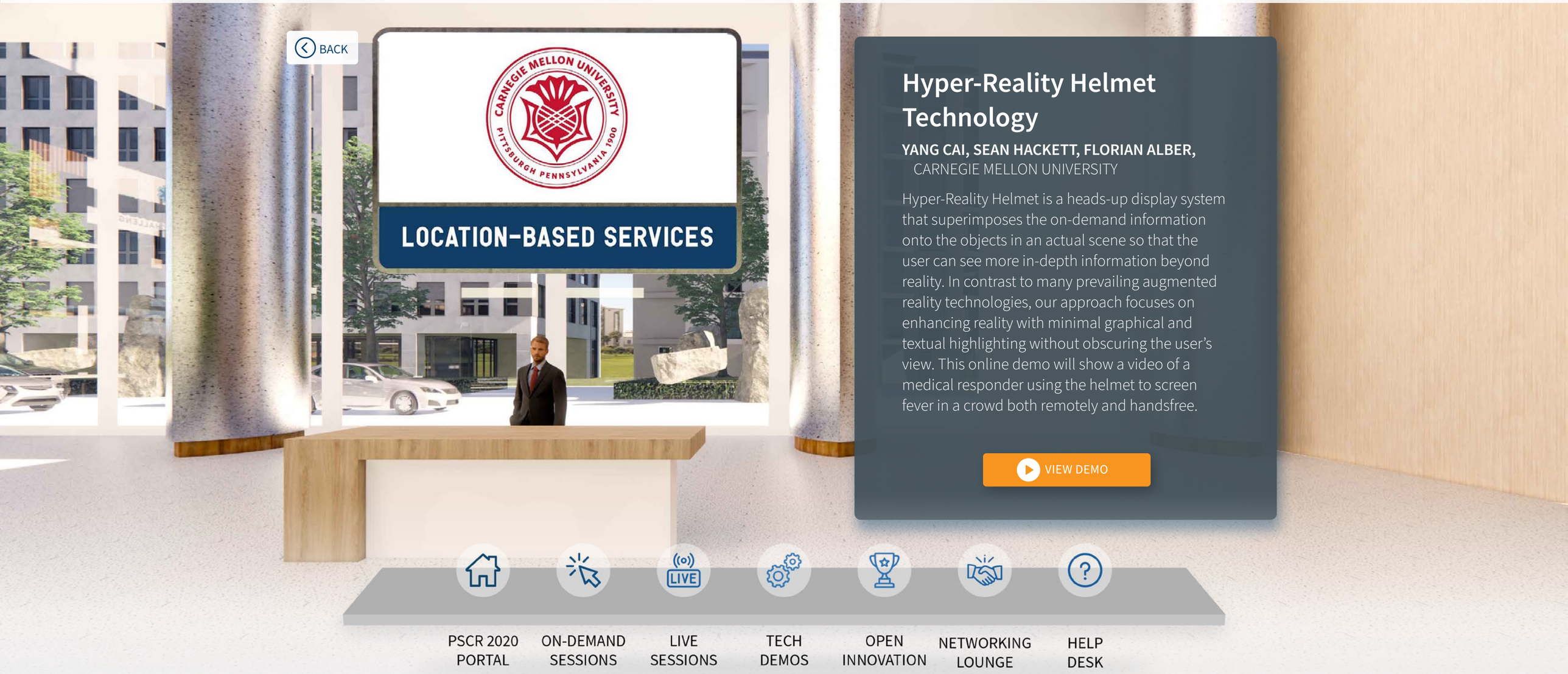


Real-Time Tracking Demo with Thermal, Inertial and Radar Sensors

DR. PEDRO PORTO BUARQUE DE GUSAMO, DR. JOHAN WAHLSTROM, PROF NIKI TRIGONI, PROF ANDREW MARKHAM, UNIVERSITY OF OXFORD

Knowing the position of first responders at an incident site is key to a fast and safe emergency response. However, localization infrastructures such GPS, Wi-Fi, or floorplans are usually unavailable during critical operations, such as search and rescue inside burning buildings. In this demo, we present various self-contained navigation systems for real-time indoor tracking. We explored the possibility of tracking emergency responders through intelligent sensor fusion and processing of multiple modalities. Through deep learning, we have developed accurate and reliable thermal, inertial, and millimeter-wave radar odometry systems that perform well in low-light and smoky conditions. We present a battery-powered handheld device comprised of a Jetson AGX Xavier developer kit, a thermal camera, a millimeter-wave sensor, and inertial measurement units (IMUs). We also utilize an RGB camera and lidar scanner to reconstruct the ground-truth positions. This demo shows a person performing a search procedure throughout an apartment and coming back to the starting position. The screens presented include the calculated position from sensors combined with the direct outputs of the RGB camera, thermal camera, and the ground-truth position. Excellent accuracy and reliability are demonstrated even in poorly illuminated scenes.

VIEW DEMO

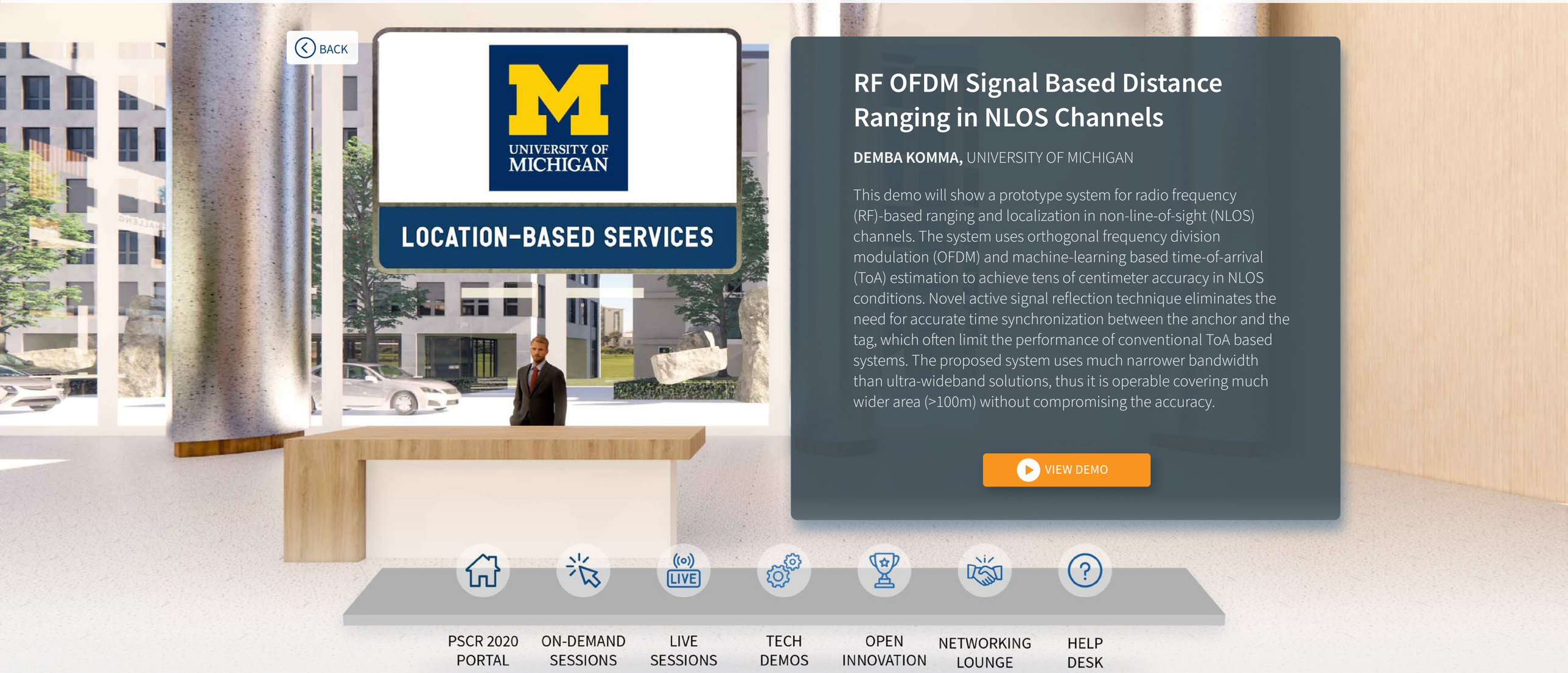


Hyper-Reality Helmet Technology

YANG CAI, SEAN HACKETT, FLORIAN ALBER,
CARNEGIE MELLON UNIVERSITY

Hyper-Reality Helmet is a heads-up display system that superimposes the on-demand information onto the objects in an actual scene so that the user can see more in-depth information beyond reality. In contrast to many prevailing augmented reality technologies, our approach focuses on enhancing reality with minimal graphical and textual highlighting without obscuring the user's view. This online demo will show a video of a medical responder using the helmet to screen fever in a crowd both remotely and handsfree.

VIEW DEMO



RF OFDM Signal Based Distance Ranging in NLOS Channels

DEMBA KOMMA, UNIVERSITY OF MICHIGAN

This demo will show a prototype system for radio frequency (RF)-based ranging and localization in non-line-of-sight (NLOS) channels. The system uses orthogonal frequency division modulation (OFDM) and machine-learning based time-of-arrival (ToA) estimation to achieve tens of centimeter accuracy in NLOS conditions. Novel active signal reflection technique eliminates the need for accurate time synchronization between the anchor and the tag, which often limit the performance of conventional ToA based systems. The proposed system uses much narrower bandwidth than ultra-wideband solutions, thus it is operable covering much wider area (>100m) without compromising the accuracy.

VIEW DEMO

Lidar Mapping and LTS Measurement Techniques

JOSEPH GRASSO AND CHARLSEA HANSEN,
NIST PSCR

The Location-Based Services (LBS) portfolio focuses on indoor mapping, tracking, and navigation. At this demonstration, we will have examples of the technology we have been working with recently. This includes lidar, which can be used to quickly produce high fidelity maps, and several approaches that could be used to measure the accuracy of indoor tracking systems, such as AprilTags, an optimized QR code that can be used to estimate the user's position.

VIEW DEMO

BACK

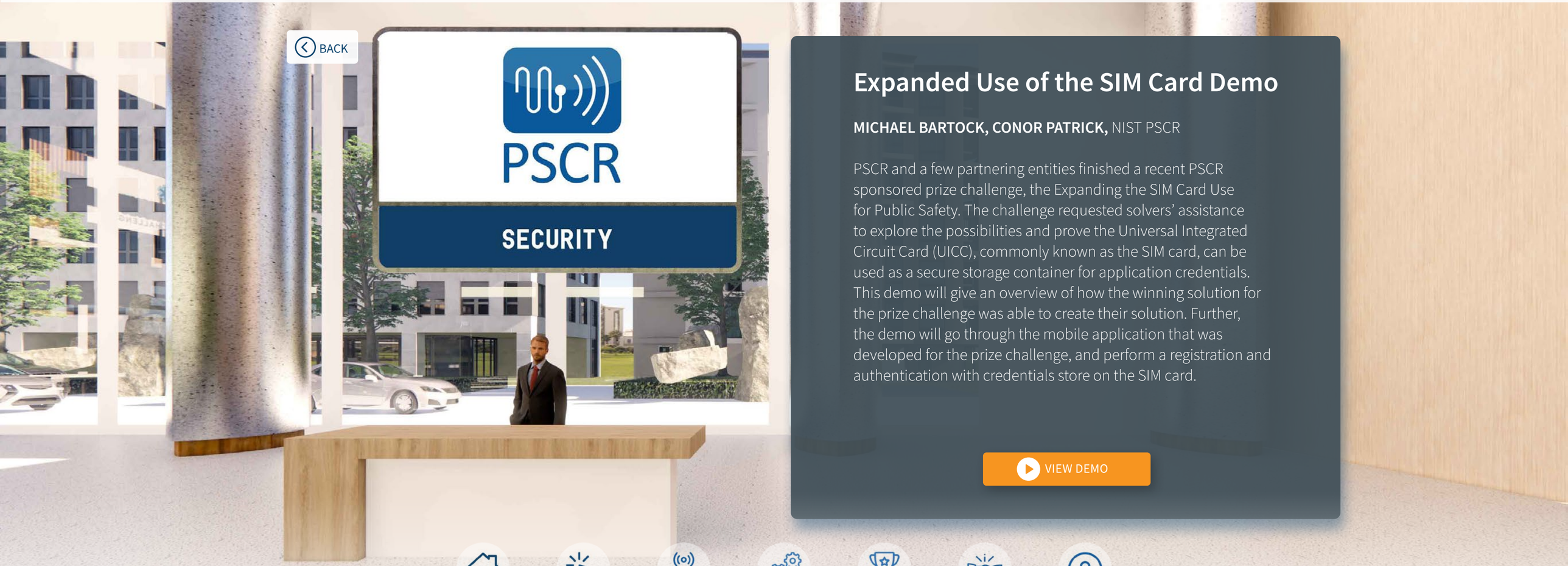
Envisioning AR Vision Enhancement in Reduced Visibility Environments

PAUL MERRITT, JOSEPH GRASSO AND CHARLSEA HANSEN, NIST PSCR

Tune in to this video of engineers from the UIUX and LBS portfolios to see how they combines the power of lidar building scans with an Augmented Reality headset to produce an enhanced visualization of the structure of a building. This type of visualization demonstrates a concept that could allow police officers to see through walls or firefighters to navigate through smoky environments.

