PSCR Portfolio Overviews

Presented in Pecha Kucha

NIST

#PSCR2020

PSCR

2019 Portfolio Overviews

Pecha Kucha Presentations


OVER 75 PROJECTS

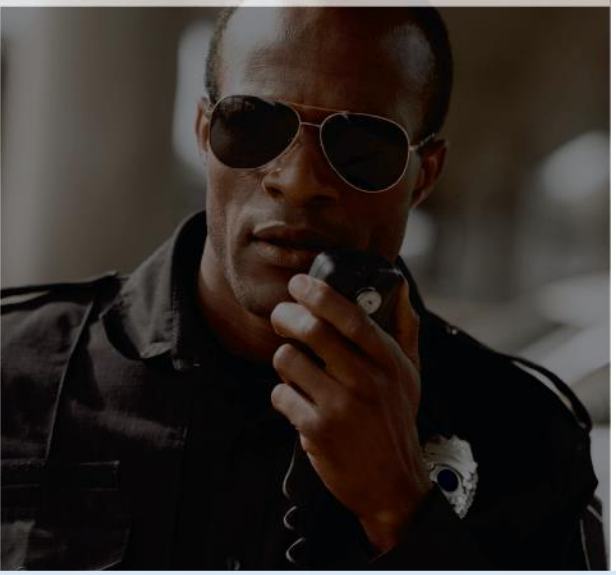
5 KEY RESEARCH AREAS

USER INTERFACE USER EXPERIENCE

LOCATION-BASED SERVICES

SECURITY

LMR to LTE



MISSION CRITICAL VOICE

PUBLIC SAFETY ANALYTICS

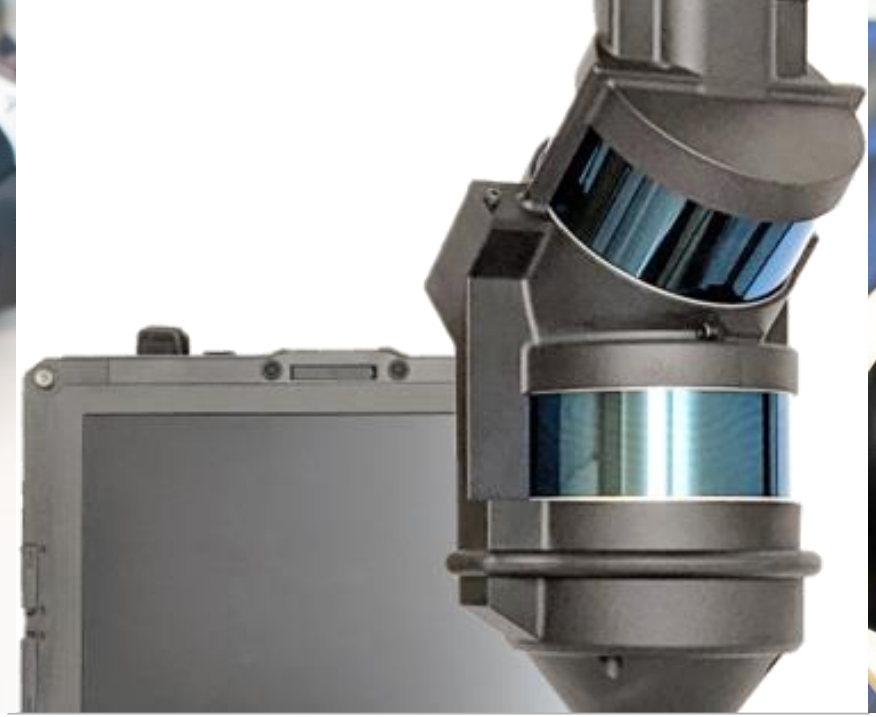
RESILIENT SYSTEMS

CROSS CUTTING RESEARCH AREAS

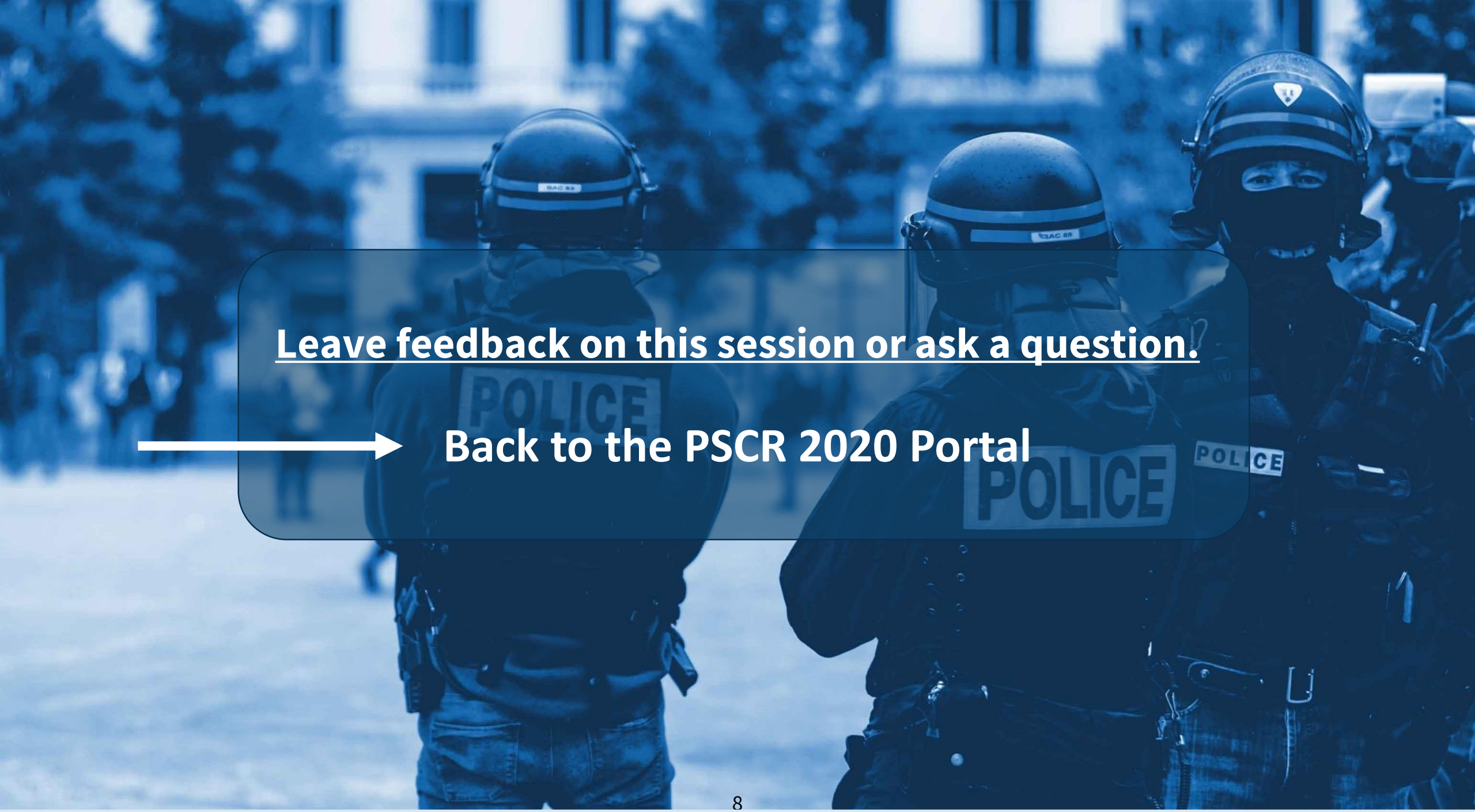
20 X 20


HOUR
3558
SMITHS
M.A.
MADE IN ENGLAN
10
20
30
40
50
60
0
HRONOMETR
S.480/1/


ANG
SUBTI

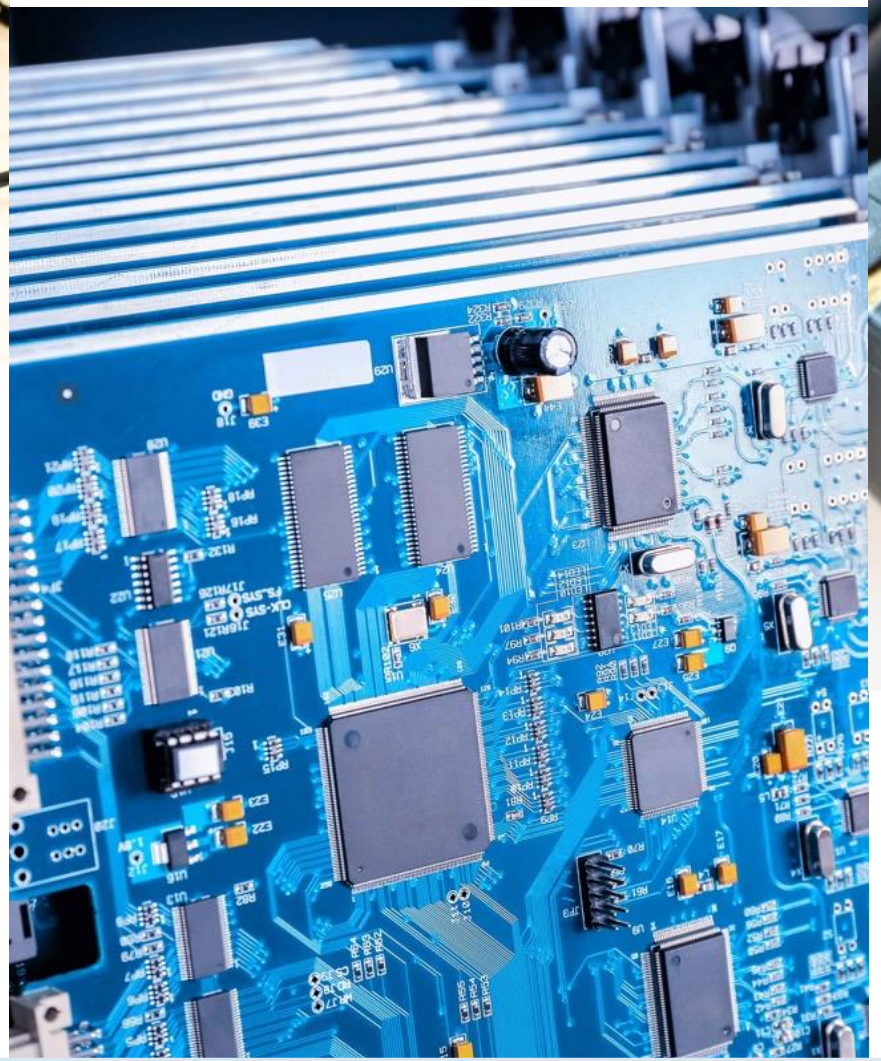


Linked Content



Leave feedback on this session or ask a question.

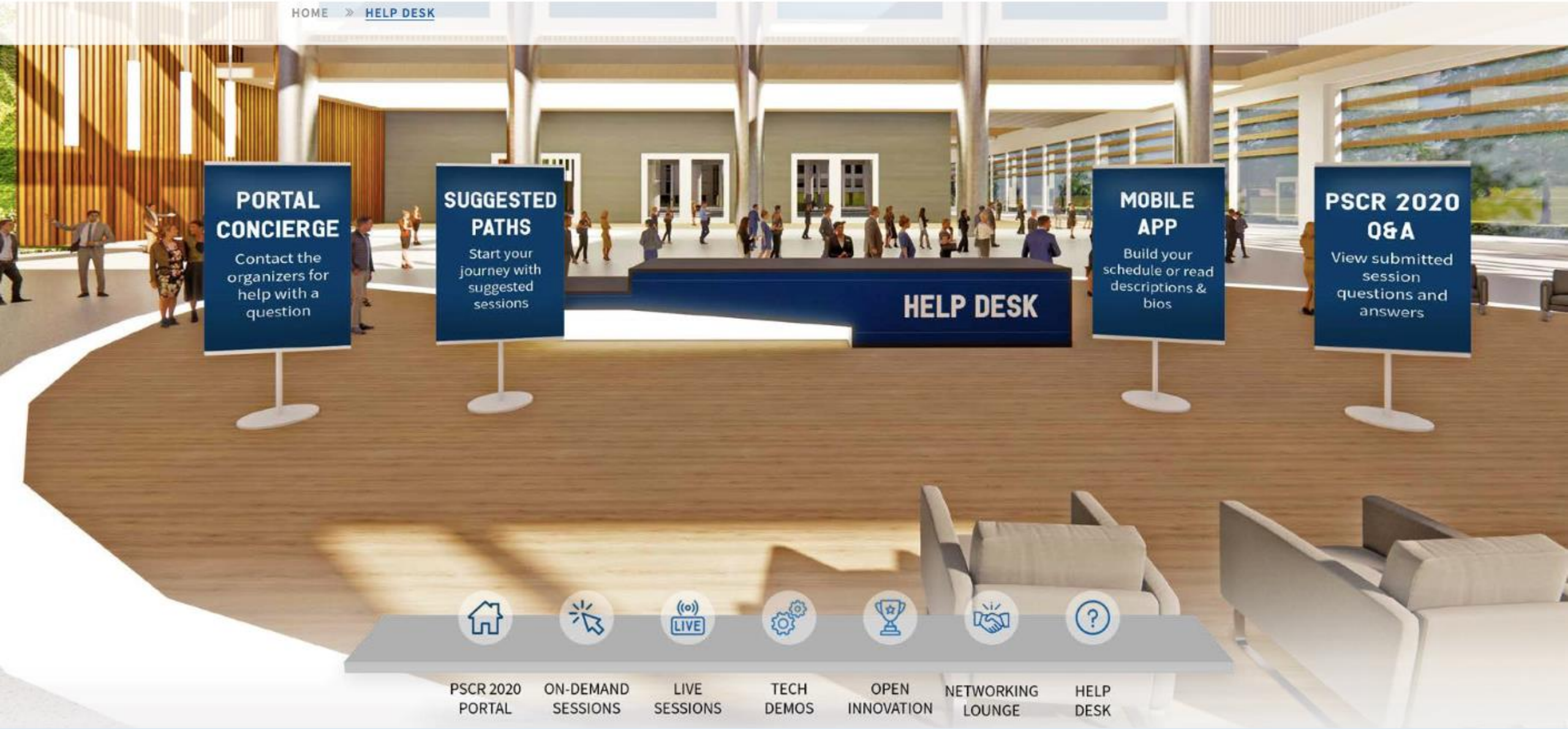
→ **Back to the PSCR 2020 Portal**



This work matters.

PUBLIC SAFETY COMMUNICATIONS RESEARCH
PSCR

PSCR 2020: THE DIGITAL EXPERIENCE



- Personalized Meeting Schedule
- Demo & Experiment Descriptions
- Event Announcements
- Session Handouts
- Speaker Information
- Attendee Messaging
- Social Media Integration

Source: 2016 Seattle Fire Calendar

What happened in the PSCR portfolios in 2020?