VIEW DEMO

BACK

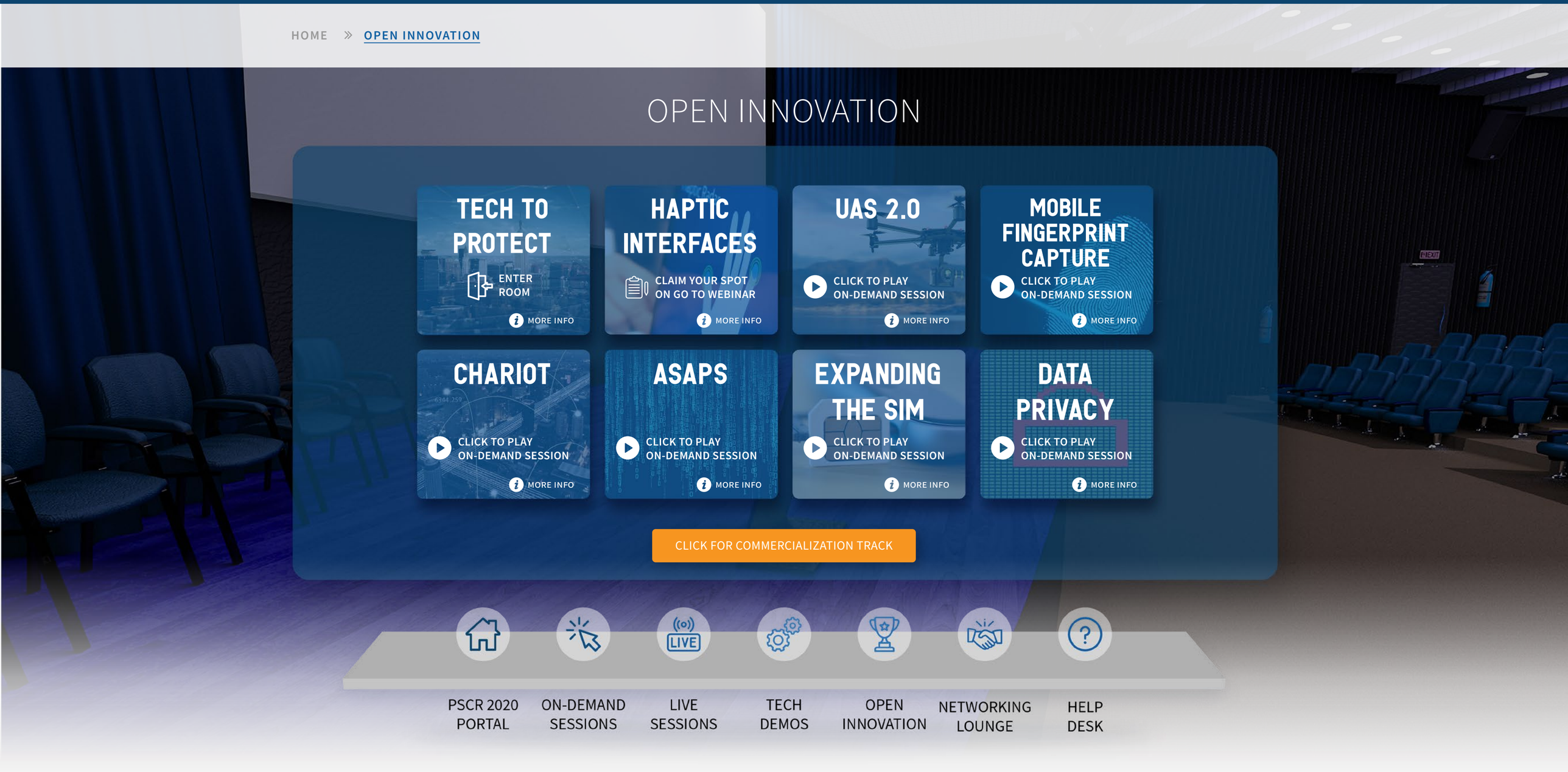


Expanded Use of the SIM Card Demo

MICHAEL BARTOCK, CONOR PATRICK, NIST PSCR

PSCR and a few partnering entities finished a recent PSCR sponsored prize challenge, the Expanding the SIM Card Use for Public Safety. The challenge requested solvers' assistance to explore the possibilities and prove the Universal Integrated Circuit Card (UICC), commonly known as the SIM card, can be used as a secure storage container for application credentials. This demo will give an overview of how the winning solution for the prize challenge was able to create their solution. Further, the demo will go through the mobile application that was developed for the prize challenge, and perform a registration and authentication with credentials store on the SIM card.

VIEW DEMO



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TECH TO PROTECT
ENTER ROOM
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HAPTIC INTERFACES
CLAIM YOUR SPOT ON GO TO WEBINAR
MORE INFO

UAS 2.0
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MORE INFO

MOBILE FINGERPRINT CAPTURE
CLICK TO PLAY ON-DEMAND SESSION
MORE INFO

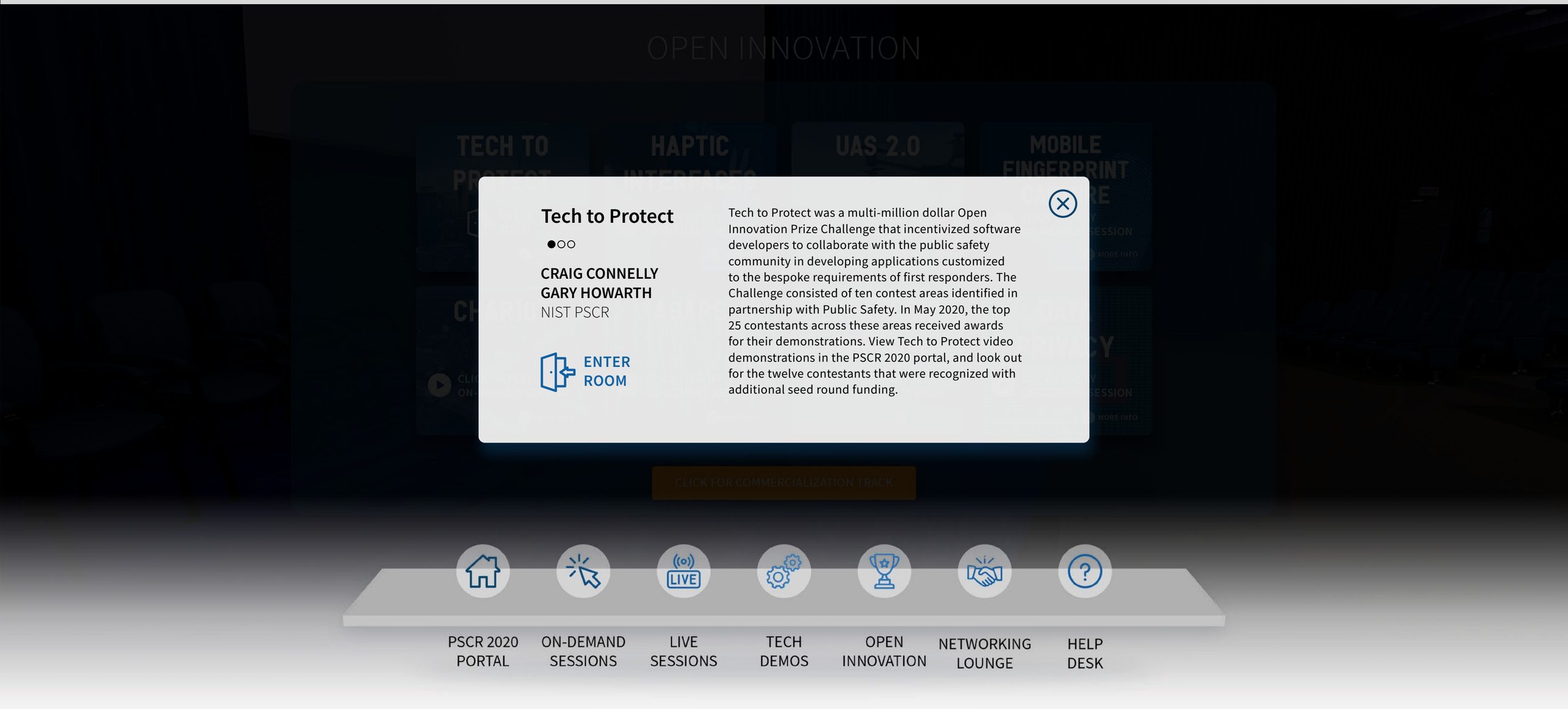
CHARIOT
CLICK TO PLAY ON-DEMAND SESSION
MORE INFO

ASAPS
CLICK TO PLAY ON-DEMAND SESSION
MORE INFO

EXPANDING THE SIM
CLICK TO PLAY ON-DEMAND SESSION
MORE INFO

DATA PRIVACY
CLICK TO PLAY ON-DEMAND SESSION
MORE INFO

CLICK FOR COMMERCIALIZATION TRACK



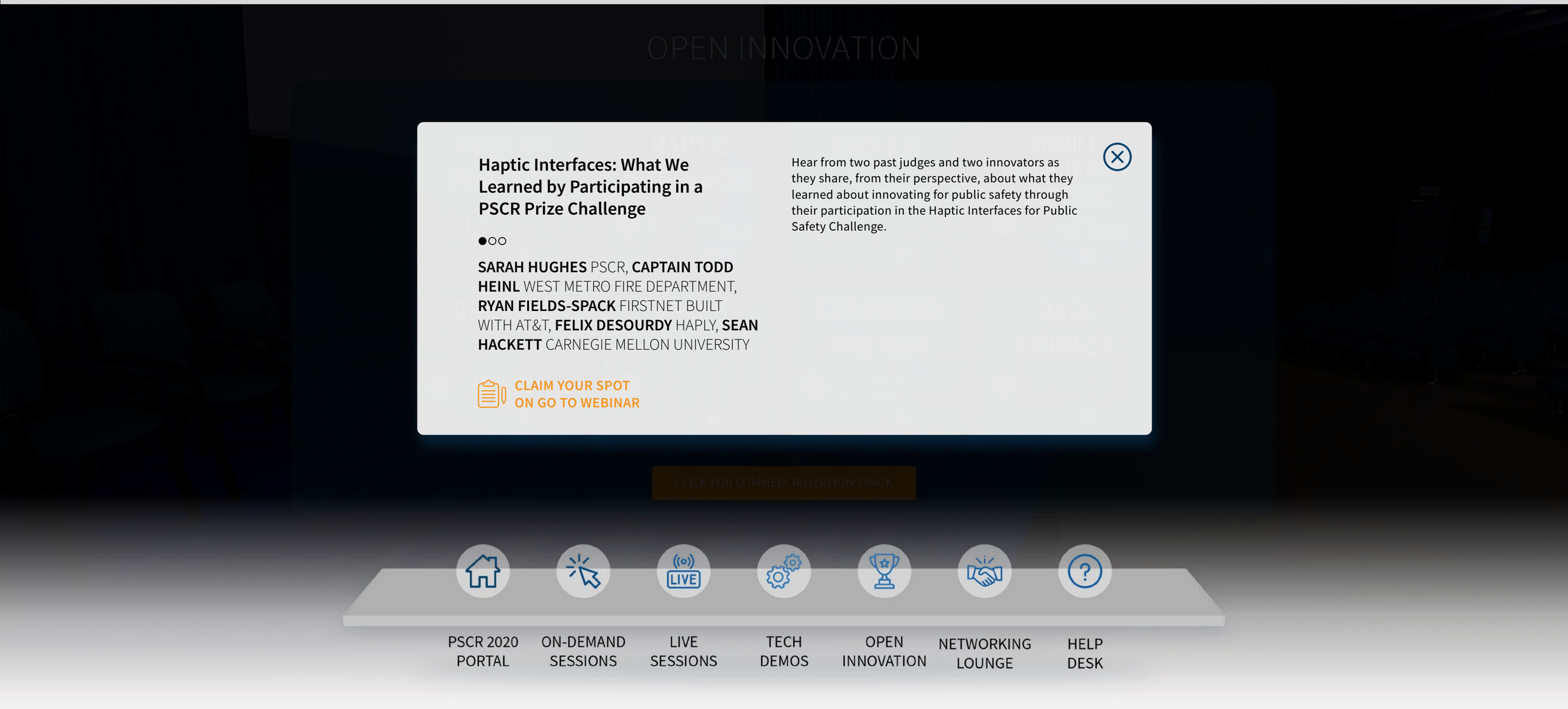
Tech to Protect

●○○

CRAIG CONNELLY
GARY HOWARTH
NIST PSCR

ENTER ROOM

Tech to Protect was a multi-million dollar Open Innovation Prize Challenge that incentivized software developers to collaborate with the public safety community in developing applications customized to the bespoke requirements of first responders. The Challenge consisted of ten contest areas identified in partnership with Public Safety. In May 2020, the top 25 contestants across these areas received awards for their demonstrations. View Tech to Protect video demonstrations in the PSCR 2020 portal, and look out for the twelve contestants that were recognized with additional seed round funding.



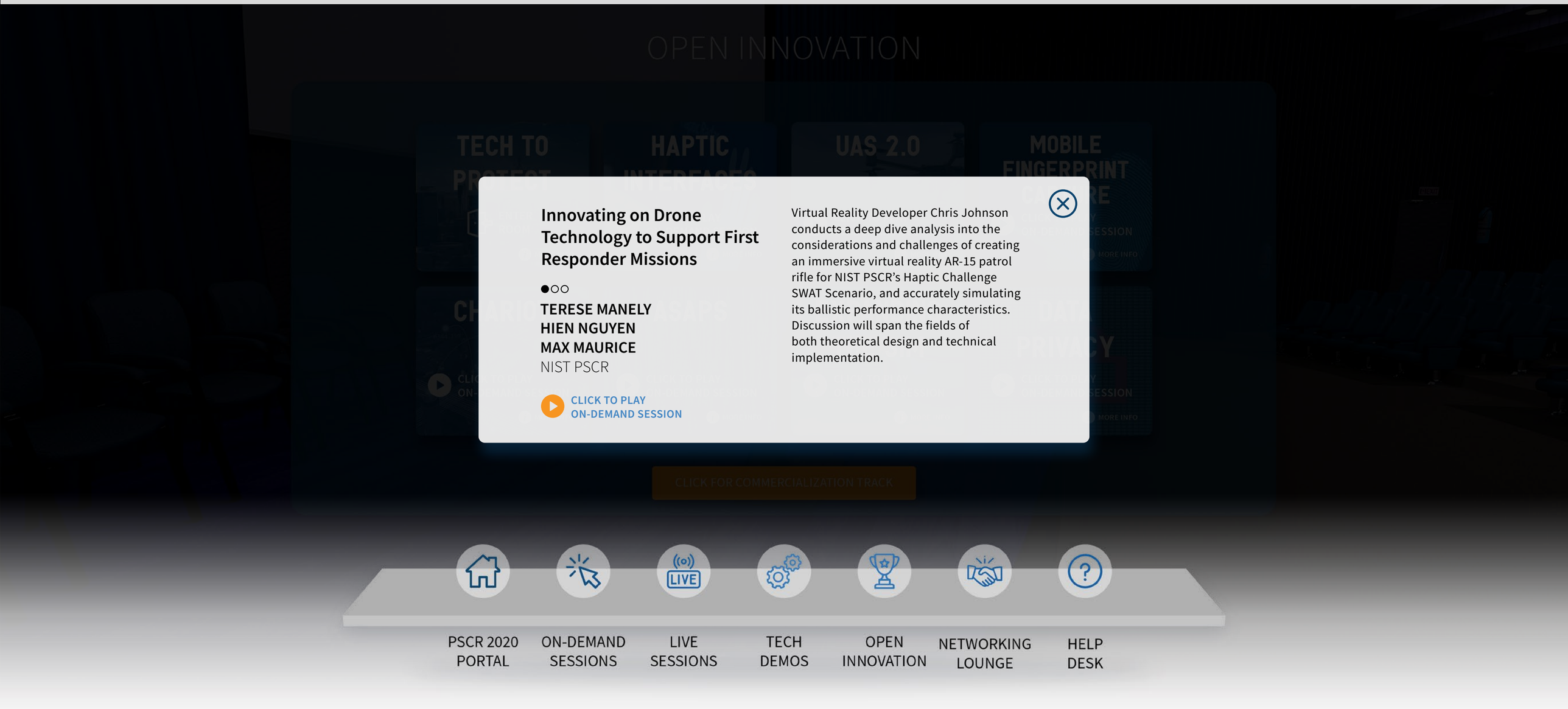
Haptic Interfaces: What We Learned by Participating in a PSCR Prize Challenge

●○○

SARAH HUGHES PSCR, **CAPTAIN TODD HEINL** WEST METRO FIRE DEPARTMENT, **RYAN FIELDS-SPACK** FIRSTNET BUILT WITH AT&T, **FELIX DESOURDY** HAPLY, **SEAN HACKETT** CARNEGIE MELLON UNIVERSITY

CLAIM YOUR SPOT
ON GO TO WEBINAR

Hear from two past judges and two innovators as they share, from their perspective, about what they learned about innovating for public safety through their participation in the Haptic Interfaces for Public Safety Challenge.



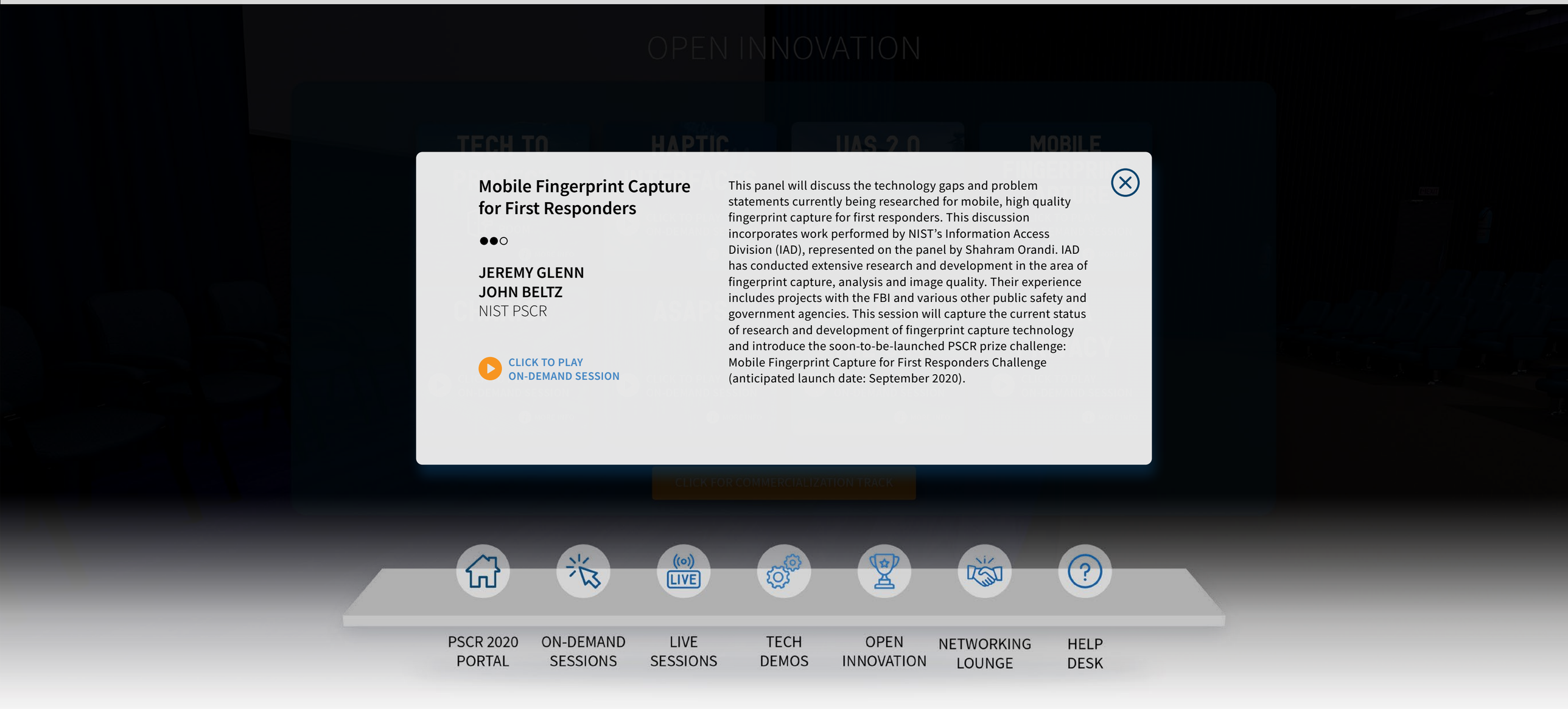
Innovating on Drone Technology to Support First Responder Missions

●○○

TERESE MANELY
HIEN NGUYEN
MAX MAURICE
NIST PSCR

CLICK TO PLAY
ON-DEMAND SESSION

Virtual Reality Developer Chris Johnson conducts a deep dive analysis into the considerations and challenges of creating an immersive virtual reality AR-15 patrol rifle for NIST PSCR's Haptic Challenge SWAT Scenario, and accurately simulating its ballistic performance characteristics. Discussion will span the fields of both theoretical design and technical implementation.



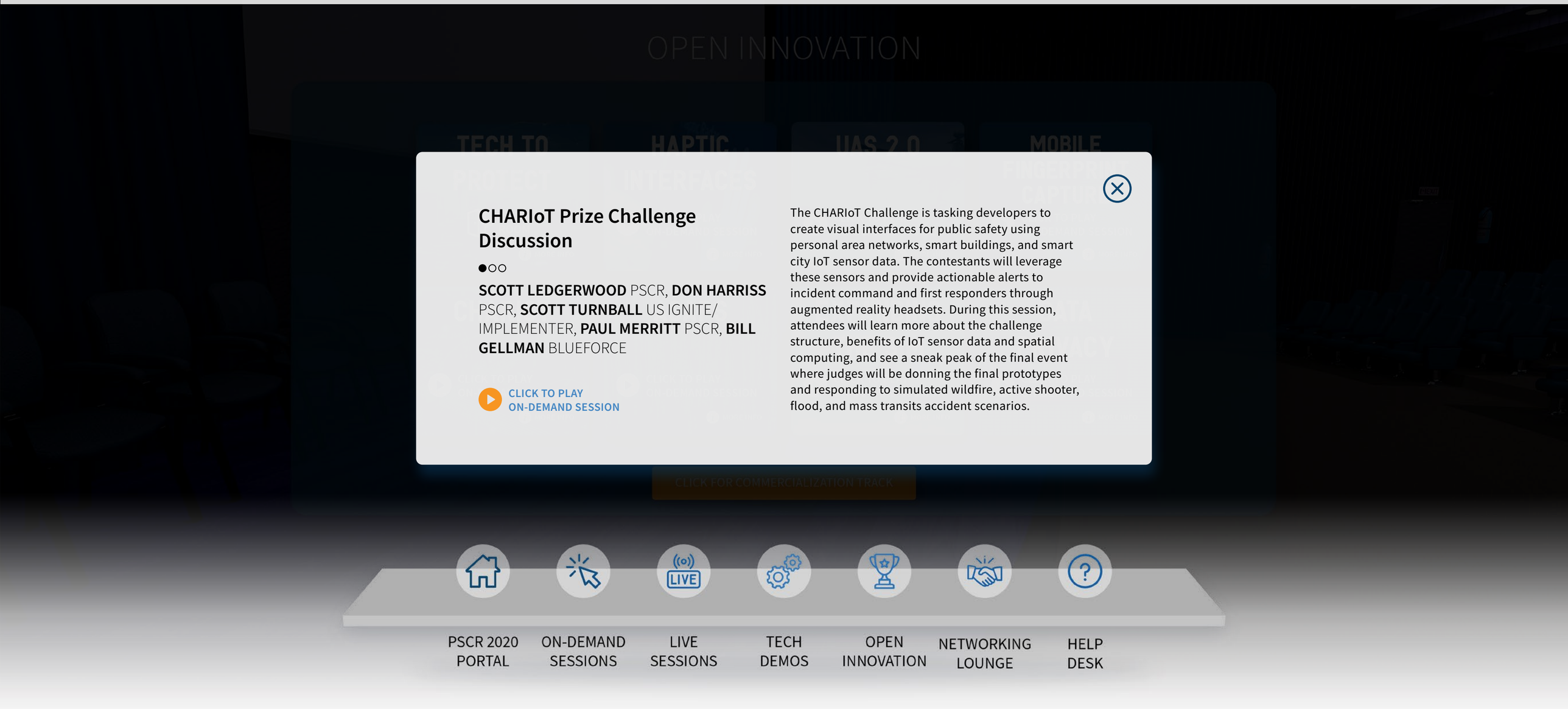
Mobile Fingerprint Capture for First Responders

●●○

JEREMY GLENN
JOHN BELTZ
NIST PSCR

CLICK TO PLAY
ON-DEMAND SESSION

This panel will discuss the technology gaps and problem statements currently being researched for mobile, high quality fingerprint capture for first responders. This discussion incorporates work performed by NIST's Information Access Division (IAD), represented on the panel by Shahram Orandi. IAD has conducted extensive research and development in the area of fingerprint capture, analysis and image quality. Their experience includes projects with the FBI and various other public safety and government agencies. This session will capture the current status of research and development of fingerprint capture technology and introduce the soon-to-be-launched PSCR prize challenge: Mobile Fingerprint Capture for First Responders Challenge (anticipated launch date: September 2020).



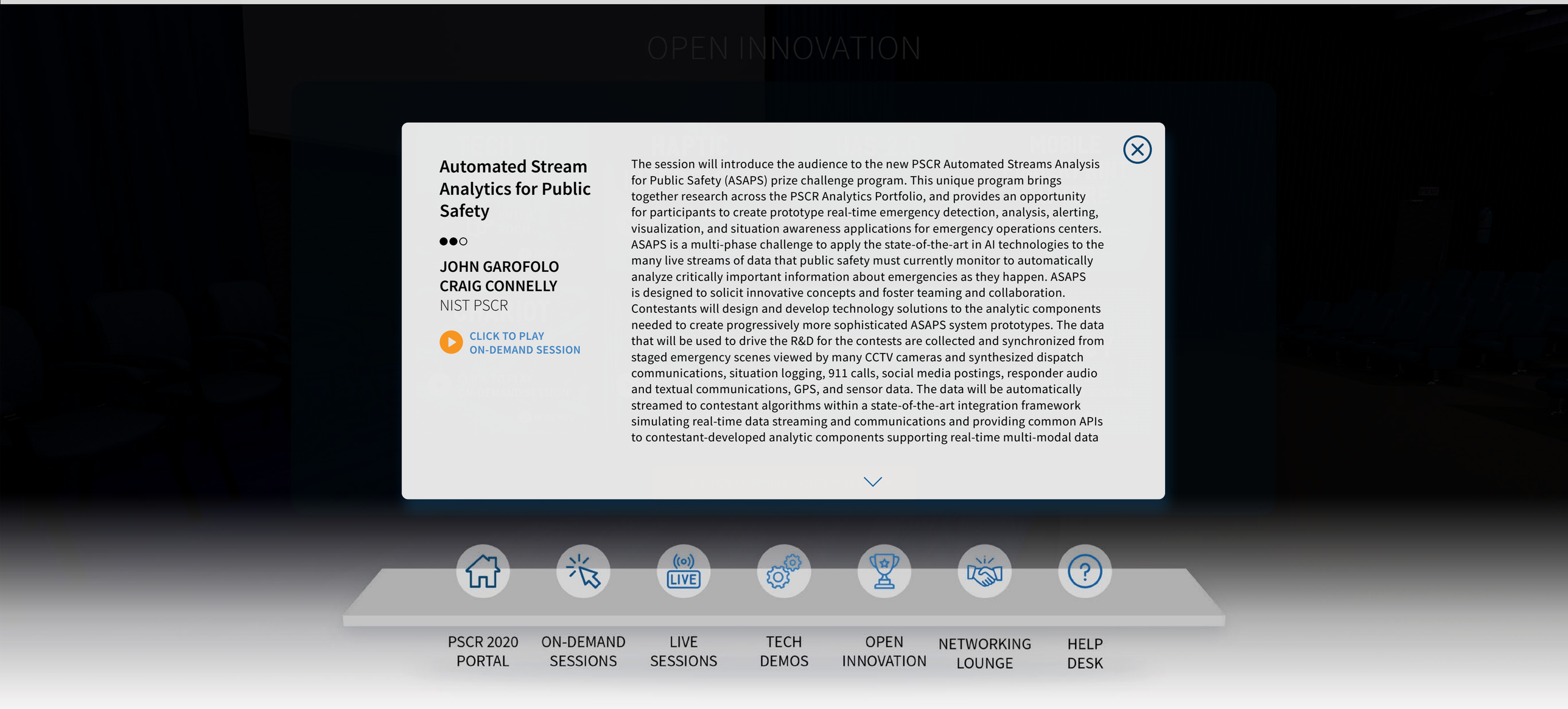
CHARIoT Prize Challenge Discussion

●○○

SCOTT LEDGERWOOD PSCR, **DON HARRISS** PSCR, **SCOTT TURNBALL** US IGNITE/ IMPLEMENTER, **PAUL MERRITT** PSCR, **BILL GELLMAN** BLUEFORCE

CLICK TO PLAY
ON-DEMAND SESSION

The CHARIoT Challenge is tasking developers to create visual interfaces for public safety using personal area networks, smart buildings, and smart city IoT sensor data. The contestants will leverage these sensors and provide actionable alerts to incident command and first responders through augmented reality headsets. During this session, attendees will learn more about the challenge structure, benefits of IoT sensor data and spatial computing, and see a sneak peak of the final event where judges will be donning the final prototypes and responding to simulated wildfire, active shooter, flood, and mass transits accident scenarios.