#PSCR2020

NIST

PSCR

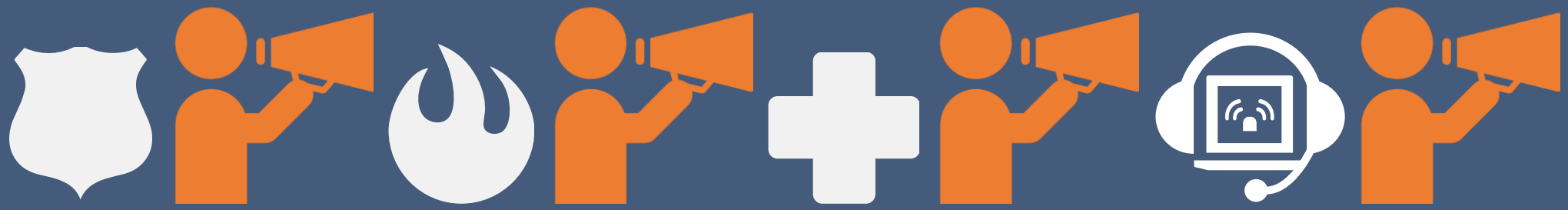
UI/UX

Portfolio Overview

NIST

#PSCR2020

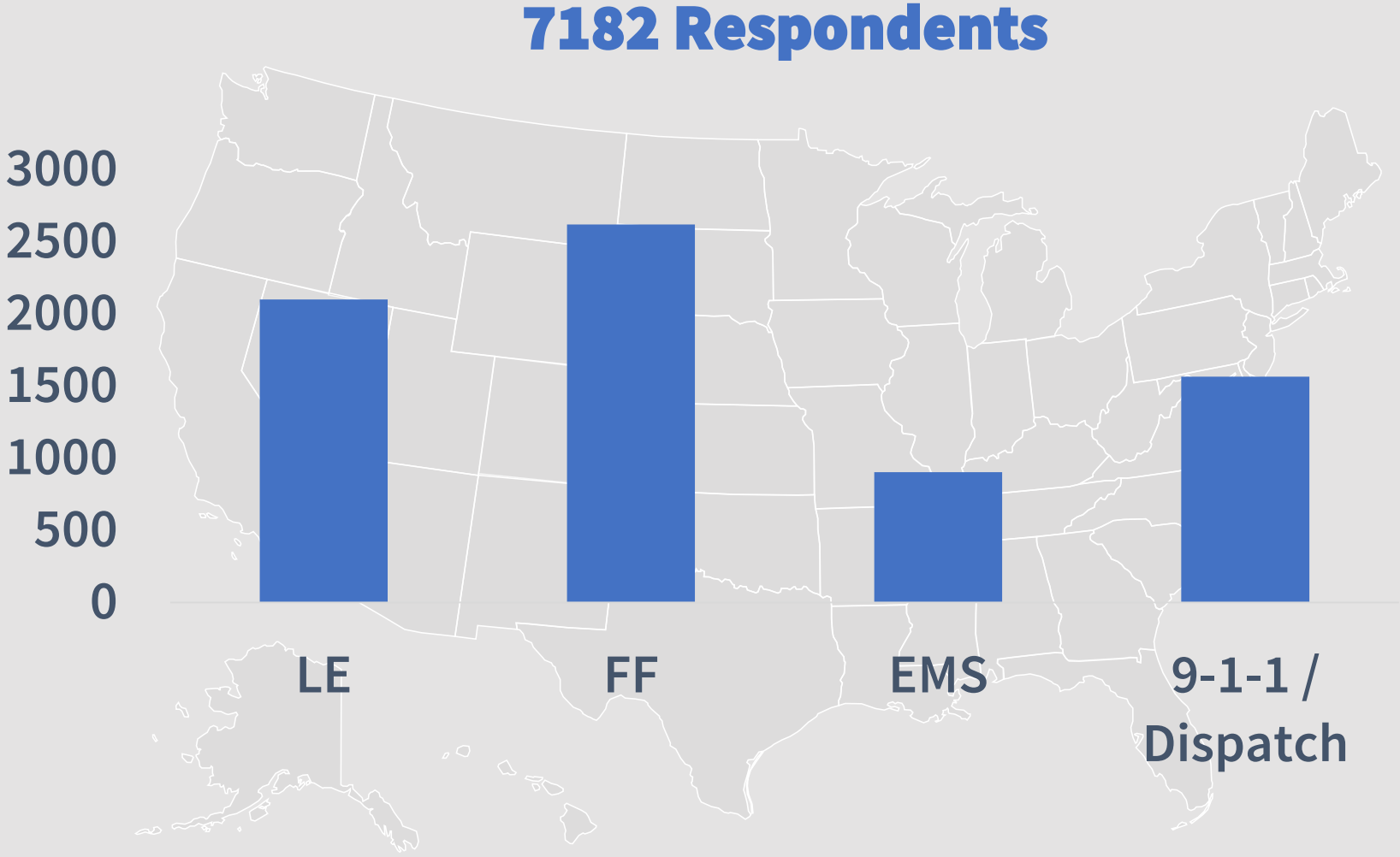
PSCR



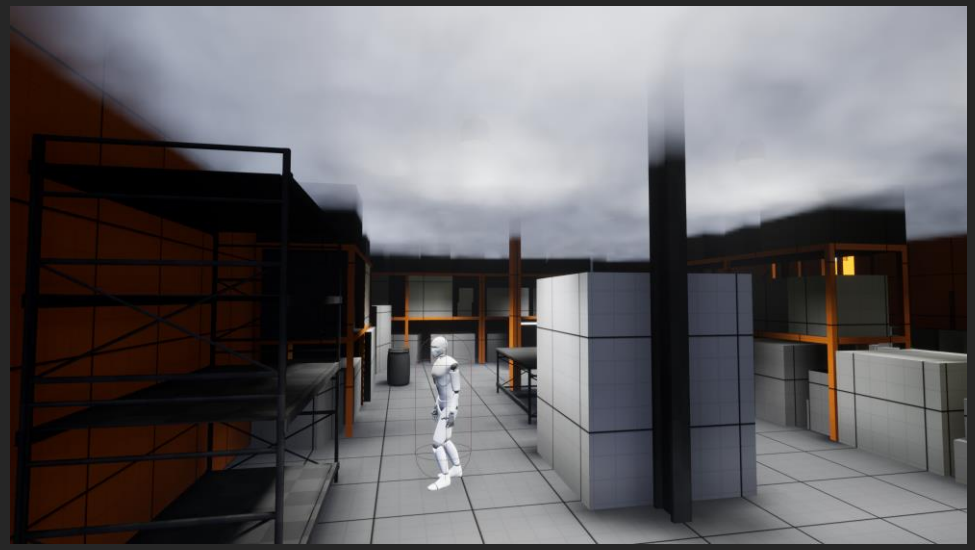
Voices of First Responders

NIST PSCR Usability Team

Nationwide First Responder Survey




FAB3414




Call Origin
AED
Entry Poi

2019 – Haptic Interfaces for Public Safety


WEST METRO
FIRE RESCUE
TRAINING
WEST METRO
FIRE
RESCUE


S.HARMS

CHARIoT CHALLENGE

Advancing First Responder Communications

HOSTED BY NIST

PSCR PUBLIC SAFETY COMMUNICATIONS RESEARCH

$1,100,000

IN

TOTAL PRIZES

Build Augmented Reality Interfaces for First Responders

Emulate Smart City Data for Disaster Scenarios

CHALLENGE PARTNERS:

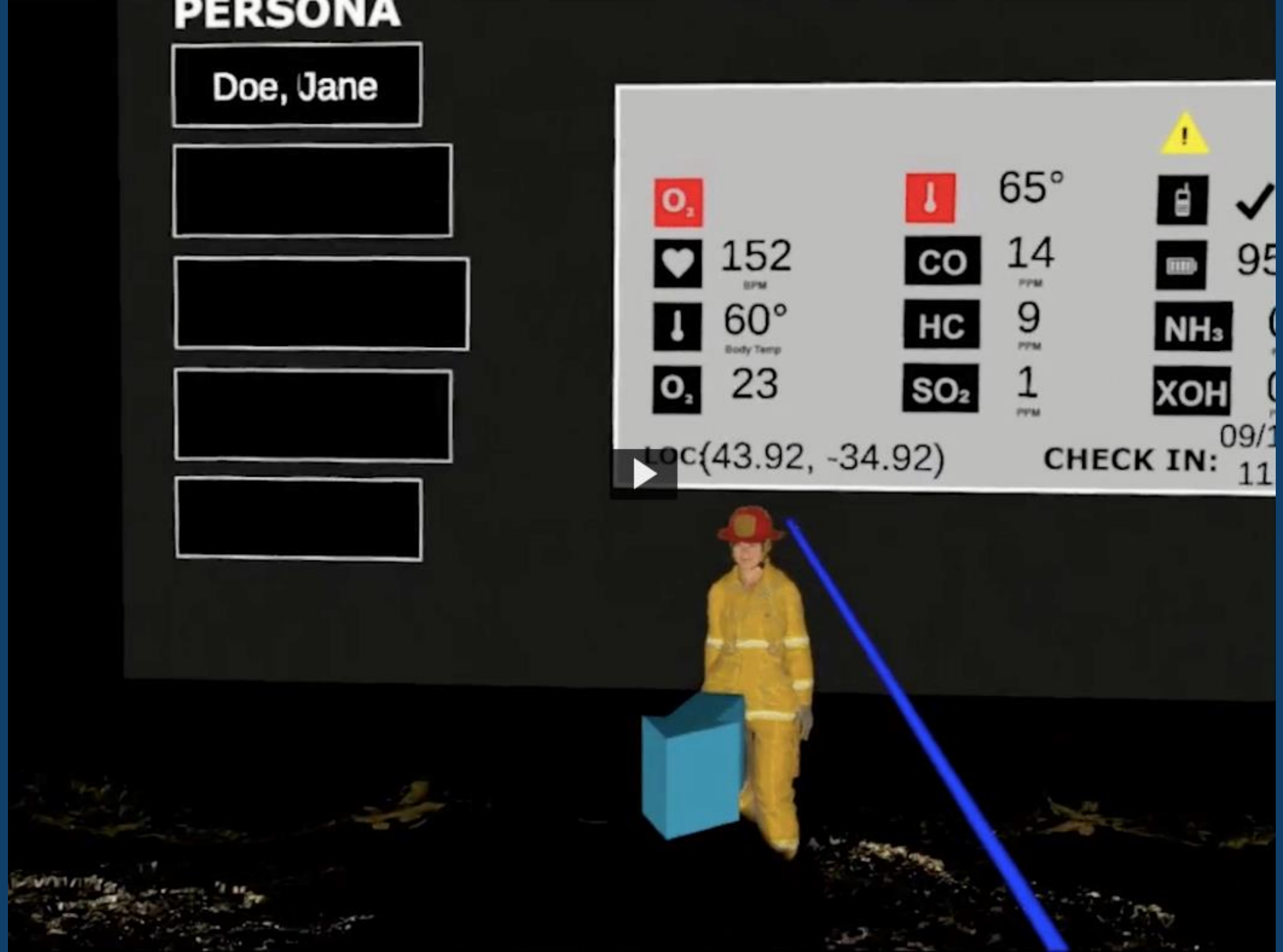
magic leap

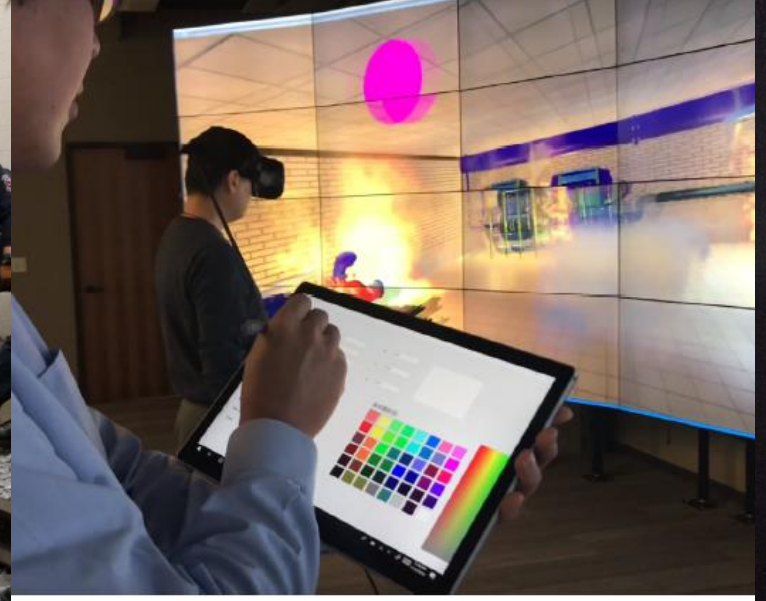
First Responder Network Authority®

FIRSTNET® Built with AT&T

MSA The Safety Company

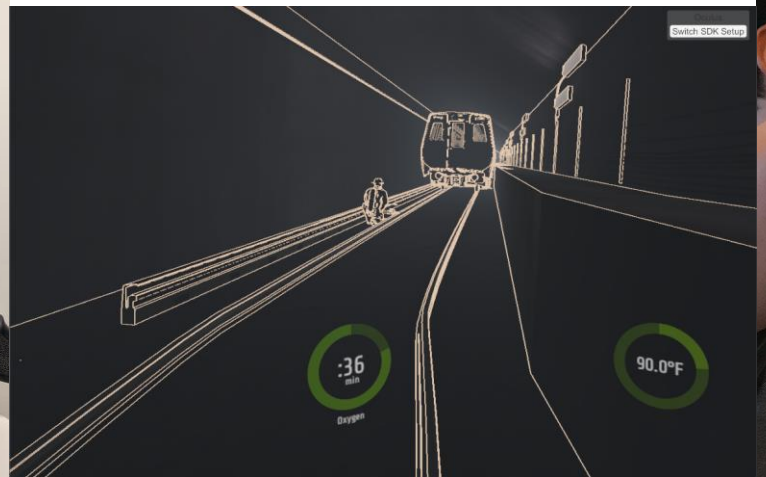
blueforce DEVELOPMENT


PERSONA
Doe, Jane
65°
152
14
60°
9
23
1
Loc:(43.92, -34.92)
CHECK IN:

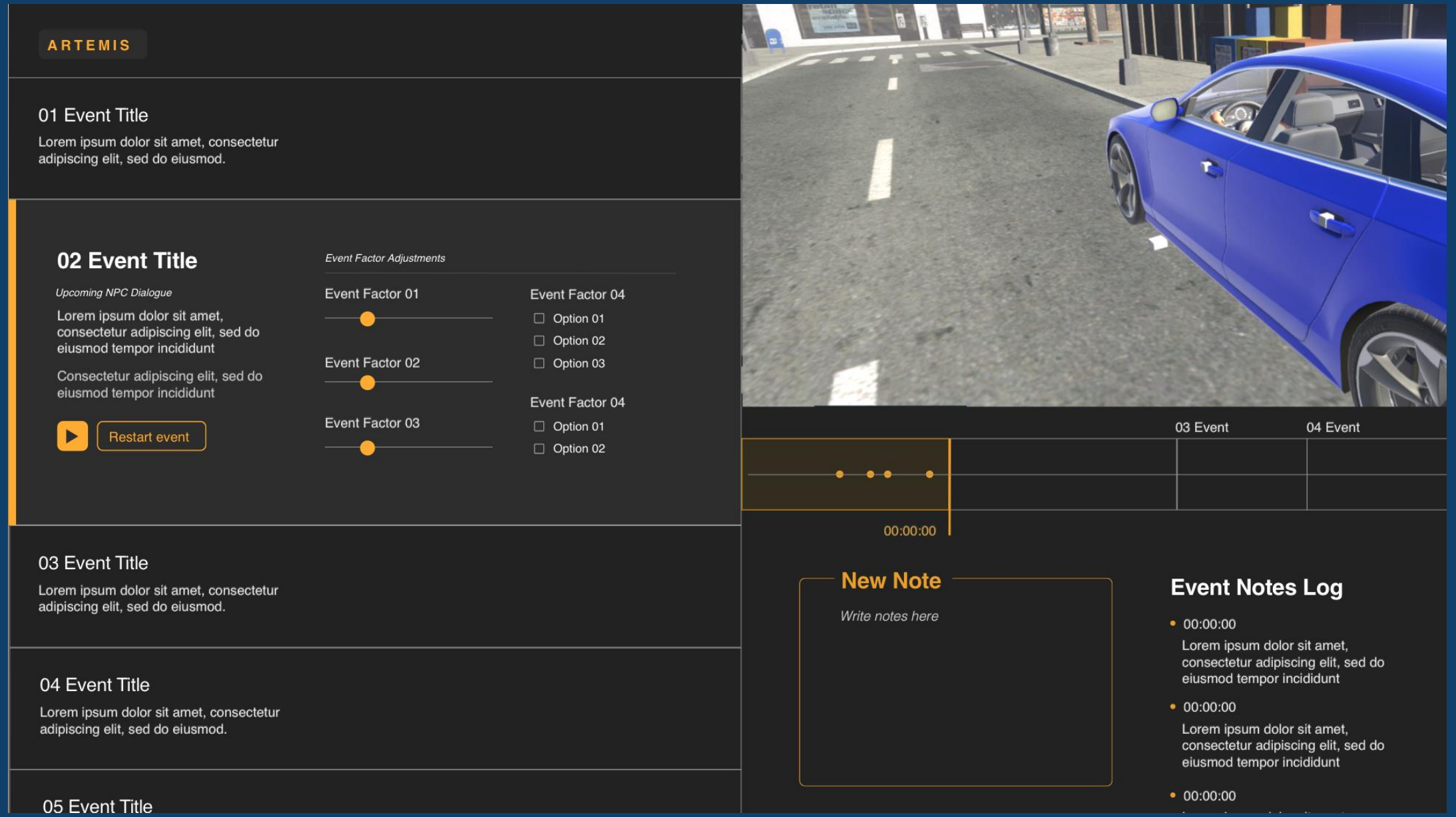


ENHANCED
USER INTERFACE
USER EXPERIENCE

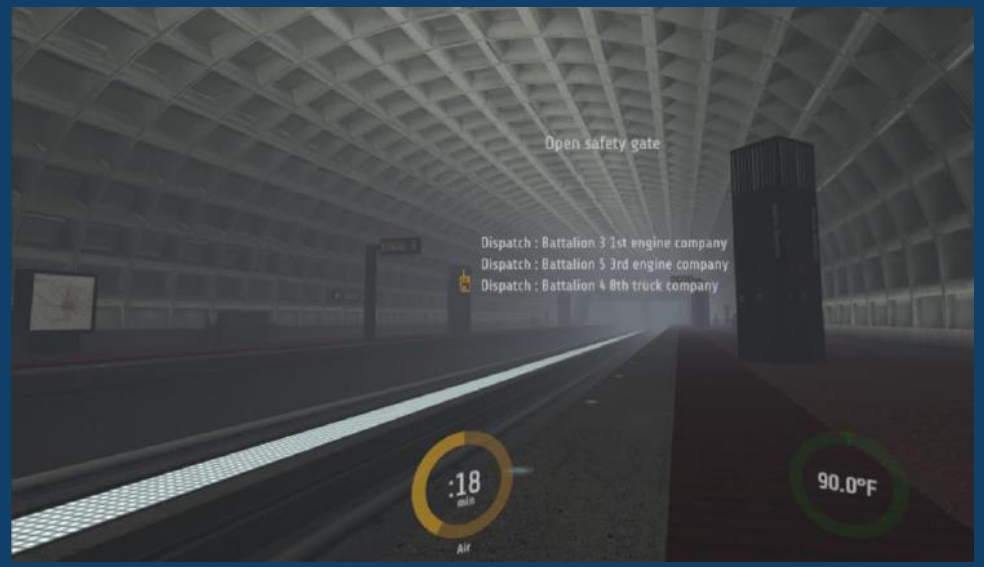
HOSE NOZZLE CONTROLLER PROTOTYPE



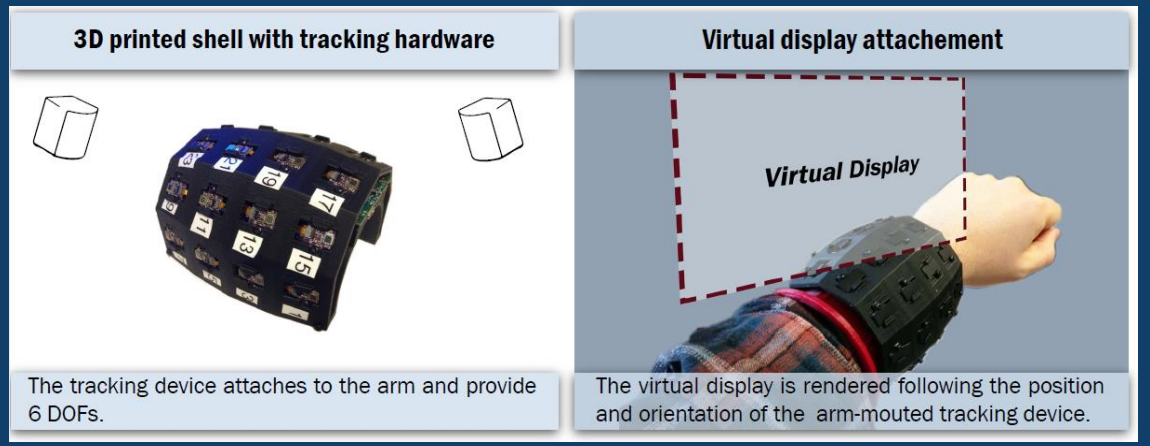
Georgia Tech Research Institute



NC State University and RTI International



UNC Greensboro and Duke University



University of Florida, Texas A&M, and Northeastern

NextGen Interactions

Health Scholars

ON-DEMAND SESSIONS

BACK

USER INTERFACE USER EXPERIENCE

●○○ 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

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

Simulating Next-Generation Public Safety User Interfaces in Virtual Reality
CLICK TO PLAY ON-DEMAND SESSION
●○○ MORE INFO

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
●○○ MORE INFO

Believability with Actionable Metrics
CLICK TO PLAY ON-DEMAND SESSION
●○○ MORE INFO

PUBLIC SAFETY COMMUNICATIONS RESEARCH
PSCR

PSCR 2020: THE DIGITAL EXPERIENCE

HOME » TECH DEMOS


Thank You
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NIST
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2020 Digital Experience

LBS Portfolio Overview

#PSCR2020

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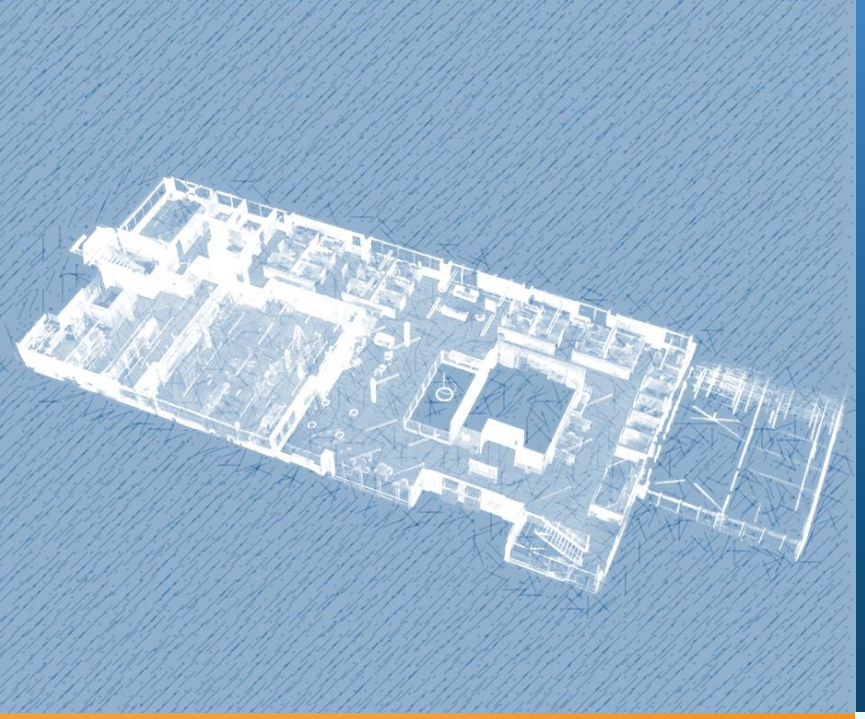