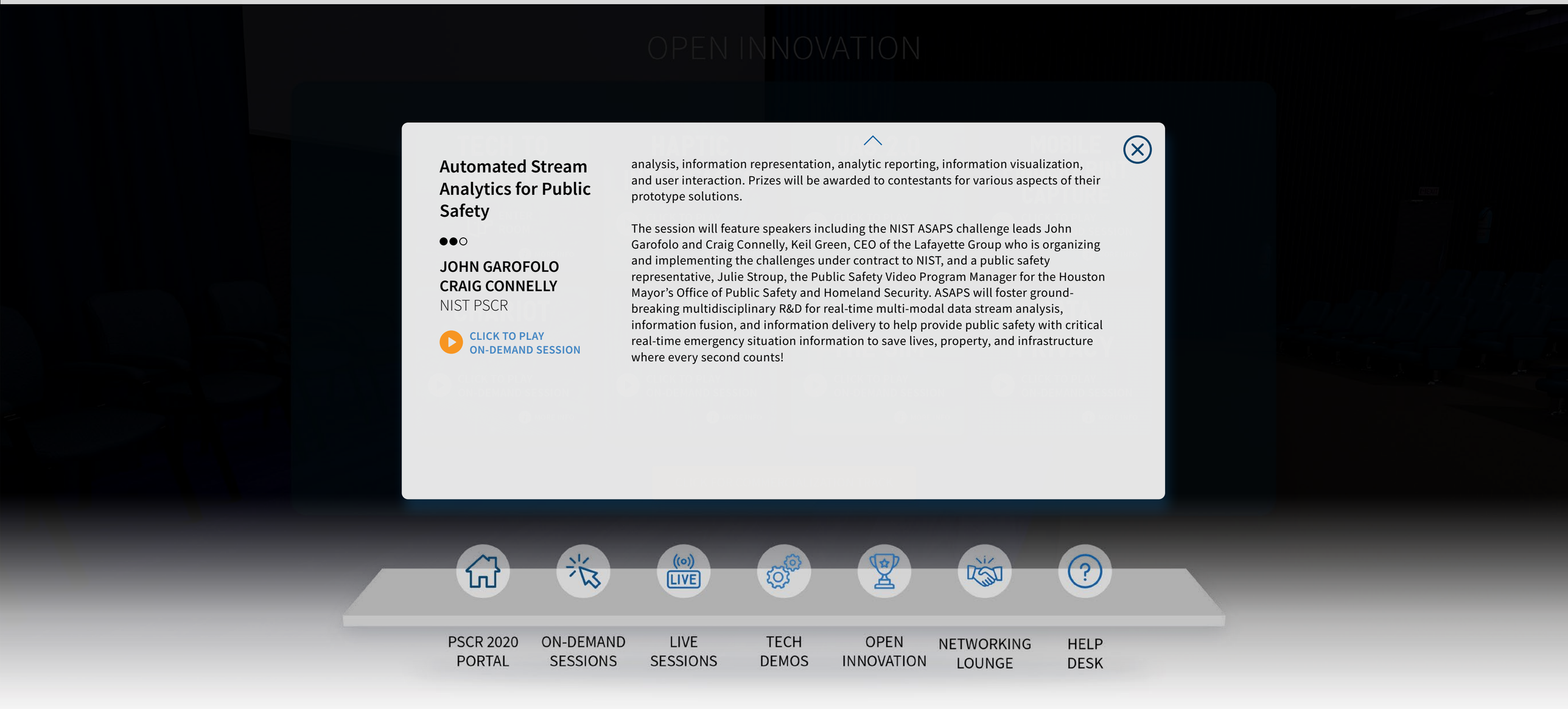
Automated Stream Analytics for Public Safety

●●○

JOHN GAROFOLO
CRAIG CONNELLY
NIST PSCR

CLICK TO PLAY
ON-DEMAND SESSION

The session will introduce the audience to the new PSCR Automated Streams Analysis for Public Safety (ASAPS) prize challenge program. This unique program brings together research across the PSCR Analytics Portfolio, and provides an opportunity for participants to create prototype real-time emergency detection, analysis, alerting, visualization, and situation awareness applications for emergency operations centers. ASAPS is a multi-phase challenge to apply the state-of-the-art in AI technologies to the many live streams of data that public safety must currently monitor to automatically analyze critically important information about emergencies as they happen. ASAPS is designed to solicit innovative concepts and foster teaming and collaboration. Contestants will design and develop technology solutions to the analytic components needed to create progressively more sophisticated ASAPS system prototypes. The data that will be used to drive the R&D for the contests are collected and synchronized from staged emergency scenes viewed by many CCTV cameras and synthesized dispatch communications, situation logging, 911 calls, social media postings, responder audio and textual communications, GPS, and sensor data. The data will be automatically streamed to contestant algorithms within a state-of-the-art integration framework simulating real-time data streaming and communications and providing common APIs to contestant-developed analytic components supporting real-time multi-modal data



Automated Stream Analytics for Public Safety

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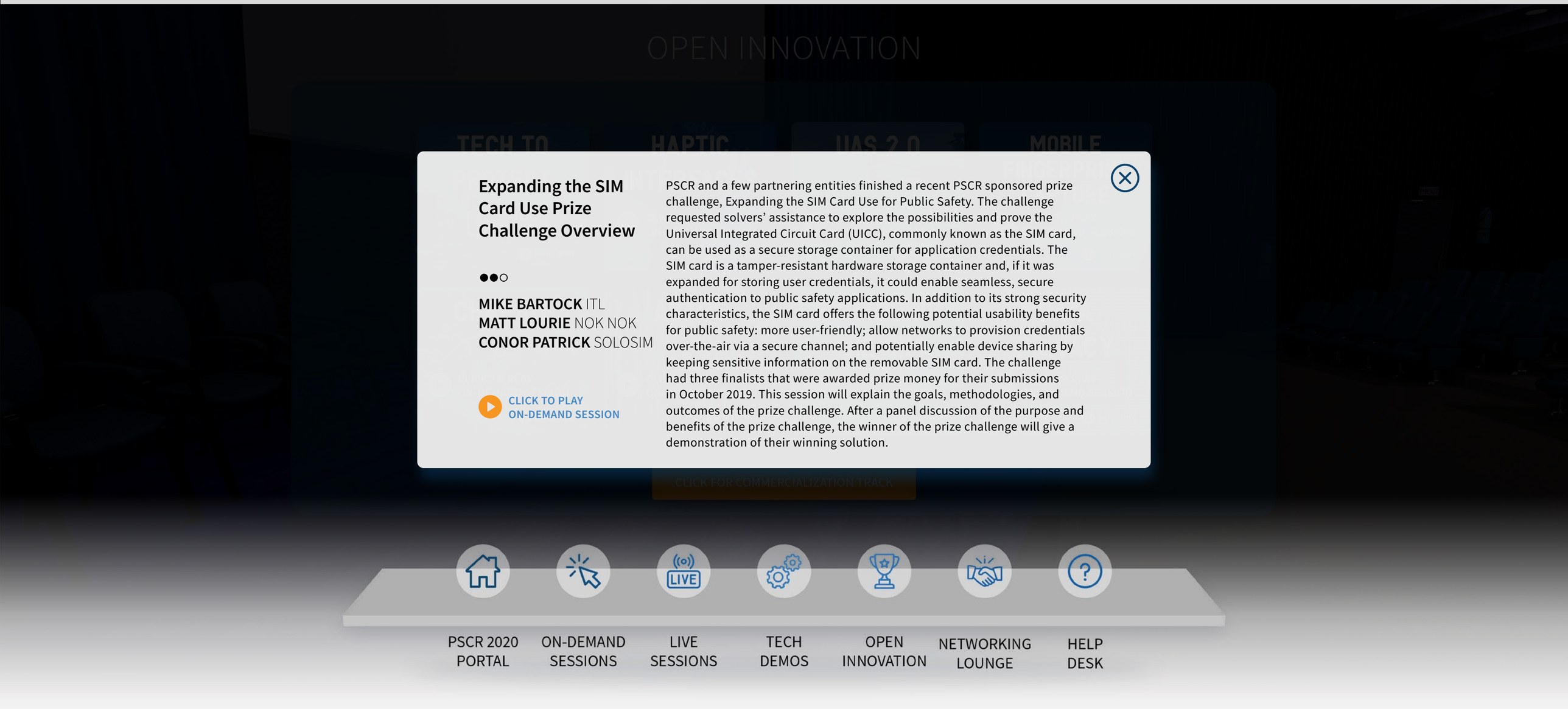
JOHN GAROFOLO
CRAIG CONNELLY
NIST PSCR

CLICK TO PLAY
ON-DEMAND SESSION

analysis, information representation, analytic reporting, information visualization, and user interaction. Prizes will be awarded to contestants for various aspects of their prototype solutions.

The session will feature speakers including the NIST ASAPS challenge leads John Garofolo and Craig Connelly, Keil Green, CEO of the Lafayette Group who is organizing and implementing the challenges under contract to NIST, and a public safety representative, Julie Stroup, the Public Safety Video Program Manager for the Houston Mayor's Office of Public Safety and Homeland Security. ASAPS will foster ground-breaking multidisciplinary R&D for real-time multi-modal data stream analysis, information fusion, and information delivery to help provide public safety with critical real-time emergency situation information to save lives, property, and infrastructure where every second counts!



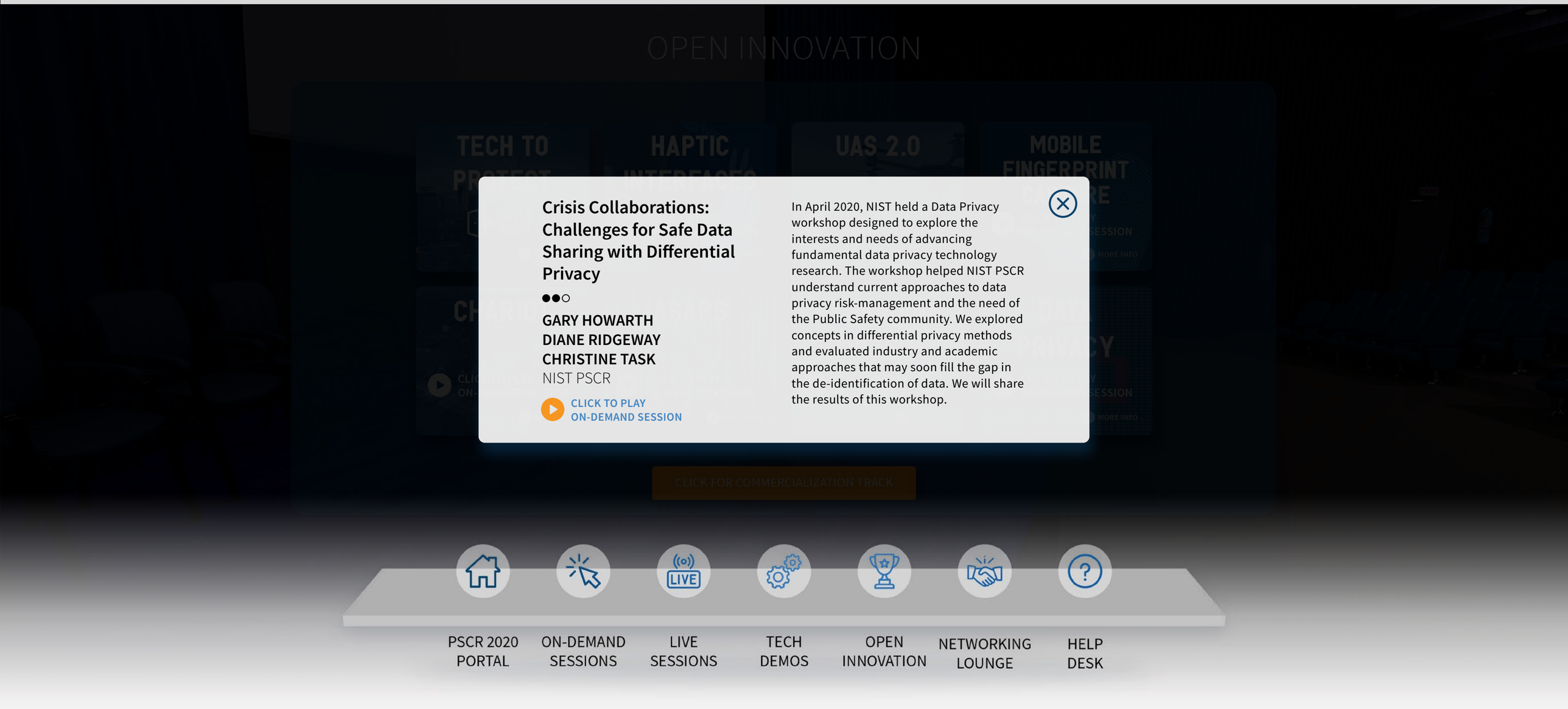
Expanding the SIM Card Use Prize Challenge Overview

●●○

MIKE BARTOCK ITL
MATT LOURIE NOK NOK
CONOR PATRICK SOLOSIM

CLICK TO PLAY
ON-DEMAND SESSION

PSCR and a few partnering entities finished a recent PSCR sponsored prize challenge, Expanding the SIM Card Use for Public Safety. The challenge requested solvers' assistance to explore the possibilities and prove the Universal Integrated Circuit Card (UICC), commonly known as the SIM card, can be used as a secure storage container for application credentials. The SIM card is a tamper-resistant hardware storage container and, if it was expanded for storing user credentials, it could enable seamless, secure authentication to public safety applications. In addition to its strong security characteristics, the SIM card offers the following potential usability benefits for public safety: more user-friendly; allow networks to provision credentials over-the-air via a secure channel; and potentially enable device sharing by keeping sensitive information on the removable SIM card. The challenge had three finalists that were awarded prize money for their submissions in October 2019. This session will explain the goals, methodologies, and outcomes of the prize challenge. After a panel discussion of the purpose and benefits of the prize challenge, the winner of the prize challenge will give a demonstration of their winning solution.



Crisis Collaborations: Challenges for Safe Data Sharing with Differential Privacy

●●○

GARY HOWARTH
DIANE RIDGEWAY
CHRISTINE TASK
NIST PSCR

CLICK TO PLAY
ON-DEMAND SESSION

In April 2020, NIST held a Data Privacy workshop designed to explore the interests and needs of advancing fundamental data privacy technology research. The workshop helped NIST PSCR understand current approaches to data privacy risk-management and the need of the Public Safety community. We explored concepts in differential privacy methods and evaluated industry and academic approaches that may soon fill the gap in the de-identification of data. We will share the results of this workshop.

OPEN INNOVATION

BACK

TECH TO PROTECT

Explore the Top Application Demonstrations from the Tech to Protect Challenge

CONTEST 001
360 Degree View: A Mobile Dashboard for Your Network Security

CONTEST 002
No Need To Repeat: Delivering Mission Critical Communications

CONTEST 003
Looking Under the Hood: Using Augmented Reality to Help Save Trapped Passengers

CONTEST 004
Got You Covered: Mapping LTE Capabilities to Save Lives

CONTEST 005
Fire Safety in 3D: Incentivizing Homeowners to Create Pre-Incident Plans for Firefighters

CONTEST 006
Voice Commands to Virtual Assistants: Hands Free Device Control

CONTEST 007
Sensor Integration: Monitoring Emergency Responders' Health

CONTEST 008
No Coverage: Placing Deployable Networks in Emergencies

CONTEST 009
Making the Case: Proactive Image Protection

CONTEST 010
Organizing Chaos: Calming Catastrophe by Tracking Patient Triage

CLICK FOR TECH TO PROTECT YEAR IN REVIEW SESSION

OPEN INNOVATION

BACK

TECH TO PROTECT

CONTEST 001
360 Degree View: A Mobile Dashboard for Your Network Security

Beam Reach

VIEW DEMO

LEGEND

- Excellent
- Superior
- Very Good
- Good
- Seed Recipient

OPEN INNOVATION

BACK

TECH TO PROTECT

CONTEST 002
No Need To Repeat:
Delivering Mission Critical
Communications

LEGEND
- Excellent
- Superior
- Very Good
- Good
- Seed Recipient

MCPTT Application	Team Talk	Trailblazer	Next-Gen MCPTT	Critical Access
VIEW DEMO	VIEW DEMO	VIEW DEMO	VIEW DEMO	VIEW DEMO

OPEN INNOVATION

BACK

TECH TO PROTECT

CONTEST 003
Looking Under the Hood: Using Augmented Reality to Help Save Trapped Passengers

AR Extrication Assist

VIEW DEMO

LEGEND

- Excellent
- Superior
- Very Good
- Good
- Seed Recipient

OPEN INNOVATION

BACK

TECH TO PROTECT

CONTEST 004
Got You Covered:
Mapping LTE Capabilities
to Save Lives

Map my LTE

VIEW DEMO

LEGEND

- Excellent
- Superior
- Very Good
- Good
- Seed Recipient

OPEN INNOVATION

BACK

TECH TO PROTECT

CONTEST 005
Fire Safety in 3D: Incentivizing Homeowners to Create Pre-Incident Plans for Firefighters

Home Pro-Tech

VIEW DEMO

LEGEND

- Excellent
- Superior
- Very Good
- Good
- Seed Recipient

OPEN INNOVATION

BACK

TECH TO PROTECT

CONTEST 006
Voice Commands to Virtual Assistants: Hands Free Device Control

LEGEND
- Excellent
- Superior
- Very Good
- Good
- Seed Recipient

Apollo A.I.	SIMBA	Zenext
VIEW DEMO	VIEW DEMO	VIEW DEMO
		VIEW SESSION

OPEN INNOVATION

BACK

TECH TO PROTECT

CONTEST 007
Sensor Integration: Monitoring Emergency Responders' Health

LEGEND
- Excellent
- Superior
- Very Good
- Good
- Seed Recipient

FireHUD	Harris County Proactive Biometric Monitoring	Heart in Hand
VIEW DEMO	VIEW DEMO	VIEW DEMO

OPEN INNOVATION

BACK

TECH TO PROTECT

CONTEST 008
No Coverage: Placing Deployable Networks in Emergencies

Front-Ranger

VIEW DEMO

LEGEND

- Excellent
- Superior
- Very Good
- Good
- Seed Recipient

OPEN INNOVATION

BACK

TECH TO PROTECT

CONTEST 009
Making the Case: Proactive Image Protection

LEGEND
- Excellent
- Superior
- Very Good
- Good
- Seed Recipient

Authim	Corroborator	ESafe	HC PIP
VIEW DEMO	VIEW DEMO	VIEW DEMO	VIEW DEMO
	VIEW SESSION		

OPEN INNOVATION

BACK

TECH TO PROTECT

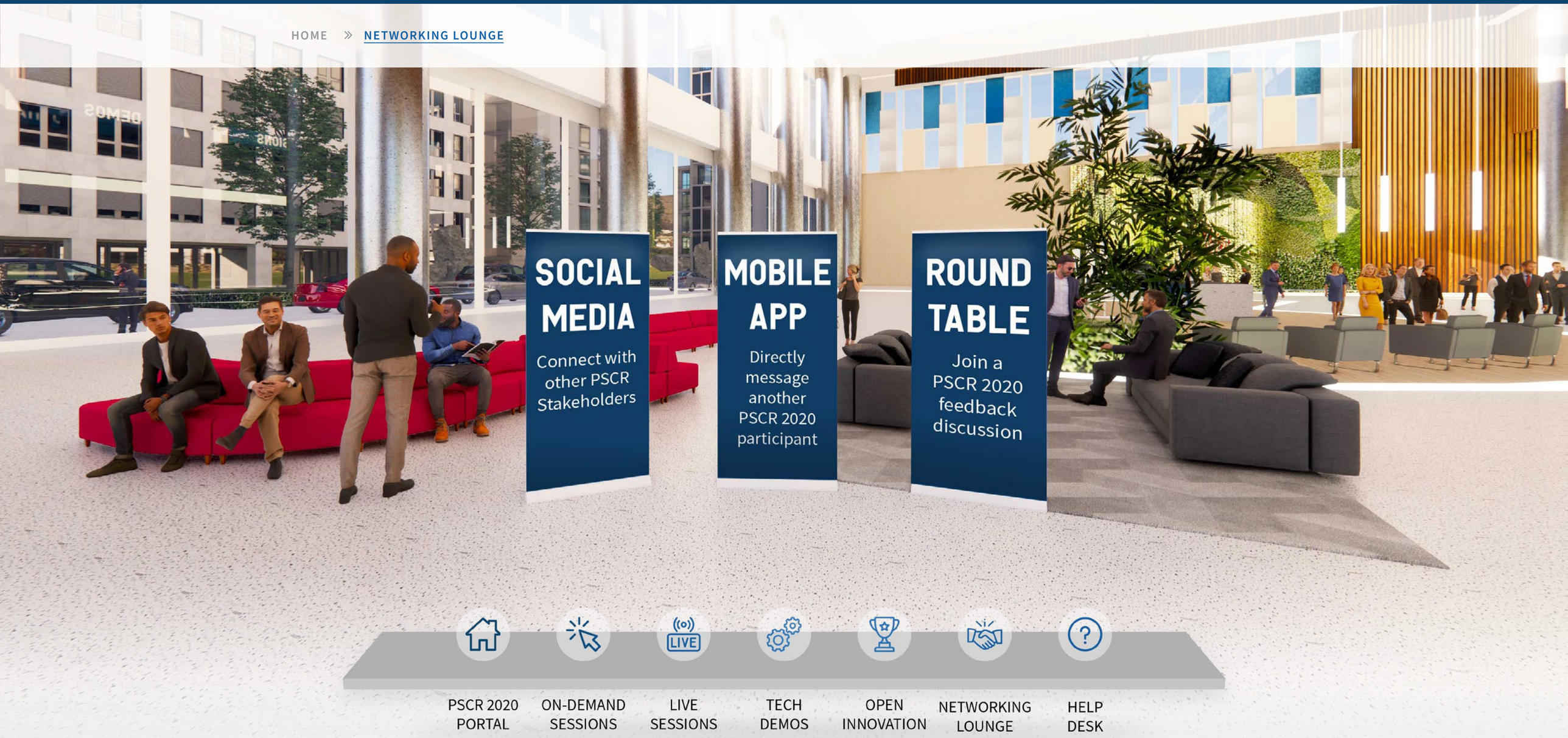
CONTEST 010
Organizing Chaos: Calming Catastrophe by Tracking Patient Triage

LEGEND
- Excellent
- Superior
- Very Good
- Good
- Seed Recipient

Bio1 Systems' PhysioCap	CritSit Care	Modern Triage Management by QuantaSTAT	NaT: SALT (Na) Triage (T) Intelligent Assistant	vTriage
VIEW DEMO	VIEW DEMO	VIEW DEMO	VIEW DEMO	VIEW DEMO
		VIEW SESSION	VIEW SESSION	

PUBLIC SAFETY COMMUNICATIONS RESEARCH
PSCR

PSCR 2020: THE DIGITAL EXPERIENCE



PSCR 2020 PORTAL
ON-DEMAND SESSIONS
LIVE SESSIONS
TECH DEMOS
OPEN INNOVATION
NETWORKING LOUNGE
HELP DESK

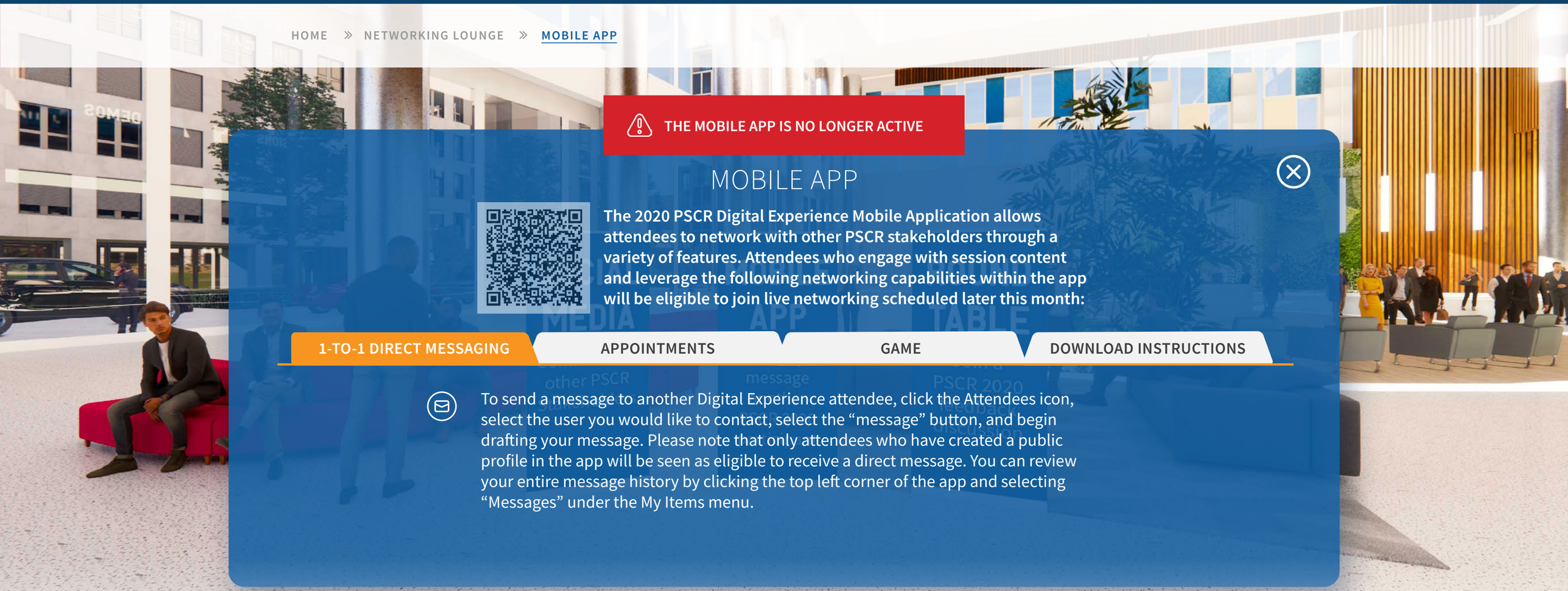
TWITTER TRIVIA HAS ALREADY OCCURRED.
FOLLOW @NISTPUBLICSAFET FOR PROGRAM UPDATES AND HIGHLIGHTS.

SOCIAL MEDIA

» FOLLOW **@NISTPUBLICSAFET** ON TWITTER FOR LIVE UPDATES THROUGHOUT PSCR 2020

#PSCR2020

From July 28-30, tune in on Twitter for PSCR 2020 Trivia to test your public safety communications technology knowledge or simply follow along to learn trivia facts about PSCR. Join the conversation at any time by using the #PSCR2020 hashtag on Twitter!



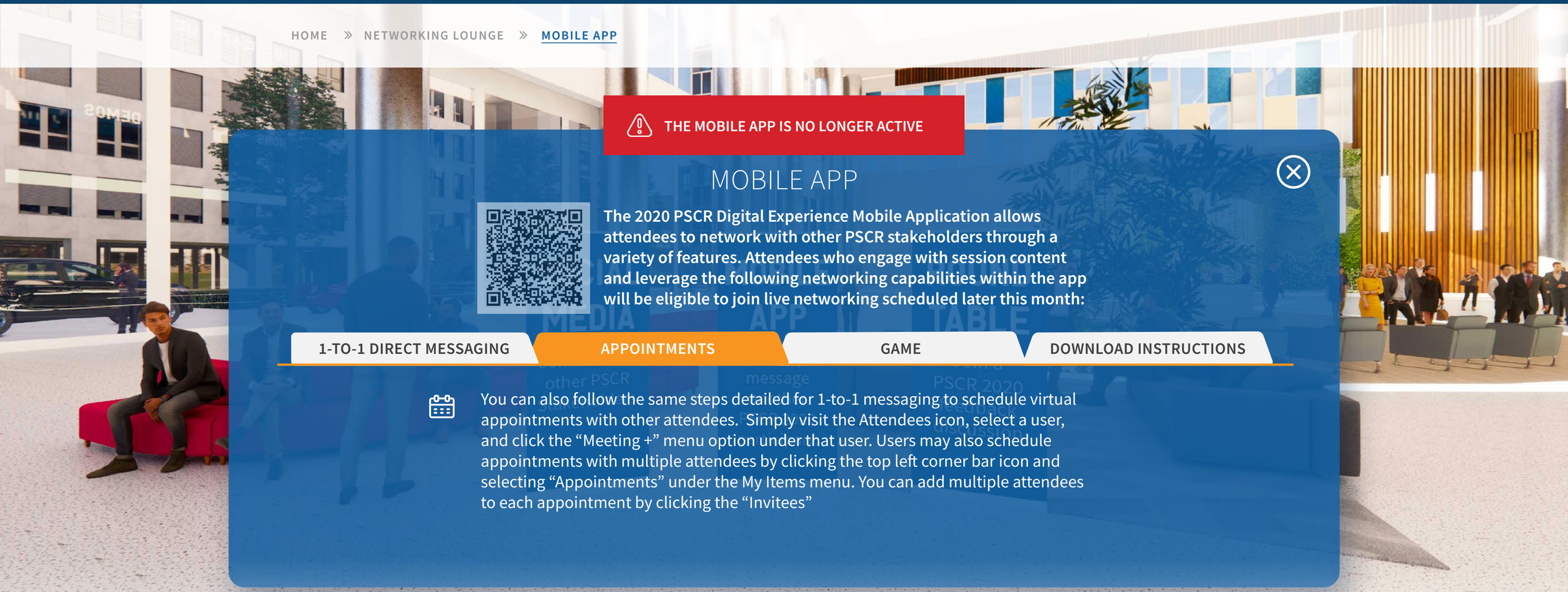
THE MOBILE APP IS NO LONGER ACTIVE

MOBILE APP

The 2020 PSCR Digital Experience Mobile Application allows attendees to network with other PSCR stakeholders through a variety of features. Attendees who engage with session content and leverage the following networking capabilities within the app will be eligible to join live networking scheduled later this month:

1-TO-1 DIRECT MESSAGING | APPOINTMENTS | GAME | DOWNLOAD INSTRUCTIONS

To send a message to another Digital Experience attendee, click the Attendees icon, select the user you would like to contact, select the “message” button, and begin drafting your message. Please note that only attendees who have created a public profile in the app will be seen as eligible to receive a direct message. You can review your entire message history by clicking the top left corner of the app and selecting “Messages” under the My Items menu.