Tracking

Mapping

Navigation

1. PSIAP 2017

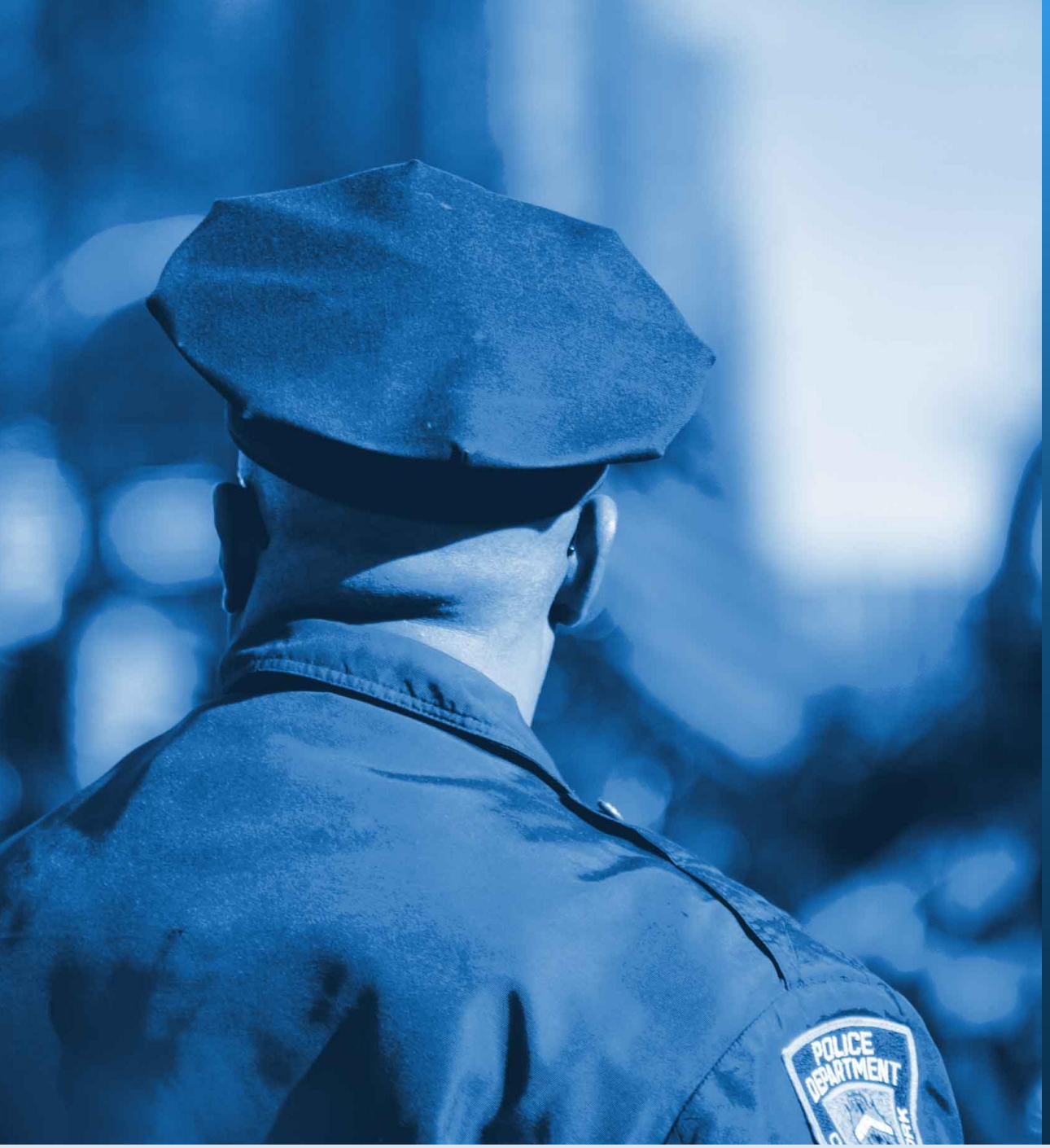
2. PSIAP Point Cloud City

3. Measurement Research

4. PSIAP i-Axis

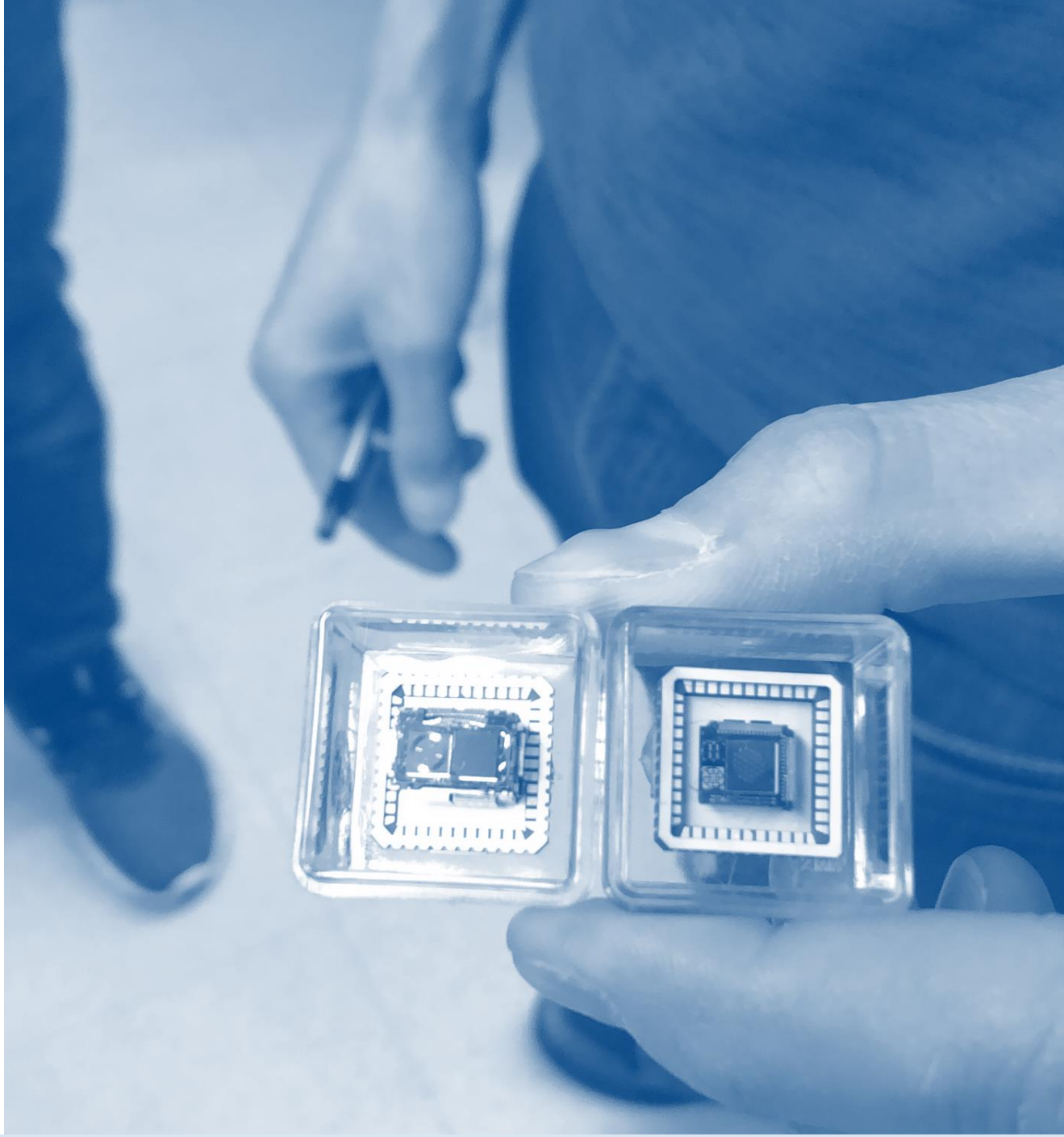

HEWLETT
PACKARD
8719D
50 MHz - 13.5 GHz
NETWORK ANALYZER
log MAG
10 dB/ REF 0 dB

CARNEGIE MELLON UNIVERSITY
PITTSBURGH PENNSYLVANIA 1900


POLICE
DEPARTMENT


UNIVERSITY · OF · OXFORD
DOMI NVS ILLV
MINA TIO MEA

UCI University of California, Irvine



UCI University of California, Irvine

MISSISSIPPI'S
HANCOCK
COUNTY

SHELBY COUNTY
MEMPHIS
TENNESSEE

ENFIELD FIRE DISTRICT 1
HEADQUARTERS
200 PHOENIX AVENUE

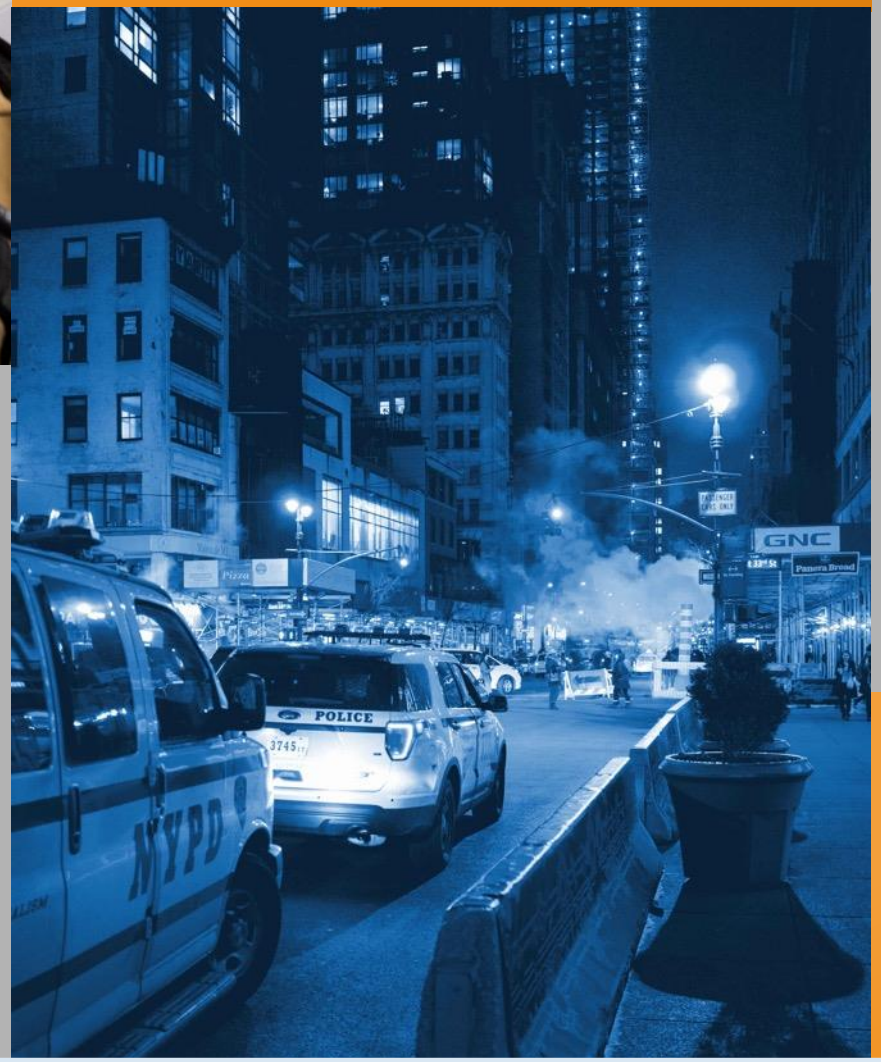
MISSISSIPPI'S
HANCOCK
COUNTY

SHELBY COUNTY
MEMPHIS
TENNESSEE

ENFIELD FIRE DISTRICT 1
HEADQUARTERS
200 PHOENIX AVENUE

NAPSG Foundation

LBS Demos



Measurement Science

Lidar

UNIVERSITY OF MICHIGAN

FR3D


LBS
PSCR
LOCATION-BASED
SERVICES

Thank You

joseph.grasso@nist.gov

NIST

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Mission Critical Voice

Portfolio Overview

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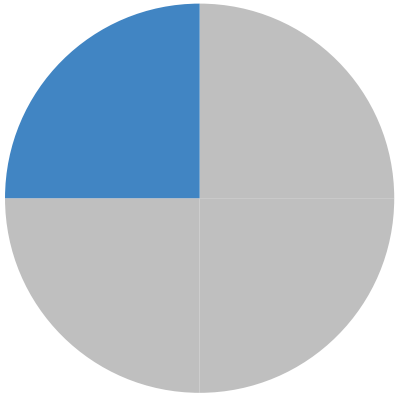
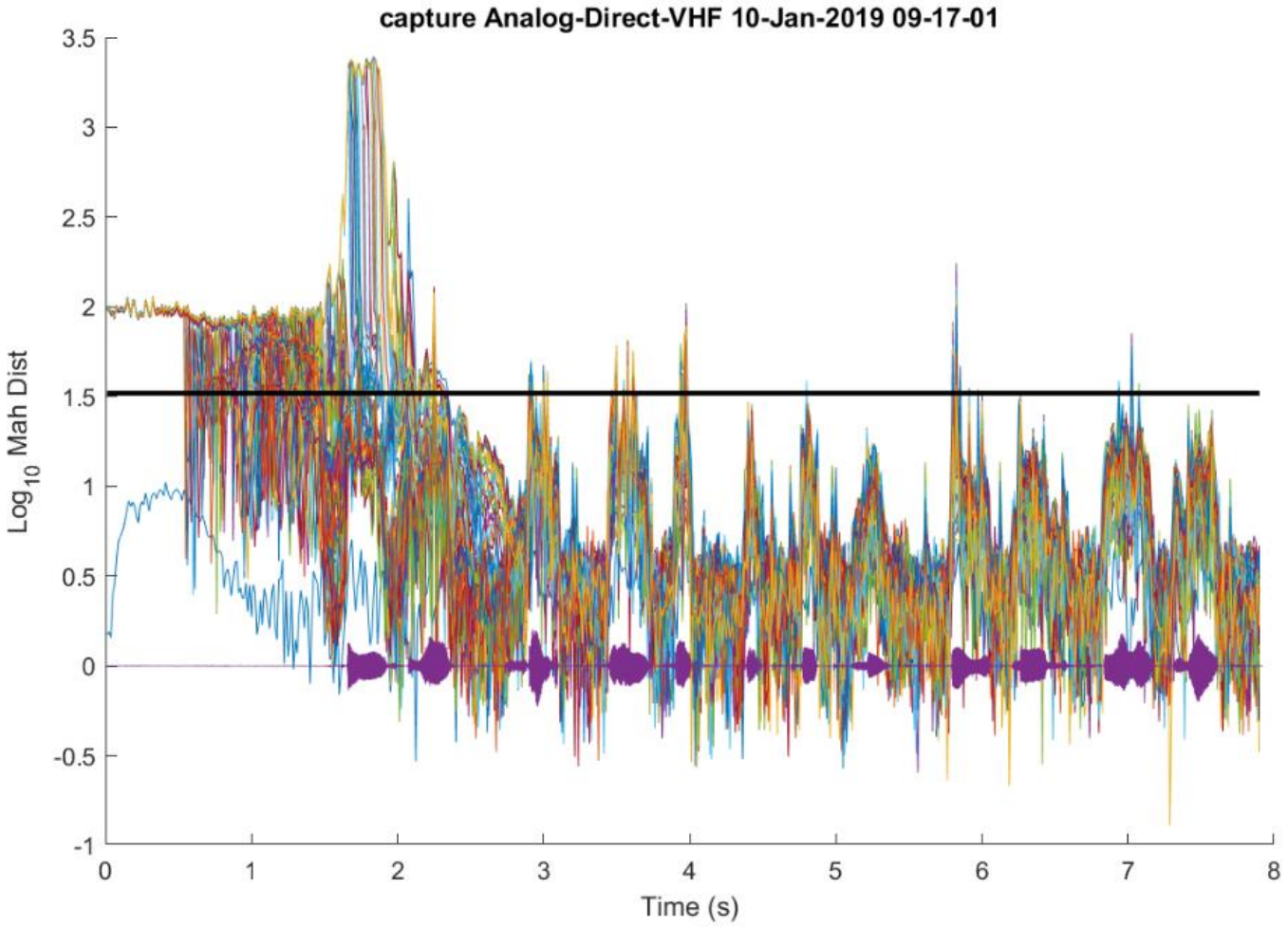
What does it mean to have Mission Critical Voice?