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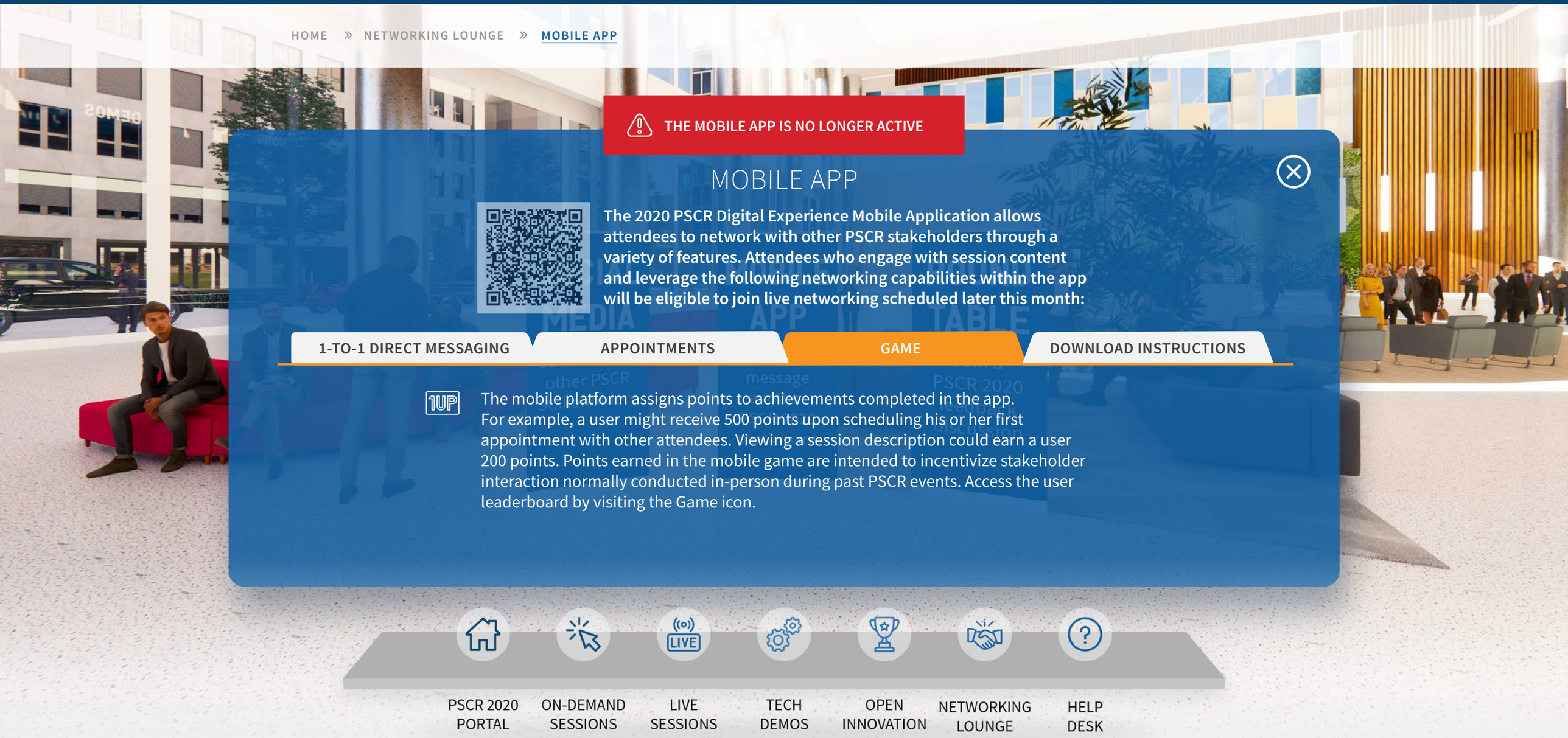
You can also follow the same steps detailed for 1-to-1 messaging to schedule virtual appointments with other attendees. Simply visit the Attendees icon, select a user, and click the “Meeting +” menu option under that user. Users may also schedule appointments with multiple attendees by clicking the top left corner bar icon and selecting “Appointments” under the My Items menu. You can add multiple attendees to each appointment by clicking the “Invitees”



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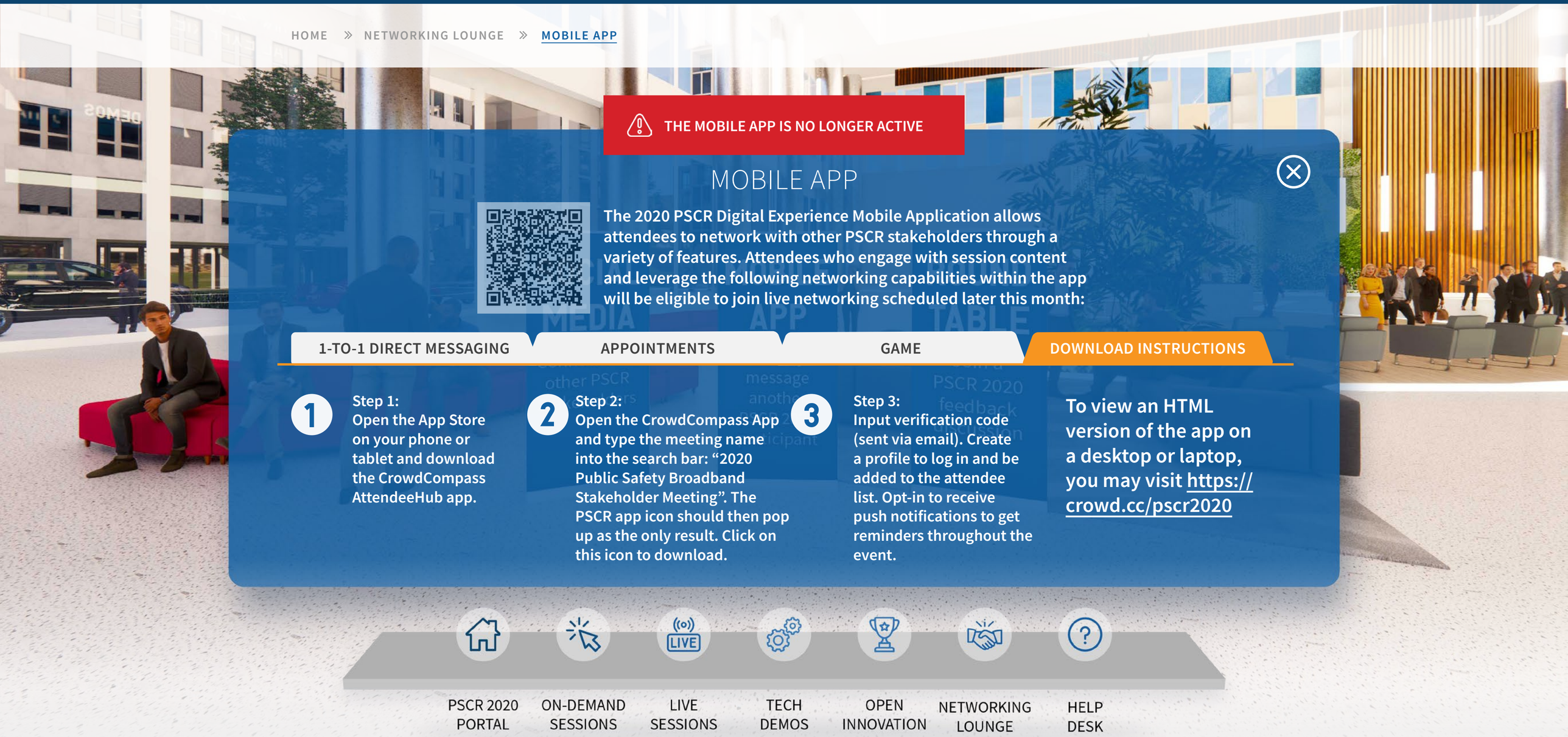
1UP

The mobile platform assigns points to achievements completed in the app. For example, a user might receive 500 points upon scheduling his or her first appointment with other attendees. Viewing a session description could earn a user 200 points. Points earned in the mobile game are intended to incentivize stakeholder interaction normally conducted in-person during past PSCR events. Access the user leaderboard by visiting the Game icon.



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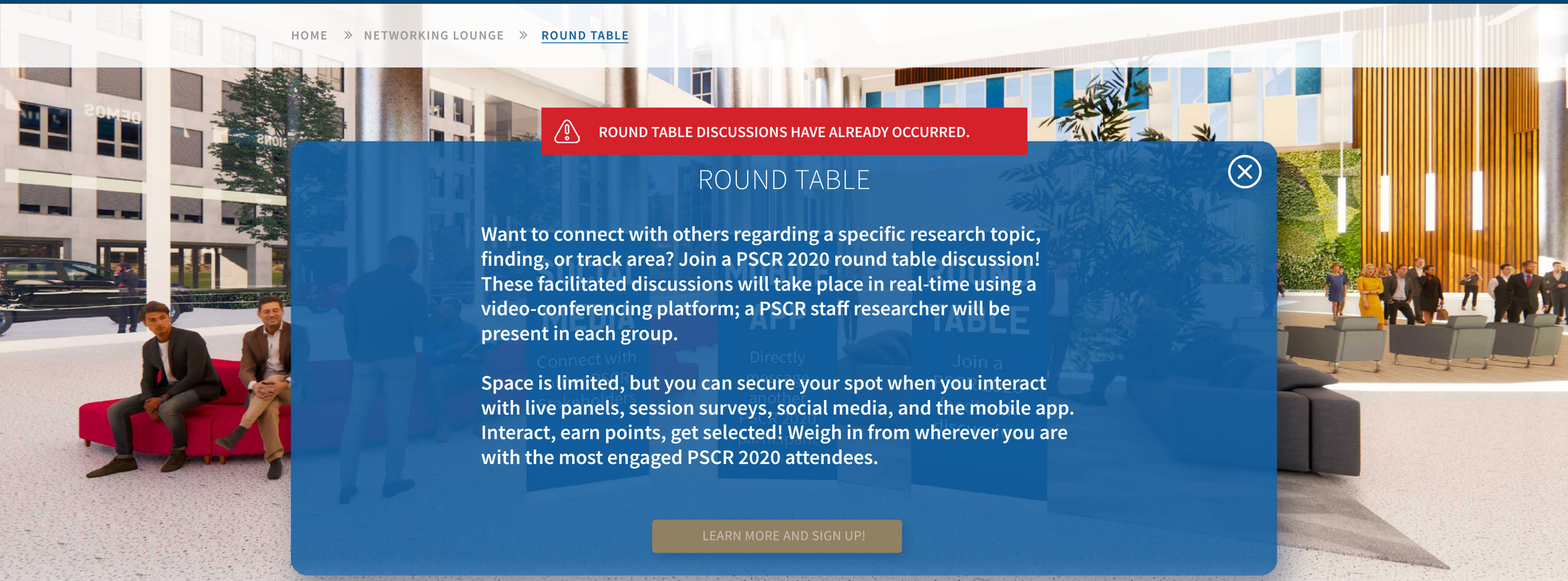


ROUND TABLE DISCUSSIONS HAVE ALREADY OCCURRED.

ROUND TABLE

Want to connect with others regarding a specific research topic, finding, or track area? Join a PSCR 2020 round table discussion! These facilitated discussions will take place in real-time using a video-conferencing platform; a PSCR staff researcher will be present in each group.

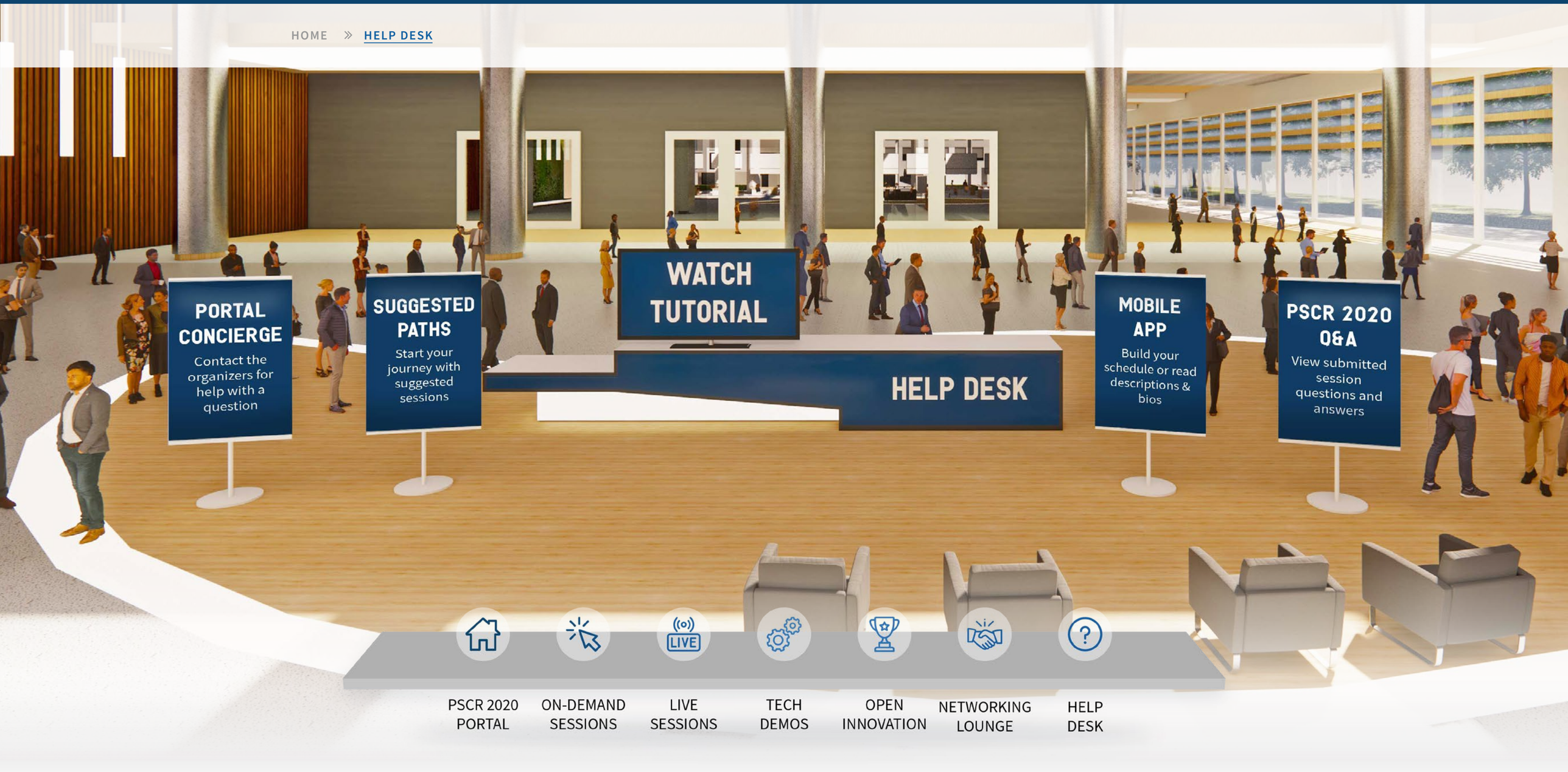
Space is limited, but you can secure your spot when you interact with live panels, session surveys, social media, and the mobile app. Interact, earn points, get selected! Weigh in from wherever you are with the most engaged PSCR 2020 attendees.

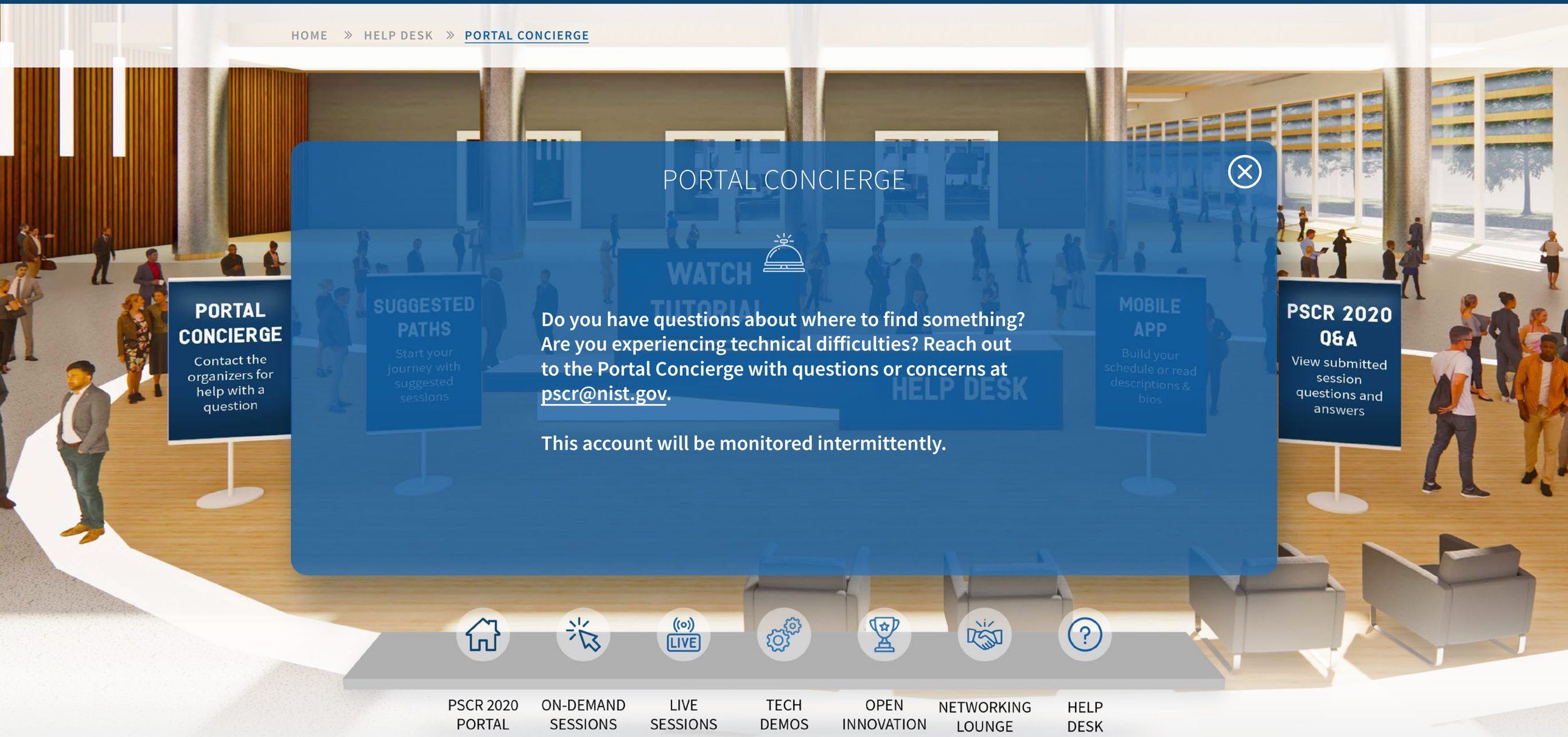
LEARN MORE AND SIGN UP!

PUBLIC SAFETY COMMUNICATIONS RESEARCH
PSCR

PSCR 2020: THE DIGITAL EXPERIENCE

HOME » HELP DESK

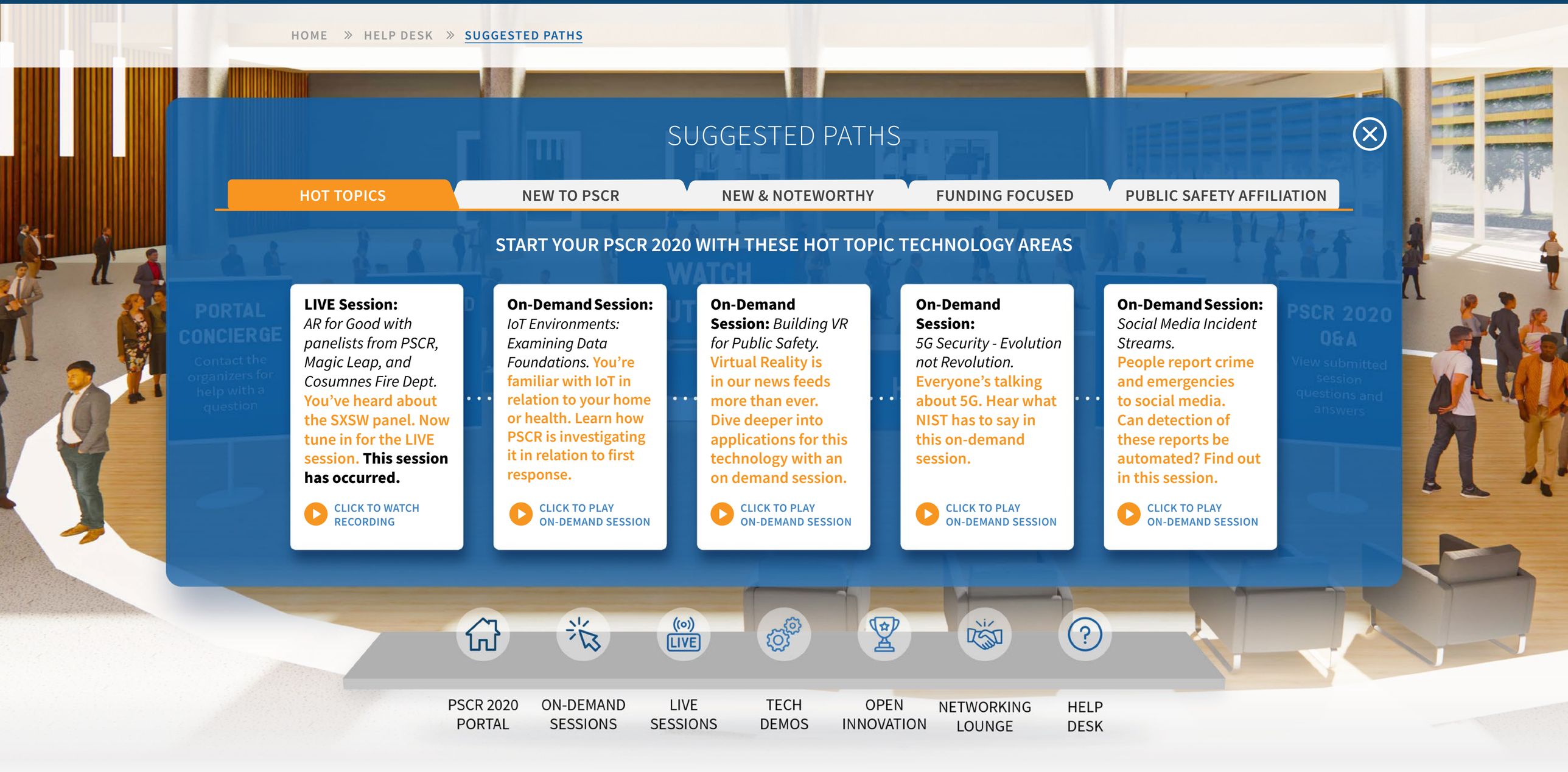




PORTAL CONCIERGE

Do you have questions about where to find something? Are you experiencing technical difficulties? Reach out to the Portal Concierge with questions or concerns at pscr@nist.gov.

This account will be monitored intermittently.



SUGGESTED PATHS

HOT TOPICS | NEW TO PSCR | NEW & NOTEWORTHY | FUNDING FOCUSED | PUBLIC SAFETY AFFILIATION

START YOUR PSCR 2020 WITH THESE HOT TOPIC TECHNOLOGY AREAS

LIVE Session: *AR for Good with panelists from PSCR, Magic Leap, and Cosumnes Fire Dept.* You've heard about the SXSW panel. Now tune in for the LIVE session. **This session has occurred.**

CLICK TO WATCH RECORDING

On-Demand Session: *IoT Environments: Examining Data Foundations.* You're familiar with IoT in relation to your home or health. Learn how PSCR is investigating it in relation to first response.

CLICK TO PLAY ON-DEMAND SESSION

On-Demand Session: *Building VR for Public Safety.* Virtual Reality is in our news feeds more than ever. Dive deeper into applications for this technology with an on demand session.

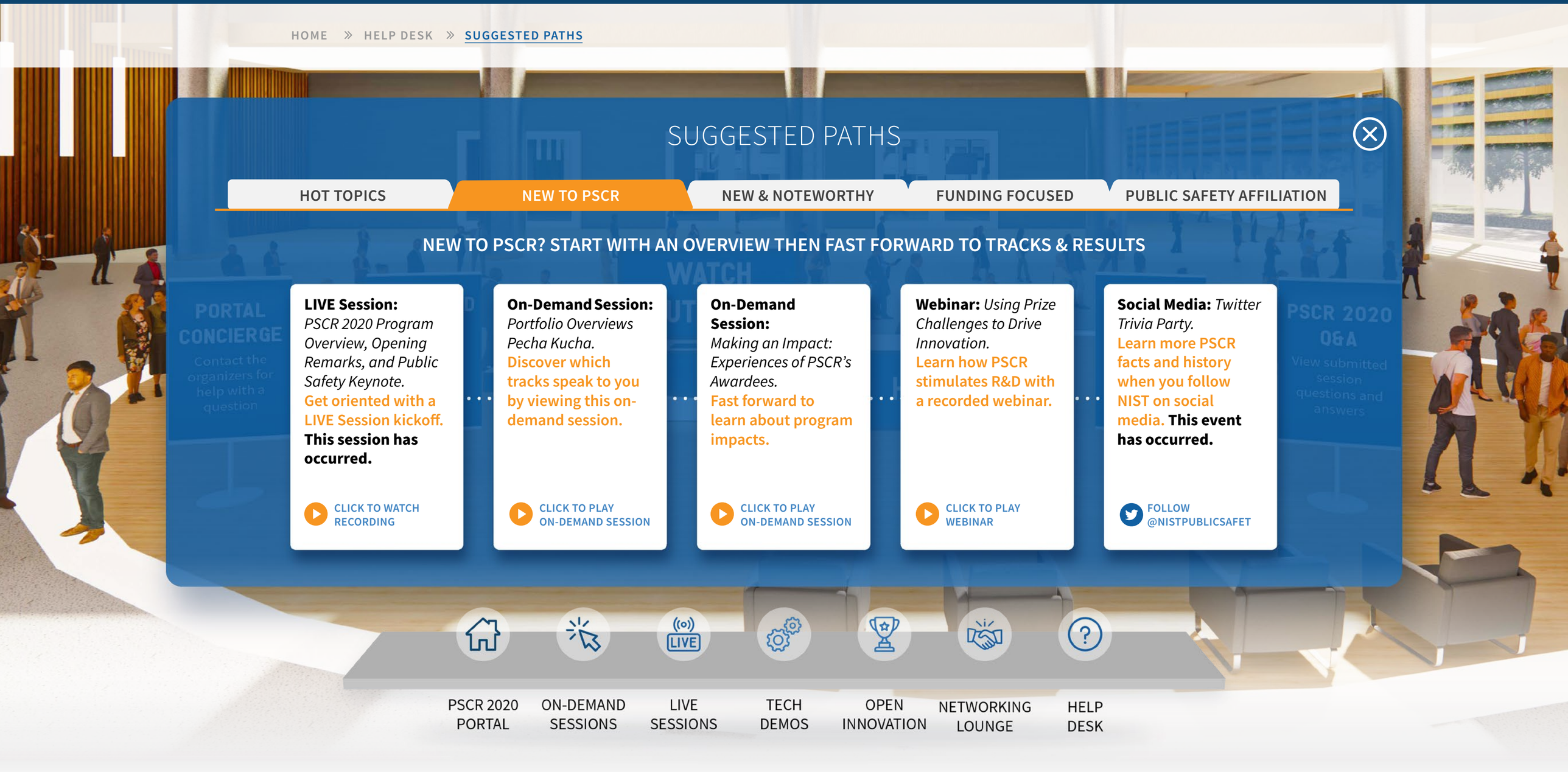
CLICK TO PLAY ON-DEMAND SESSION

On-Demand Session: *5G Security - Evolution not Revolution.* Everyone's talking about 5G. Hear what NIST has to say in this on-demand session.

CLICK TO PLAY ON-DEMAND SESSION

On-Demand Session: *Social Media Incident Streams.* People report crime and emergencies to social media. Can detection of these reports be automated? Find out in this session.

CLICK TO PLAY ON-DEMAND SESSION



SUGGESTED PATHS

HOT TOPICS | NEW TO PSCR | NEW & NOTEWORTHY | FUNDING FOCUSED | PUBLIC SAFETY AFFILIATION

NEW TO PSCR? START WITH AN OVERVIEW THEN FAST FORWARD TO TRACKS & RESULTS

LIVE Session: *PSCR 2020 Program Overview, Opening Remarks, and Public Safety Keynote.* Get oriented with a LIVE Session kickoff. **This session has occurred.**

CLICK TO WATCH RECORDING

On-Demand Session: *Portfolio Overviews Pecha Kucha.* Discover which tracks speak to you by viewing this on-demand session.

CLICK TO PLAY ON-DEMAND SESSION

On-Demand Session: *Making an Impact: Experiences of PSCR's Awardees.* Fast forward to learn about program impacts.