Mission Critical Push to Talk

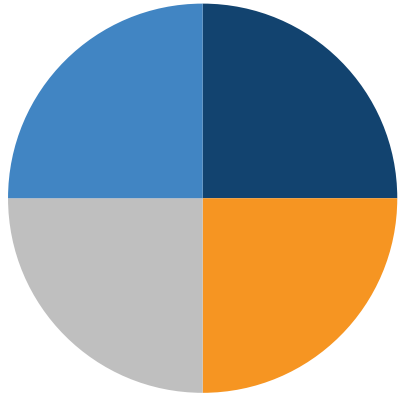


Direct Mode Operations

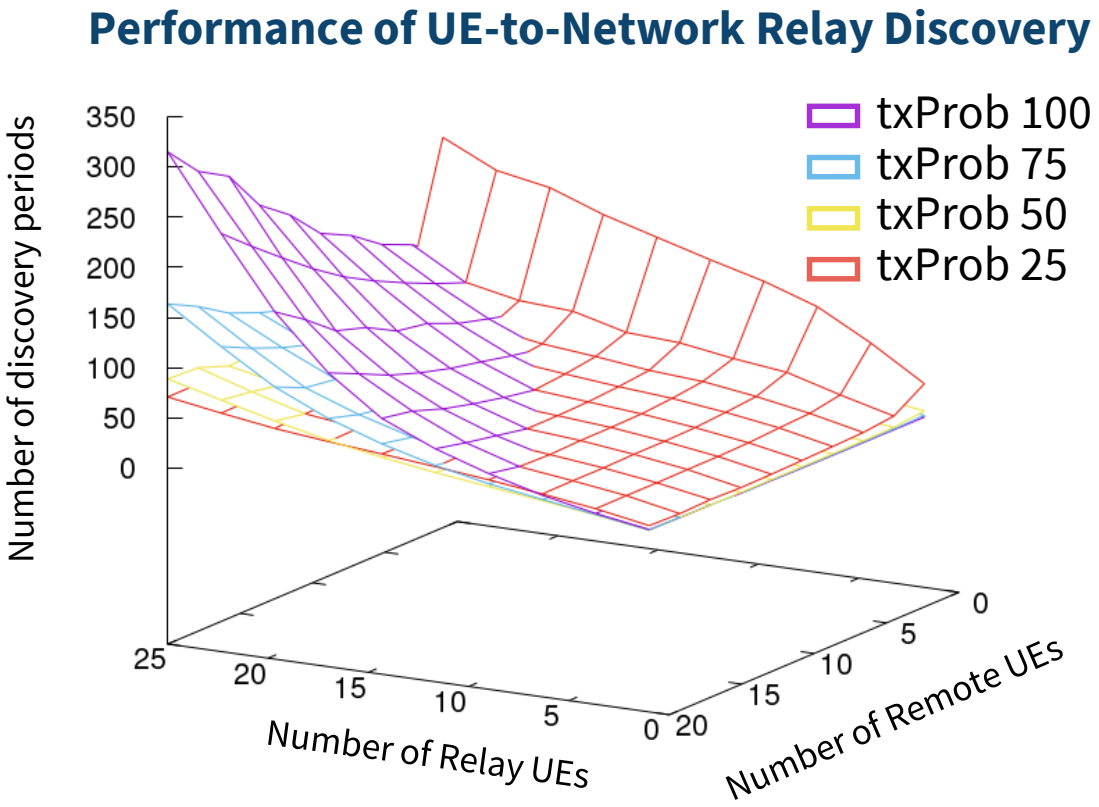
Land Mobile Radio to LTE

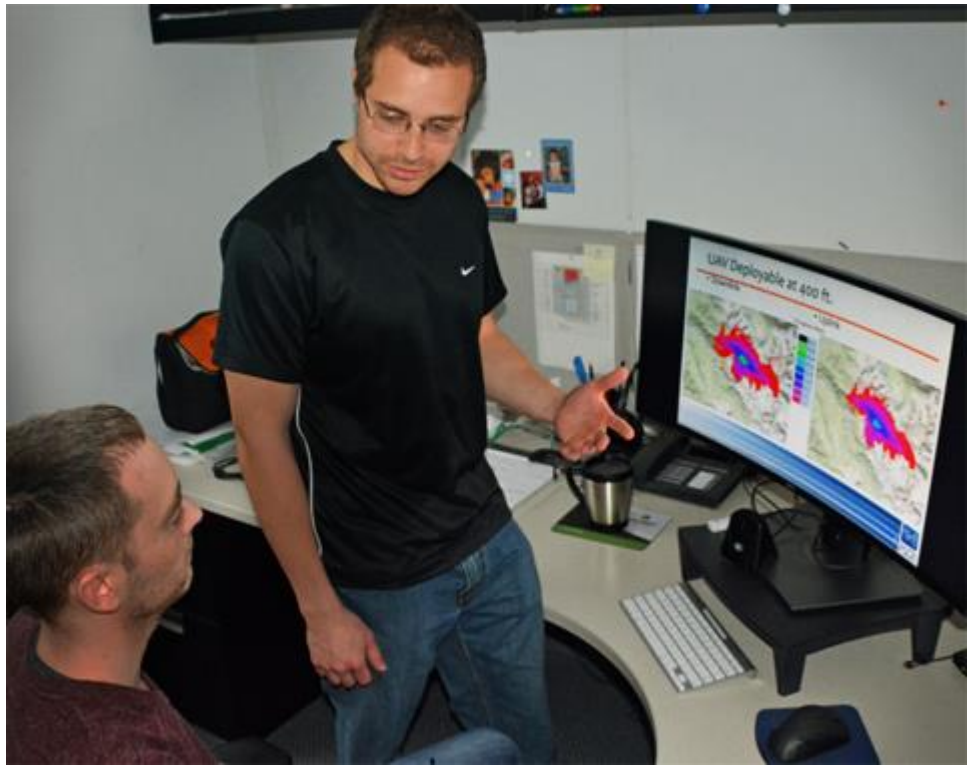


Quality of Experience of Mission Critical Voice

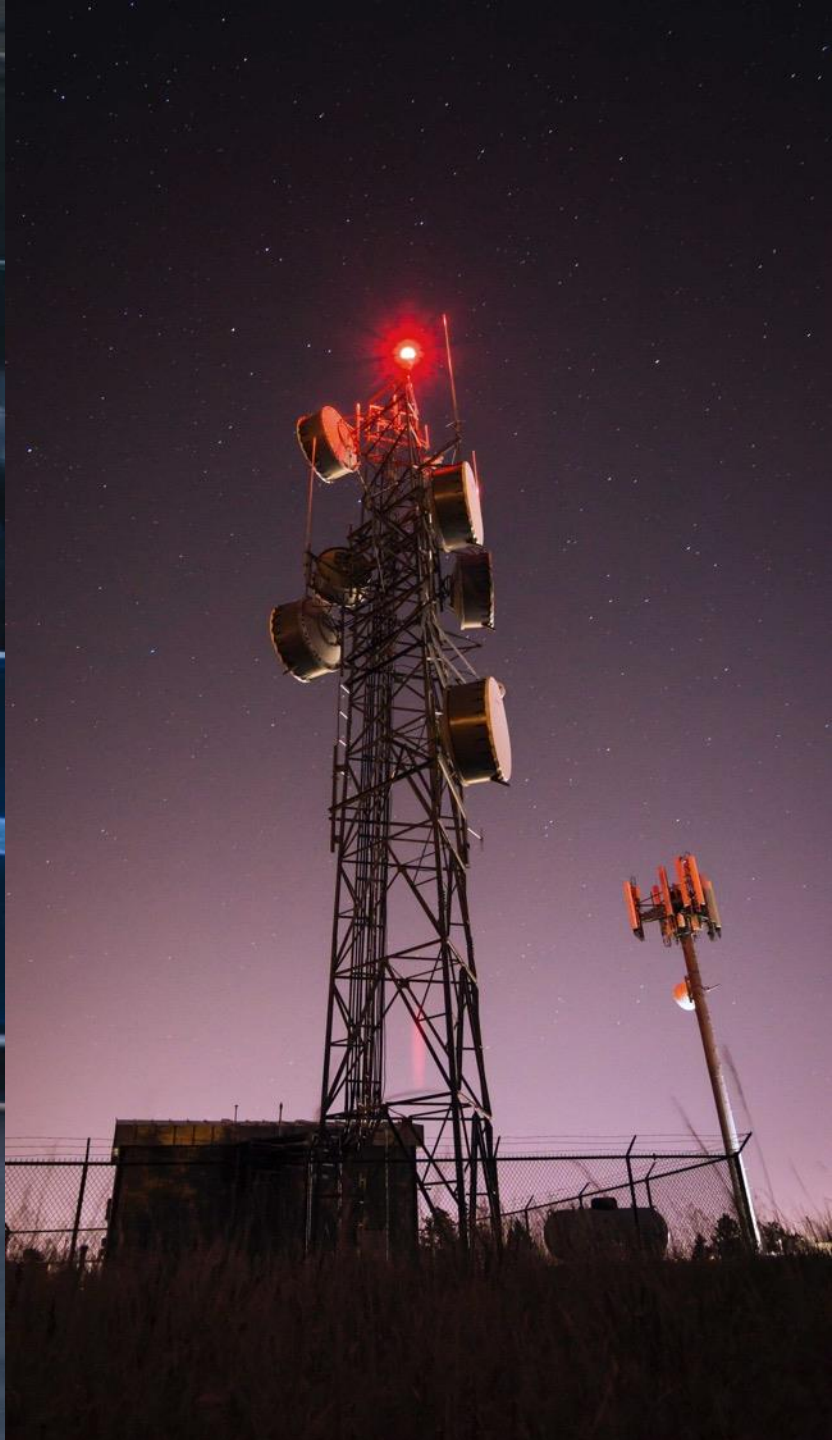


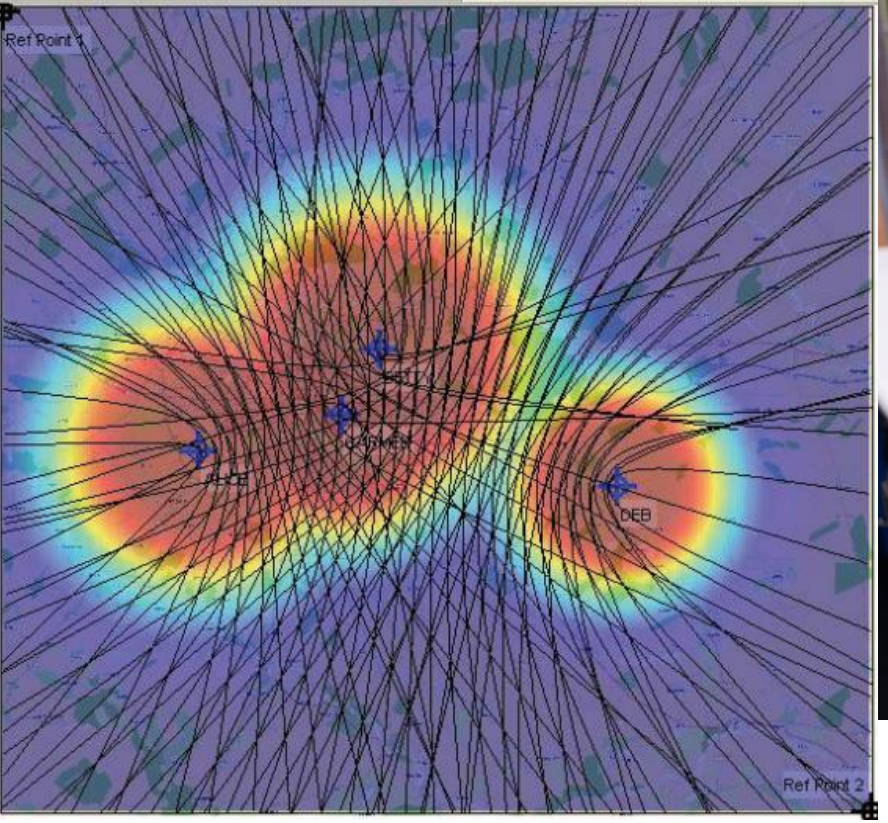
Wireless Networks Division

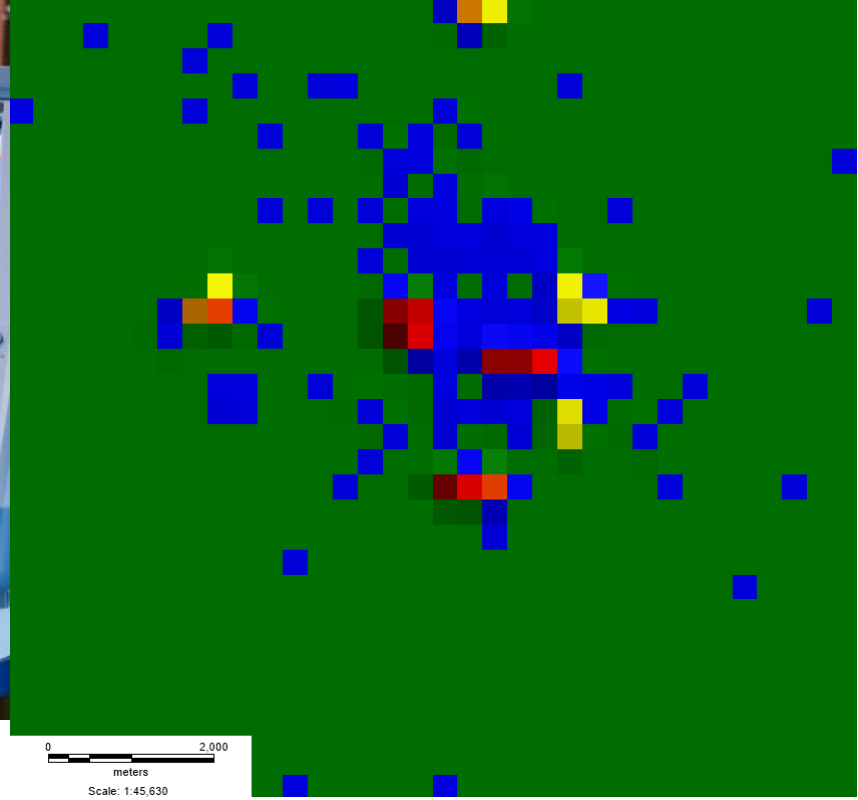





POLICE
NYPD
2125
COURTESY
PROFESSIONALISM
RESPECT

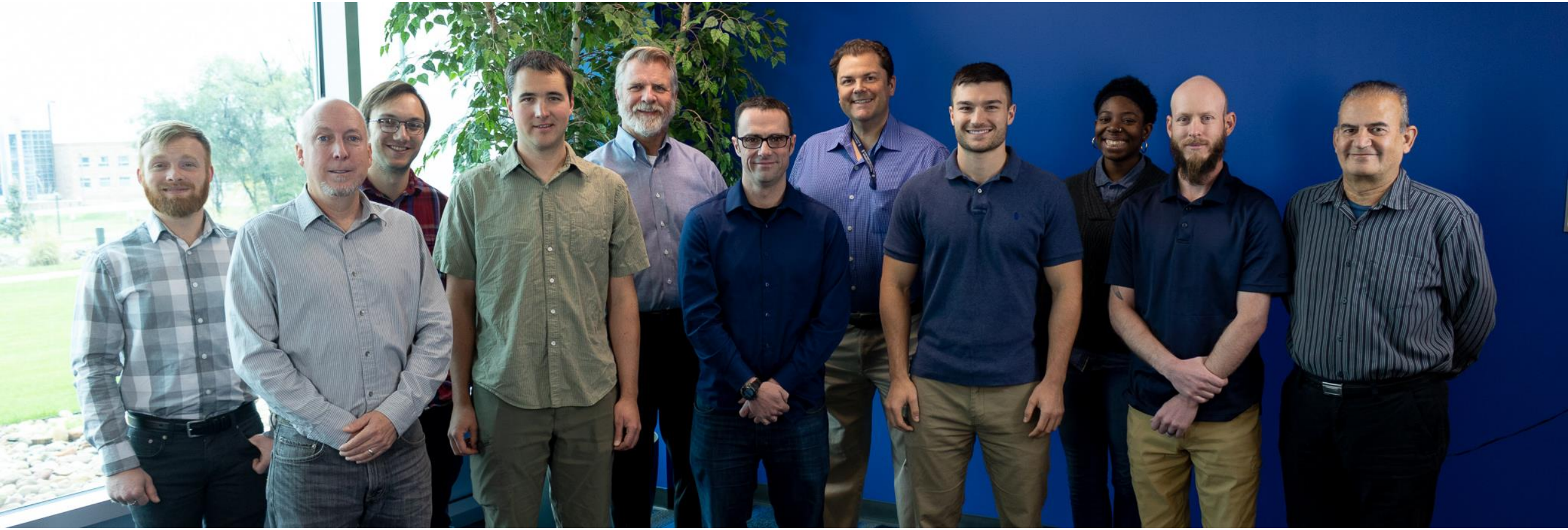




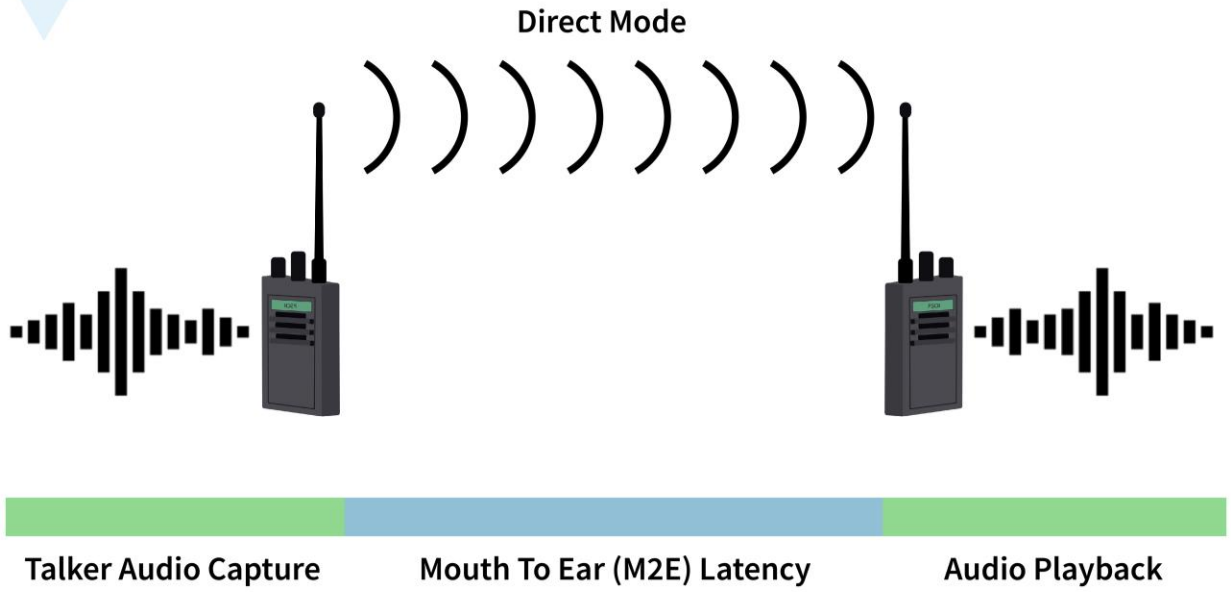


Public Safety MCV Call Model

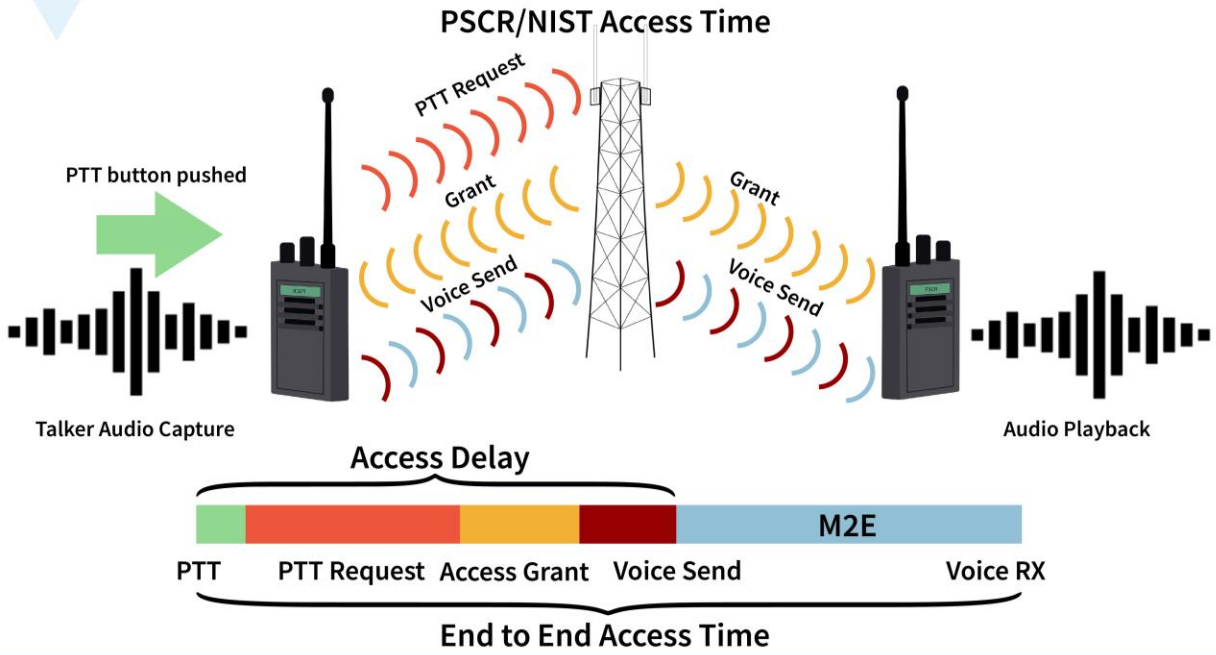
Boulder Team (Most of Us)



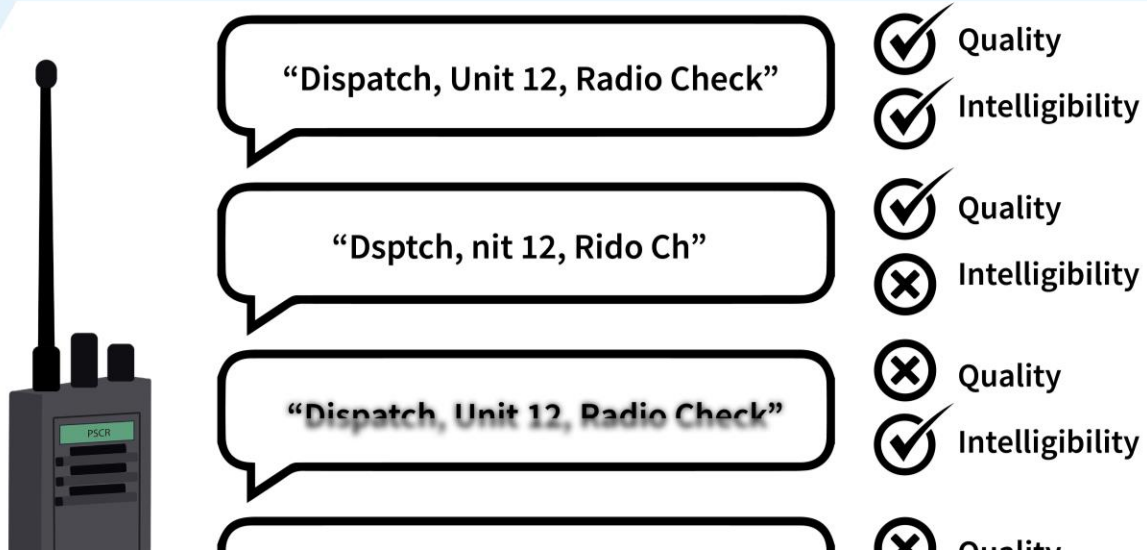
MOUTH TO EAR LATENCY



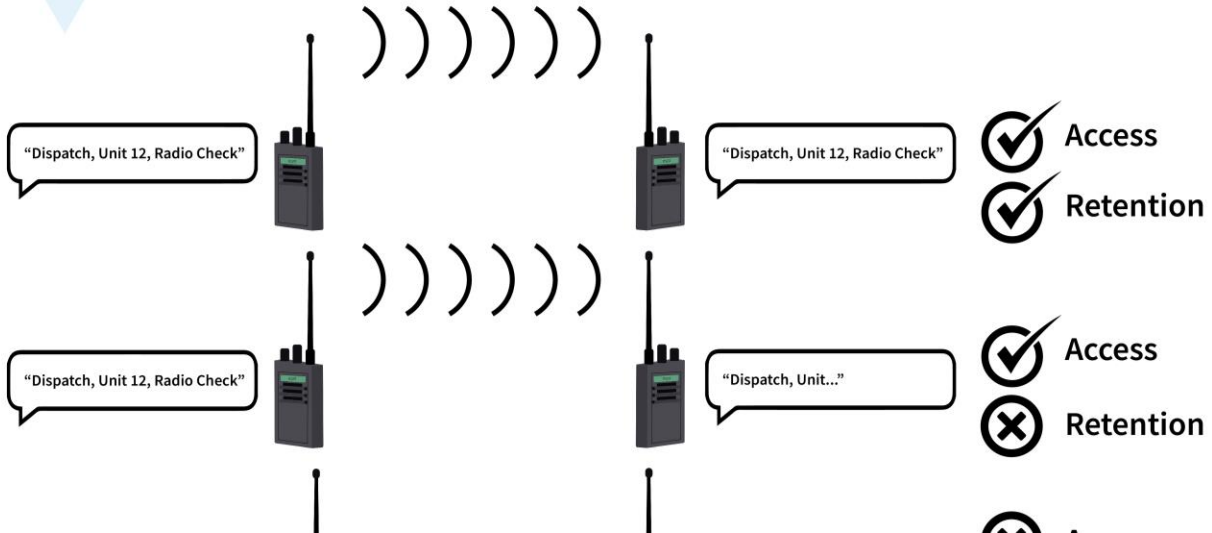
END TO END ACCESS TIME



VOICE QUALITY & INTELLIGIBILITY



PROBABILITY OF ACCESS & RETENTION




PSCR

LMR to LTE



Federal Funding Opportunities

User QoE Measurements

COLUMBIA UNIVERSITY
IN THE CITY OF NEW YORK

Georgia Tech Research Institute

Recent Awards

Polaris Networks

eman ta zabal zazu
Universidad del País Vasco
Euskal Herriko Unibertsitatea
CAMPUS OF INTERNATIONAL EXCELLENCE