CLICK TO PLAY ON-DEMAND SESSION

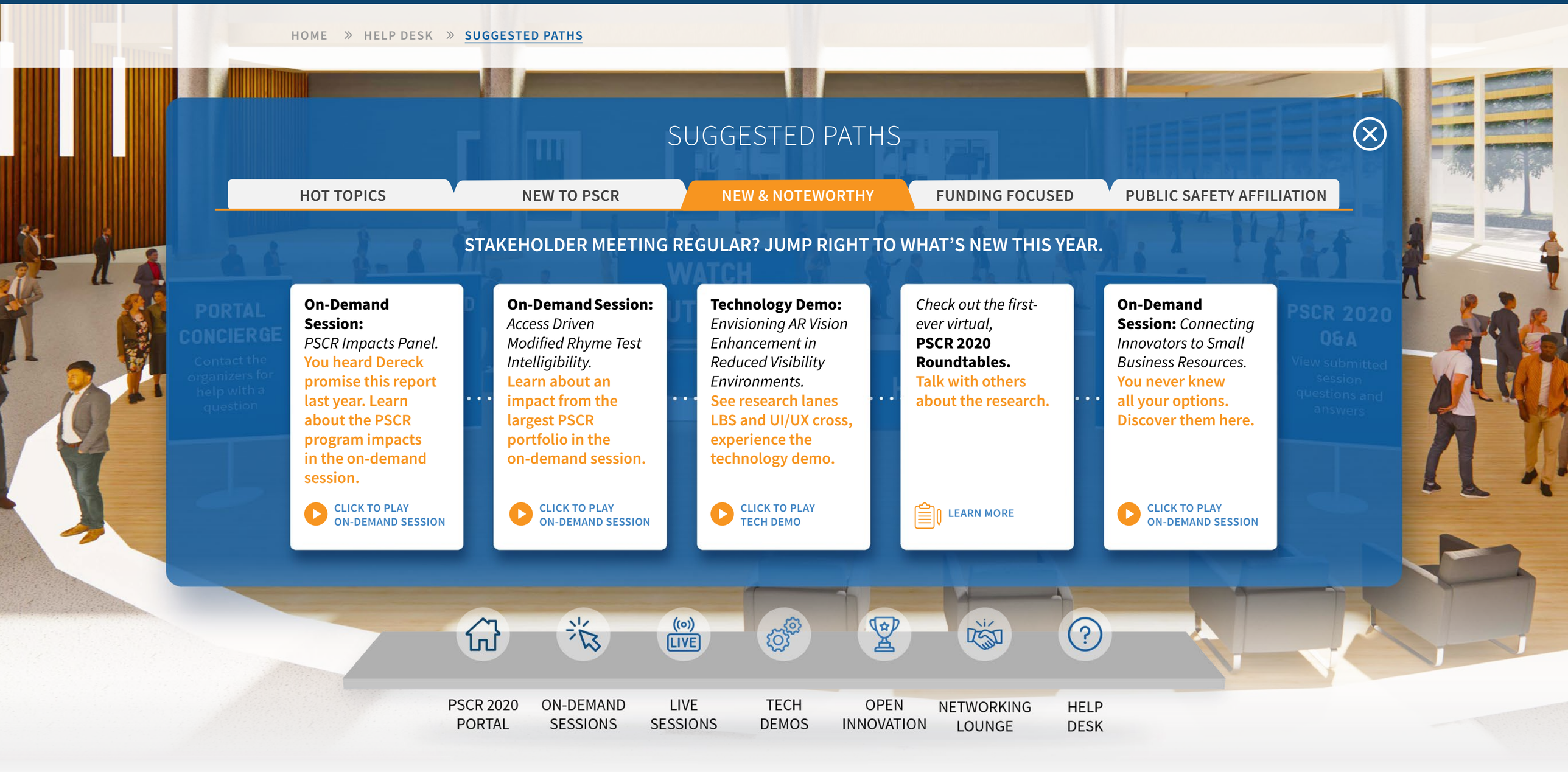
Webinar: *Using Prize Challenges to Drive Innovation.* Learn how PSCR stimulates R&D with a recorded webinar.

CLICK TO PLAY WEBINAR

Social Media: *Twitter Trivia Party.* Learn more PSCR facts and history when you follow NIST on social media. **This event has occurred.**

FOLLOW @NISTPUBLICSAFET

PSCR 2020 PORTAL | ON-DEMAND SESSIONS | LIVE SESSIONS | TECH DEMOS | OPEN INNOVATION | NETWORKING LOUNGE | HELP DESK



SUGGESTED PATHS

HOT TOPICS | NEW TO PSCR | NEW & NOTEWORTHY | FUNDING FOCUSED | PUBLIC SAFETY AFFILIATION

STAKEHOLDER MEETING REGULAR? JUMP RIGHT TO WHAT'S NEW THIS YEAR.

On-Demand Session: *PSCR Impacts Panel.* You heard Dereck promise this report last year. Learn about the PSCR program impacts in the on-demand session.

CLICK TO PLAY ON-DEMAND SESSION

On-Demand Session: *Access Driven Modified Rhyme Test Intelligibility.* Learn about an impact from the largest PSCR portfolio in the on-demand session.

CLICK TO PLAY ON-DEMAND SESSION

Technology Demo: *Envisioning AR Vision Enhancement in Reduced Visibility Environments.* See research lanes LBS and UI/UX cross, experience the technology demo.

CLICK TO PLAY TECH DEMO

Check out the first-ever virtual, **PSCR 2020 Roundtables.** Talk with others about the research.

LEARN MORE

On-Demand Session: *Connecting Innovators to Small Business Resources.* You never knew all your options. Discover them here.

CLICK TO PLAY ON-DEMAND SESSION

PSCR 2020 PORTAL | ON-DEMAND SESSIONS | LIVE SESSIONS | TECH DEMOS | OPEN INNOVATION | NETWORKING LOUNGE | HELP DESK

SUGGESTED PATHS

HOT TOPICS | NEW TO PSCR | NEW & NOTEWORTHY | **FUNDING FOCUSED** | PUBLIC SAFETY AFFILIATION

LOOKING TO GET INVOLVED? START WITH THESE FUNDING-FOCUSED SESSIONS. THEY MIGHT JUST LEAD TO YOUR NEXT ENDEAVOR.

LIVE Session: *What We Learned from Participating in a PSCR Prize Challenge - Haptic Interfaces.* Hear the results from the challenge you influenced in 2019. **This session has occurred.**

CLICK TO WATCH RECORDING

On-Demand Session: *Automated Stream Analytics for Public Safety (ASAPS).* Catch up and jump in on this multi-million dollar challenge.

CLICK TO PLAY ON-DEMAND SESSION

Watch **On-Demand Session:** *First Responders and Drones* Get ready for round two.

CLICK TO PLAY ON-DEMAND SESSION

Message PSCR 2020 participant using the **mobile app!** Meet a potential partner or simply connect with someone new. **The mobile app is no longer active.**

DOWNLOAD MOBILE APP

On-Demand Session: *PSCR's Follow-On Funding Opportunity.* Been there, done that? Consider what's next.

CLICK TO PLAY ON-DEMAND SESSION

SUGGESTED PATHS

HOT TOPICS | NEW TO PSCR | NEW & NOTEWORTHY | FUNDING FOCUSED | PUBLIC SAFETY AFFILIATION

ARE YOU PUBLIC SAFETY PERSONNEL? WE THINK THIS CONTENT WILL PIQUE YOUR INTEREST. THANK YOU FOR ALL YOU DO.

On-Demand Session: *7000+ First Responders Have More To Say - Nationwide Usability Survey Results at your Fingertips.*
You took the survey; now, hear the results!

CLICK TO PLAY ON-DEMAND SESSION

On-Demand Session: *Immersive Ballistic Simulation in Virtual Reality Officers.*
See our efforts to match your realistic experience.

CLICK TO PLAY ON-DEMAND SESSION

Technology Demos *from the Tech to Protect Winning Solutions.*
See them here now, maybe later in stores near you.

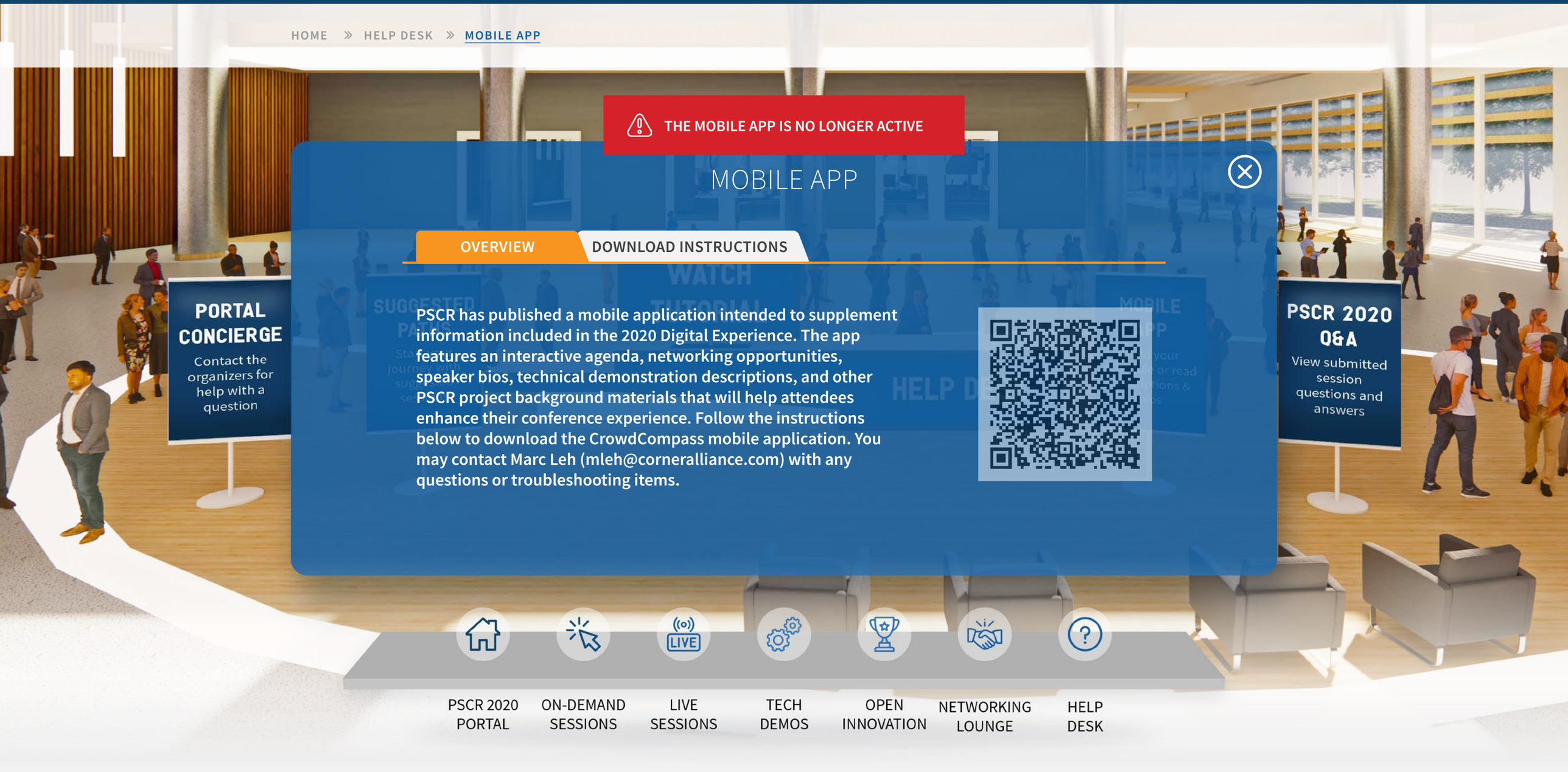
CLICK TO EXPLORE TECH DEMOS

On-Demand Session: *Mobile Fingerprint Capture for Public Safety.*
ATTN: First Responders: Hear from your own about their experience.

CLICK TO PLAY ON-DEMAND SESSION

PSCR 2020 Mobile App.
Connect with public safety around the world, message the researchers dedicated to your mission. **The mobile app is no longer active.**

DOWNLOAD MOBILE APP



THE MOBILE APP IS NO LONGER ACTIVE

MOBILE APP

OVERVIEW | DOWNLOAD INSTRUCTIONS

PSCR has published a mobile application intended to supplement information included in the 2020 Digital Experience. The app features an interactive agenda, networking opportunities, speaker bios, technical demonstration descriptions, and other PSCR project background materials that will help attendees enhance their conference experience. Follow the instructions below to download the CrowdCompass mobile application. You may contact Marc Leh (mleh@corneralliance.com) with any questions or troubleshooting items.

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MOBILE APP

OVERVIEW | DOWNLOAD INSTRUCTIONS

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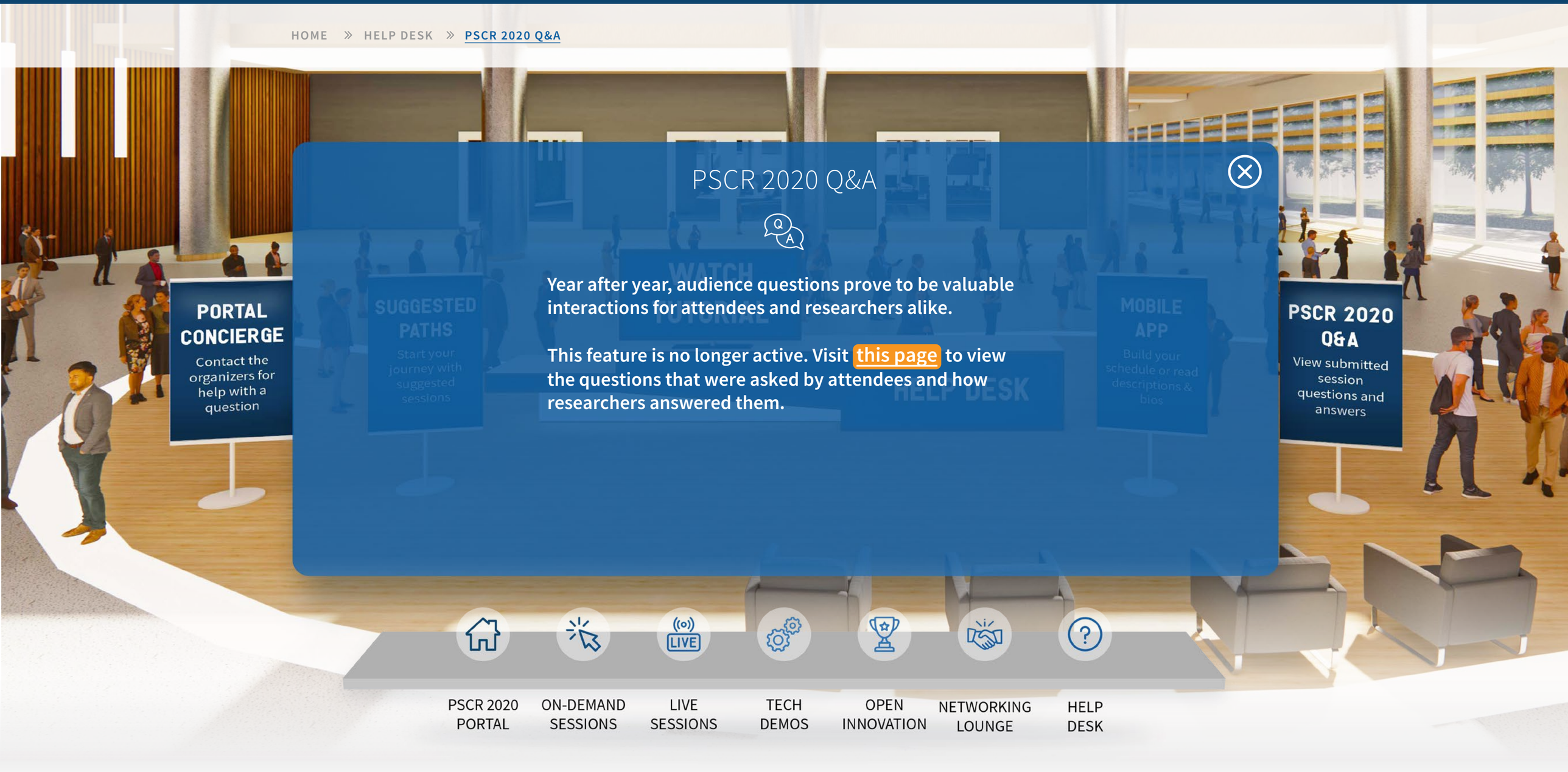

PSCR 2020 Q&A

Year after year, audience questions prove to be valuable interactions for attendees and researchers alike.

This feature is no longer active. Visit this page to view the questions that were asked by attendees and how researchers answered them.