VALID8.com

The Home Stretch


HARRIS
tait
TP9400
PXA
KEYSIGHT
Real-Time SA 1
Spectrum & PvT
Center 415.065 MHz
Res BW 52.9 kHz
PSCR MISSION CRITICAL VOICE
POWER


Thank You
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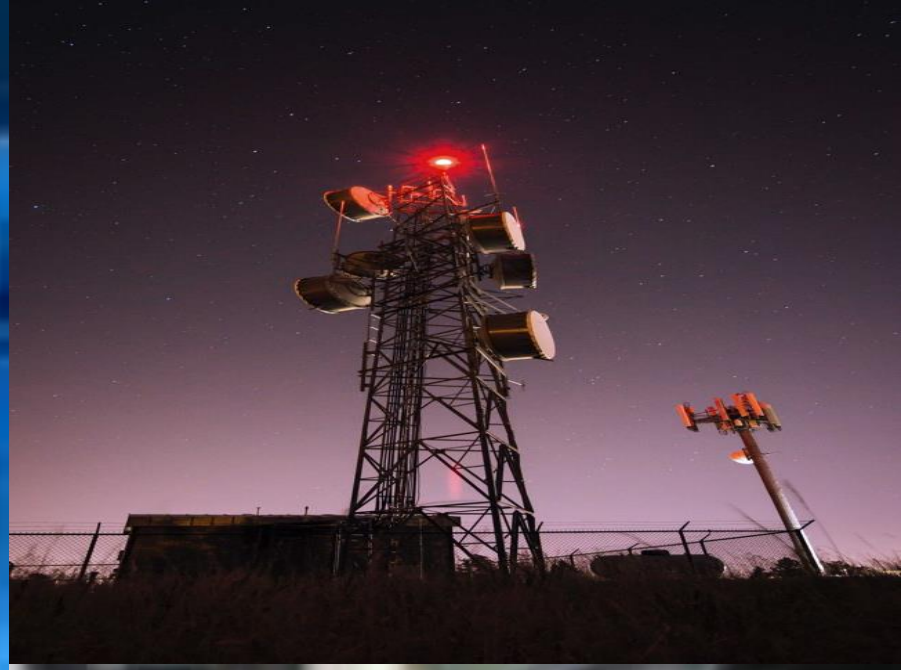
PSCR

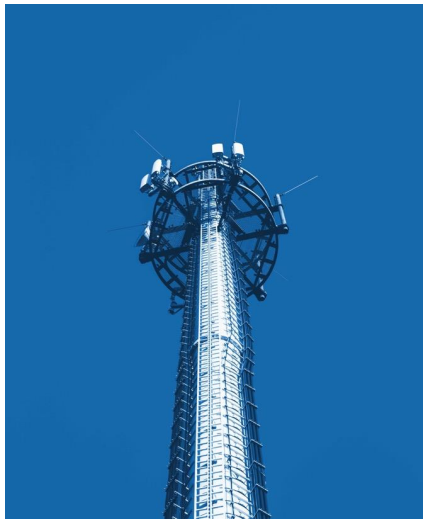
PSCR Analytics Portfolio Overview

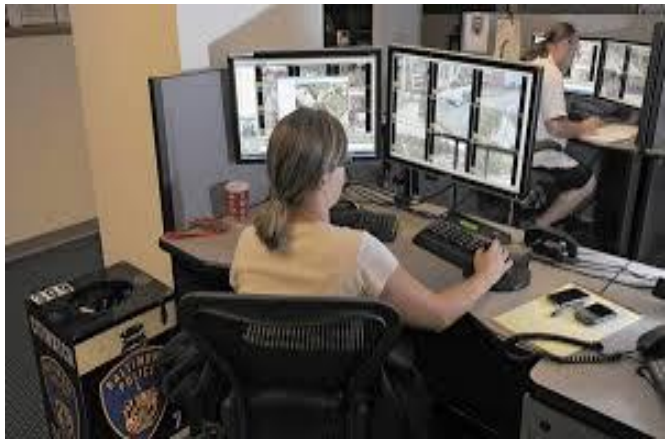
John Garofolo

#PSCR2020

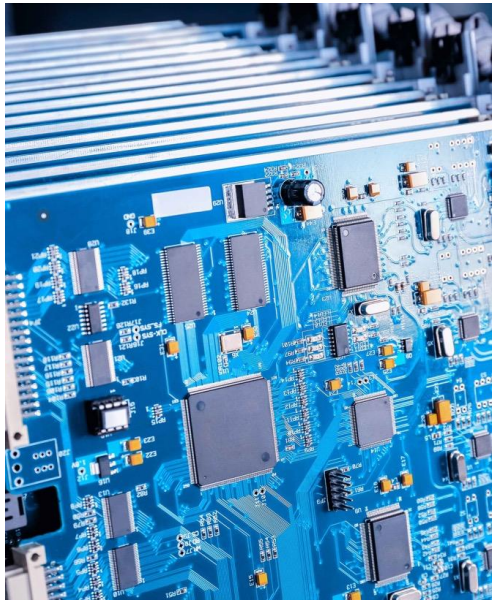


PSCR ANALYTICS





Capture → Encoding → Compression → Transmission/ Communication → Broadcasting/ Distribution → Alerting → Triage → Forensics → Data Storage/ Management



PSCR ANALYTICS

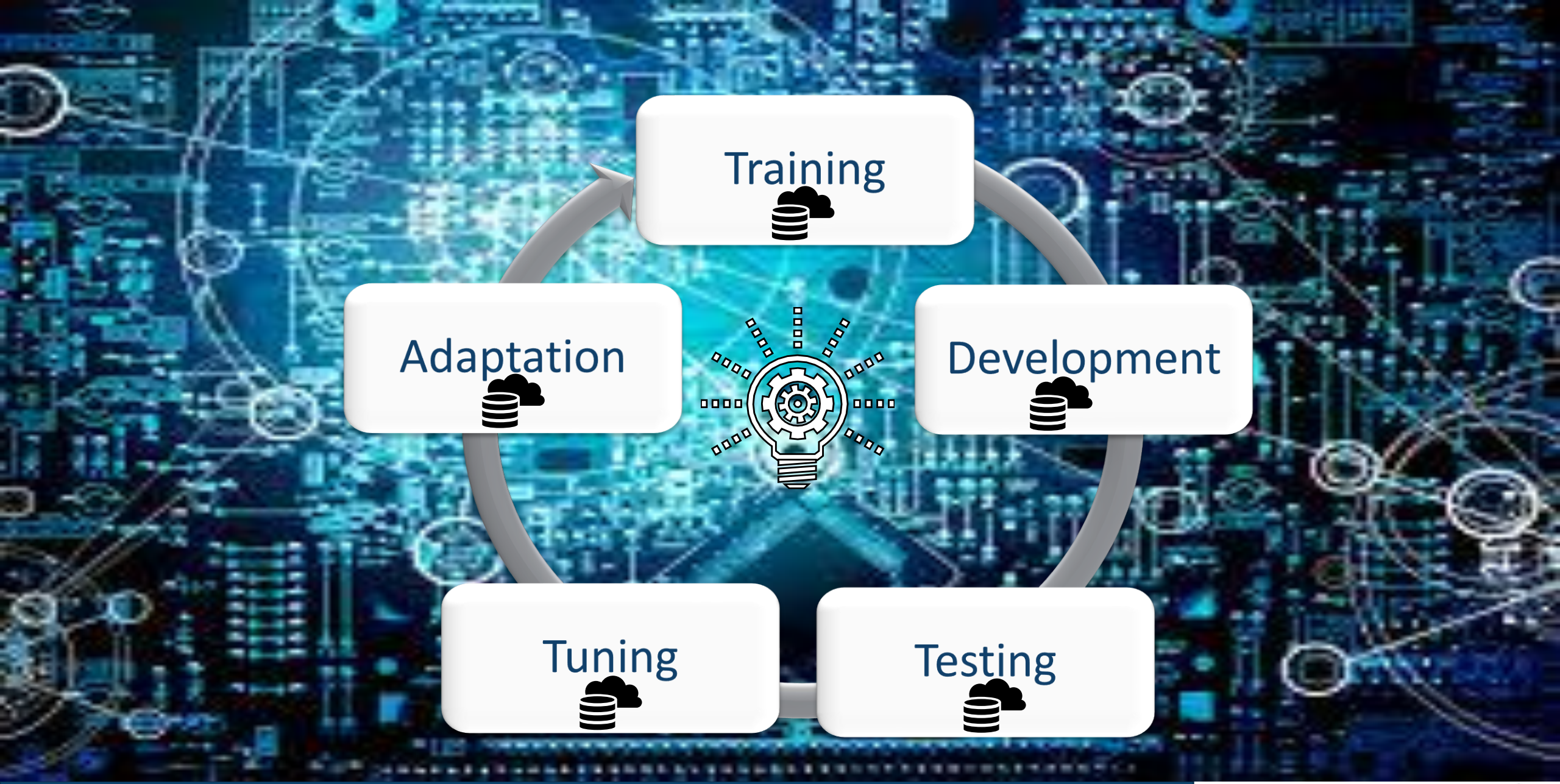
Analytics to Save Lives, Property, and Infrastructure

Where every second counts!

Our Focus: Increase automation to identify and analyze emergency events in real-time from a large number of data streams and provide first responders with actionable information.

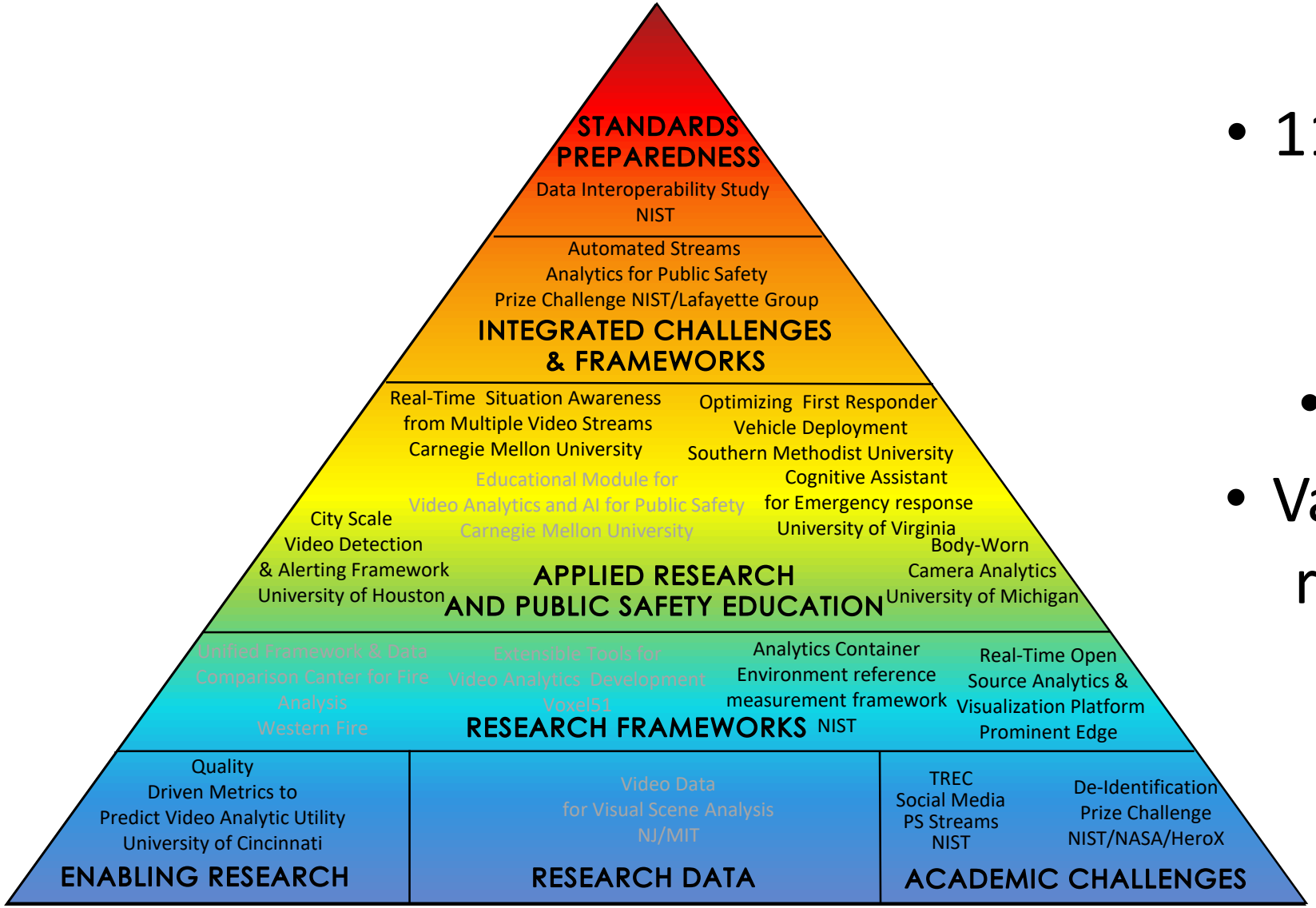
R&D Thrusts

PSOR ANALYTICS


Training
Development
Testing
Tuning
Adaptation

The PSCR Analytics Portfolio Strategy

Built on a Foundation of Robust Research

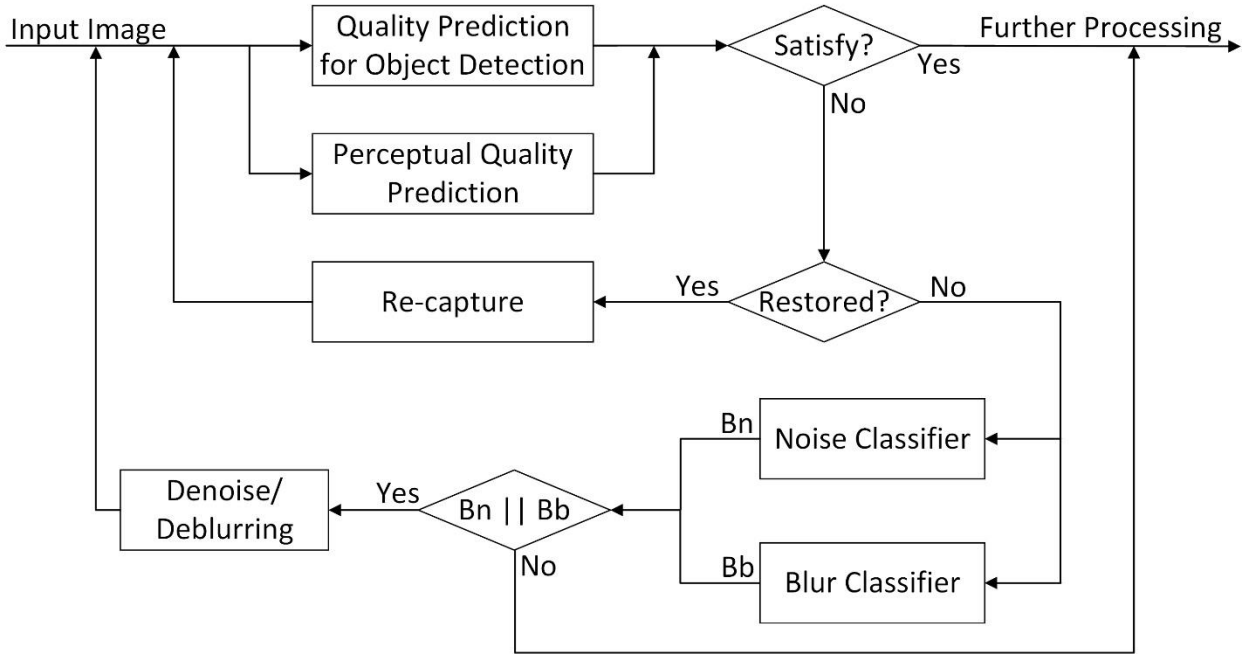


As of May, 2020

- 11 grants / agreements (4 completed)
- 4 NIST projects
- 2 Prize Challenges
- Variety of SW tools and research data created
- Over 25 reports published

University of Cincinnati

Measuring and Optimizing Video Quality for Analytic Performance



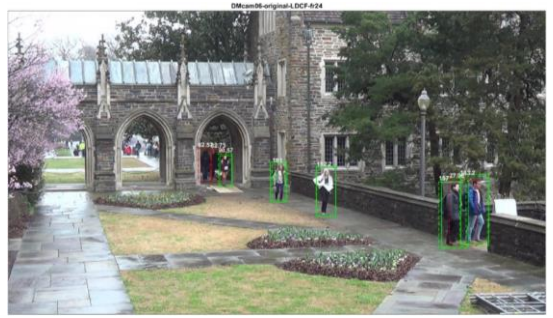
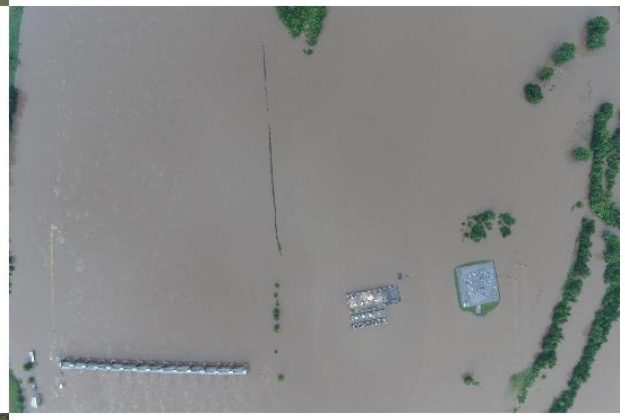


Image quality assessment and adjustment framework for object detection on embedded cameras

AI THOUGHT
FLOODING
WAS A TOILET*

SO WE BUILT A DATASET
WITH 400,000+ IMAGES (TERABYTES!)
FROM REAL OPERATIONS TO TEACH AI
WHAT A DISASTER LOOKS LIKE



USE THE DATASET
FOR THE NIST TRECVID 2020
DISASTER SCENE
DESCRIPTION
AND INDEXING CHALLENGE

https://github.com/ladi-dataset
https://www-nlpir.nist.gov/projects/tv2020/dsdi.html

* https://www.technologyreview.com/2019/08/30/133206/ai-image-recognition-improves-disaster-response/

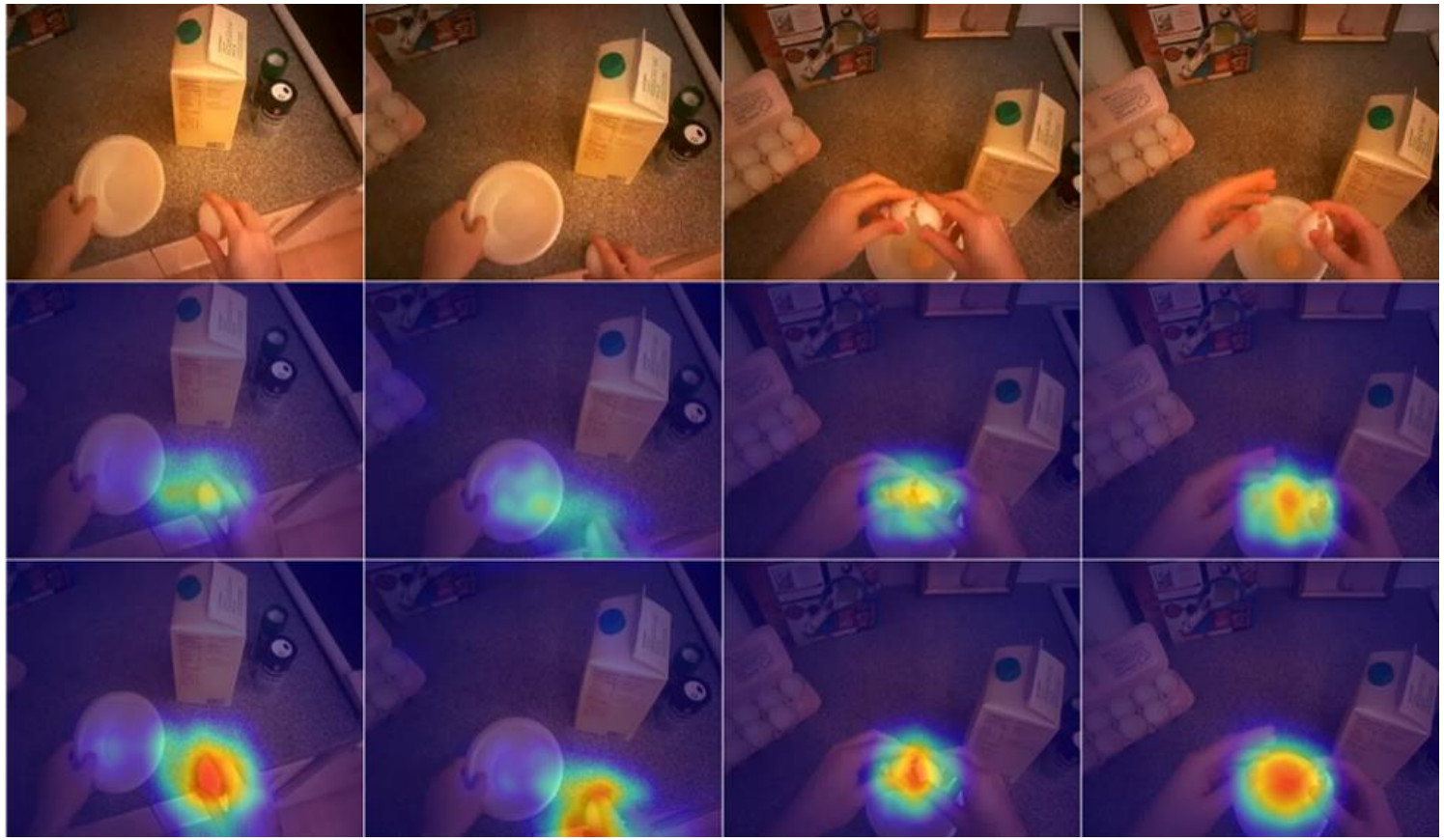
New Jersey Office of Homeland Security and Preparedness with MIT-LL

Unprecedented data collection for Video Analytics R&D in Disaster Scenes

NIST TRECVID Disaster Scene Description/Indexing Evaluation
https://www-nlpir.nist.gov/projects/tv2020/index.html

NJ OFFICE OF HOMELAND SECURITY AND PREPAREDNESS

MIT LINCOLN LABORATORY



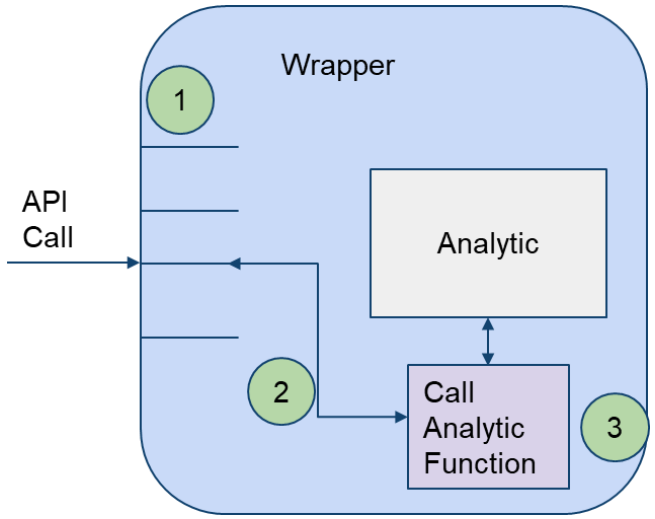
University of Michigan Body-Worn Camera Analytics in Public Safety BOCA

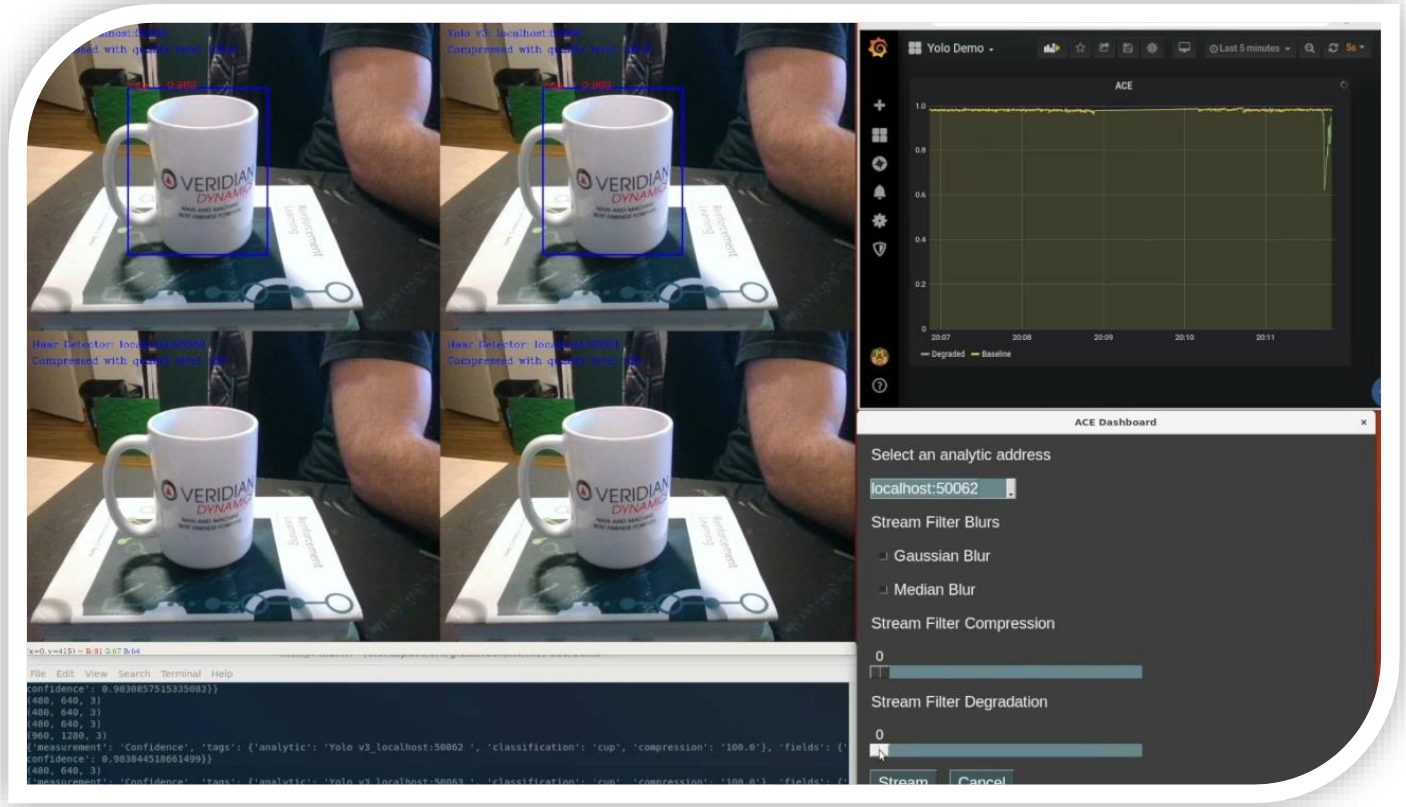
ELECTRICAL ENGINEERING AND COMPUTER SCIENCE
UNIVERSITY OF MICHIGAN

- Created framework for “egocentric” video analytic R&D workflow
- Developed gaze-analysis-centered approach to activity recognition
- Correlating CCTV video with BWC video to leverage and enhance scene understanding from multiple perspectives

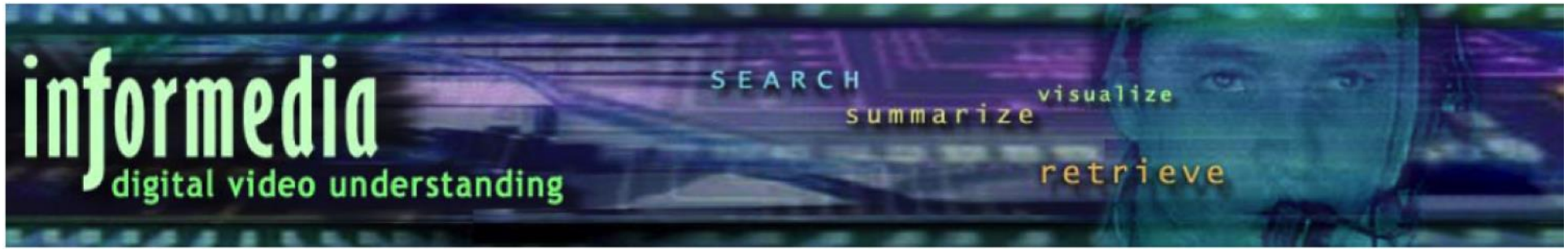
NIST Analytics Container Environment (ACE)

Open framework and tools to create, test, and transition analytic capabilities into public safety





Demo: ACE framework used to create tool to impair video quality and visualize effect on analytic performance. Tool was created in less than a day.



Carnegie Mellon University

Automatic Disaster Damage Assessment Using Drone Videos

Disaster damage assessment, cross-camera person re-identification, pedestrian/vehicle trajectory prediction.

Carnegie Mellon University

Building sophisticated video analysis capabilities to develop a 3D understanding of public safety scenes from many different video streams fused with supporting information from other modalities.

Southern Methodist University

SAFENET: Measuring and fusing factors related to fire response deployment and developing predictive models that optimize response

SAFE-NET is a novel computational platform to support efficient and safe dynamic mobilization of resources and personnel for emergency response.

Approach:

- Spatial Risk Analysis for Emergency Dispatching
- Data Fusion for Roadway Flood Risk Estimation
- Resource Allocation Under Uncertainty
- A Network Decomposition Methodology for Multi-Objective Routing

Data Analytics & Machine Learning

Multi-Source Data Fusion for Link-Based Risk Estimation

Algorithm Development

A Multi-objective Shortest Paths Algorithm for Large Scale Networks

System Optimization

Optimal Resource Allocation and Workload Balancing

Time Varying Risk Estimation

Web-Based Emergency Vehicle Routing Platform

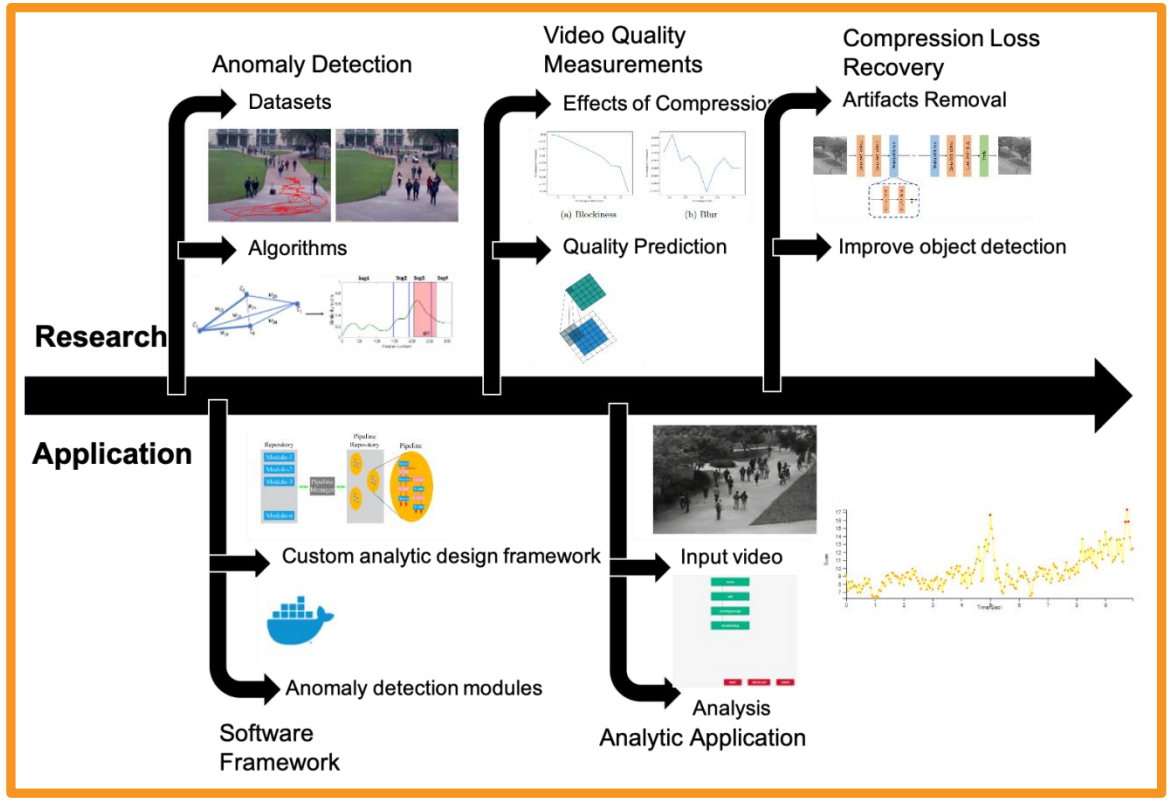
UT DALLAS

SMU

DALLAS FIRE-RESCUE DEPARTMENT

University of Houston with City of Houston

Multi-Tiered Video Analytics for Public Safety



UNIVERSITY of VIRGINIA

ENGINEERING

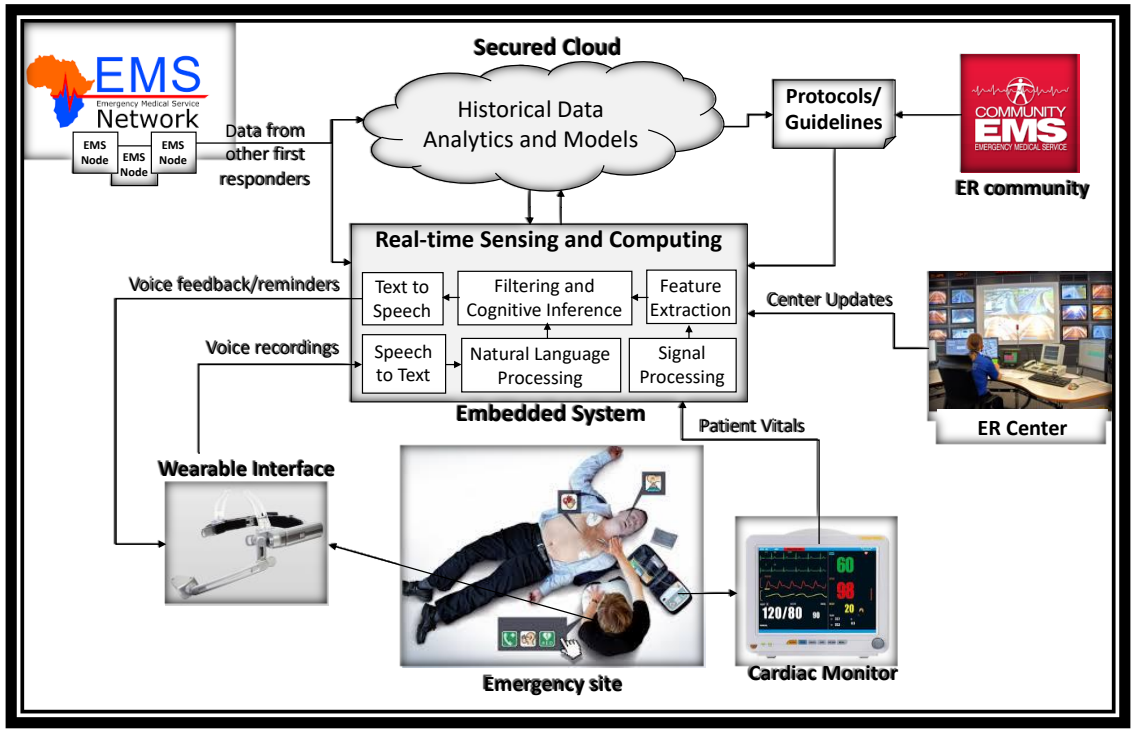
Cognitive EMS: Intelligent Assistant for EMS

North Garden Fire Department

Richmond Ambulance Authority

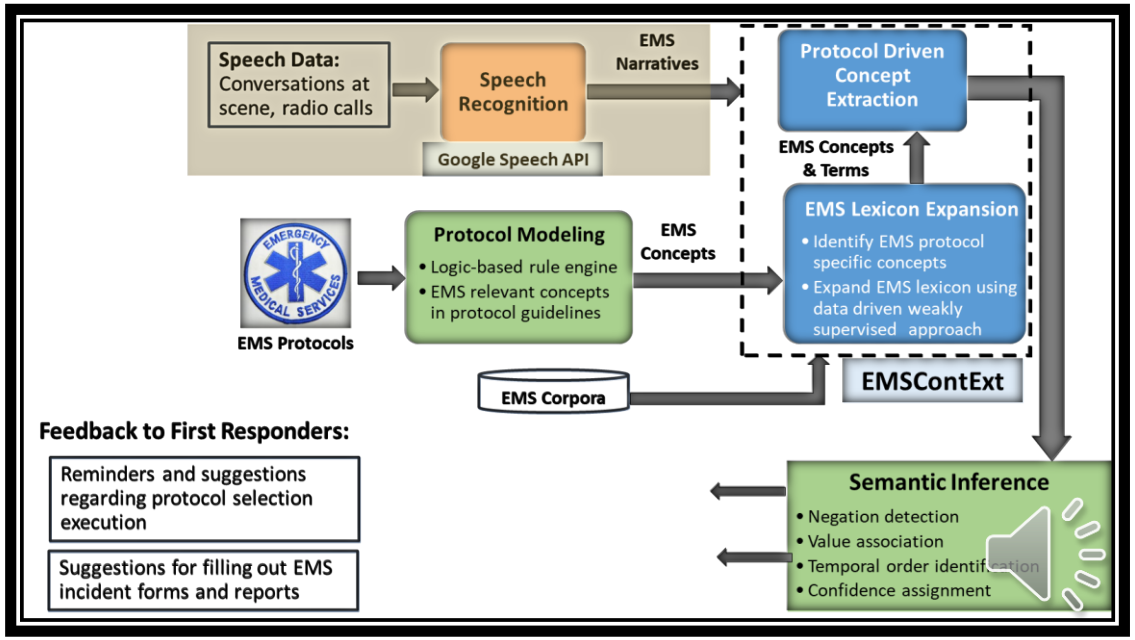
Thomas Jefferson EMS Council (TJEMS)

Office of Emergency Medical Services



Framework for integration of EMS protocols and systems

Context-aware speech processing and notification



AI Framework and Tools to Make Video Analytics Easy for Public Safety

VOXEL51 – A PSCR Success Story

Voxel51 created a video analytics framework under PSCR that they are now leveraging for a variety of applications and customers in physical security, logistics, and public safety.

NIST TREC Social Media Incident Streams Technology Evaluation

Data-Driven Evaluation

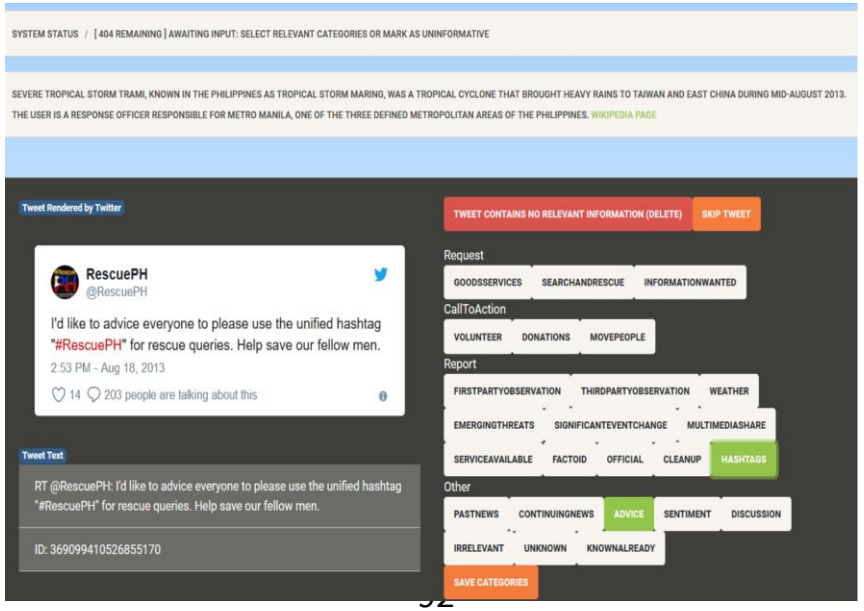
Uses 33 Twitter datasets from earthquake, wildfire, hurricane, flood, bomb and shooting events.

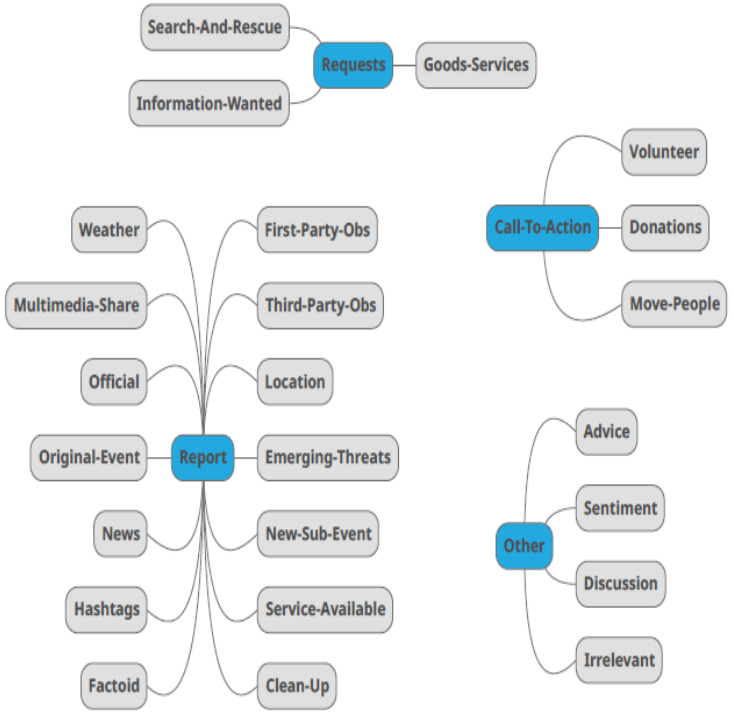
Each tweet is labeled to indicate:

Relevance: Does it contain actionable information?

Categories: What kind of information does it contain?

Criticality: How important is it that public safety should see this tweet?





TREC.NIST.GOV

PSCR Data De-Identification Challenge Program

- First Phase 2018-19 Focused on Differential Privacy approaches to de-identifying tabular numeric data
- Second Phase challenge focused on spatio-temporal data de-identification
  - Kicking off Fall 2020

PSCR
NIST

Automated Streams Analysis for Public Safety (ASAPS) Challenge

Where every second counts!

Data Sources

VIDEO

TEXT MESSAGES

AUDIO

SOCIAL MEDIA POSTS

SENSORS

Extract

Analyze

Artificial Intelligence

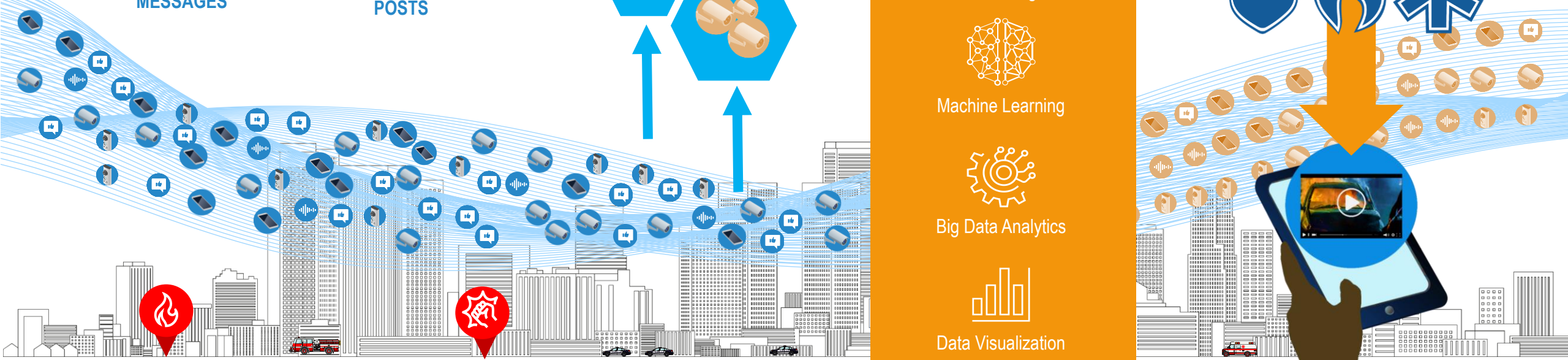
Machine Learning

Big Data Analytics

Data Visualization

Visualize and Interact

Public Safety Decision Support



Realtime Analysis, Alerting, Visualization, and Interaction

PSCR NIST


PSCR
ANALYTICS
Thank You
NIST
#PSCR2020
PSCR

2020 Stakeholder Meeting

#PSCR2020

NIST

PSCR

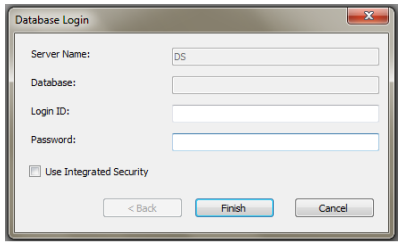
PSCR Security Portfolio 2020

PSCR SECURITY

ICAM: Identity Credential & Access Management

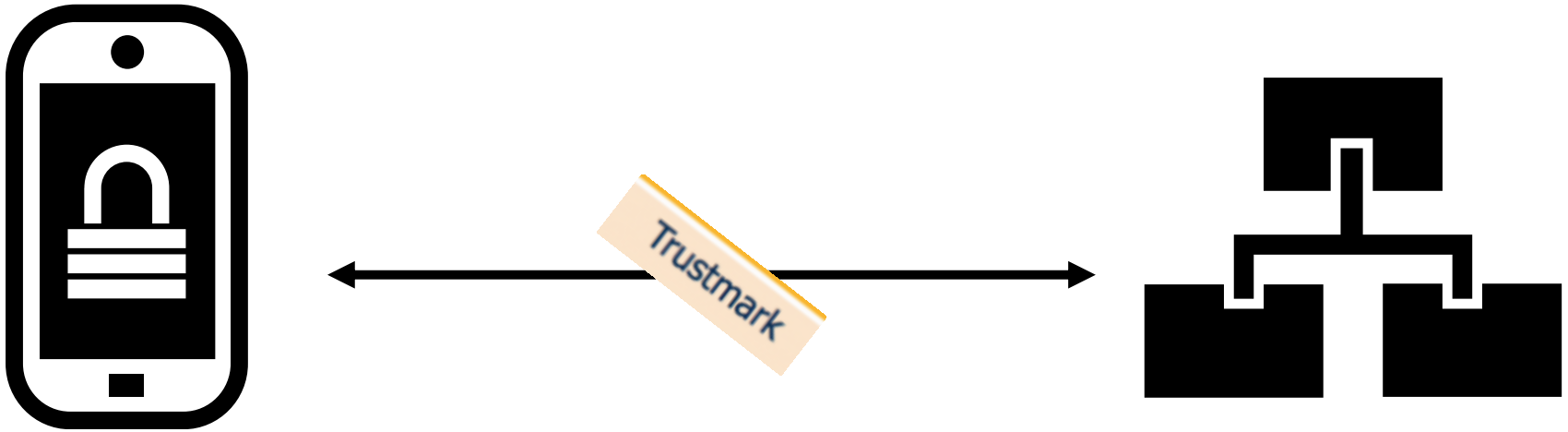

POLICE
POLICE

Federation


Database Login
Server Name:
DS
Database:
Login ID:
Password:
Use Integrated Security
< Back
Finish
Cancel


Login enter your credentials
Username:
Password:
Login
acer

Federation



Public Safety
Agency User

Service Provides
Relying Party

Georgia Tech Research Institute

- Specific for Public Safety
- Reliable, Re-usable trust
- Demonstrated in multi-state pilot
- Integration with NCCoE Federation Lab

Georgia Tech Research Institute

Hardware-Based Two Factor Authentication

Phase 1 - Concept Paper

Phase 2 - File Stored on SIM Card

Phase 3 - Verified Authentication

SoloSIM

1st Place - $30,000 Prize

Most Commercially Promising Award - $3,500

Creativity in Public Safety Award - $4,000

B.EST Solutions

2nd Place - $15,000

B.EST Solutions

Fortifyedge

3rd Place - $7,500

Fortifyedge

PSCR

FIRSTNET
Built with AT&T

ITL

3GPP
A GLOBAL INITIATIVE

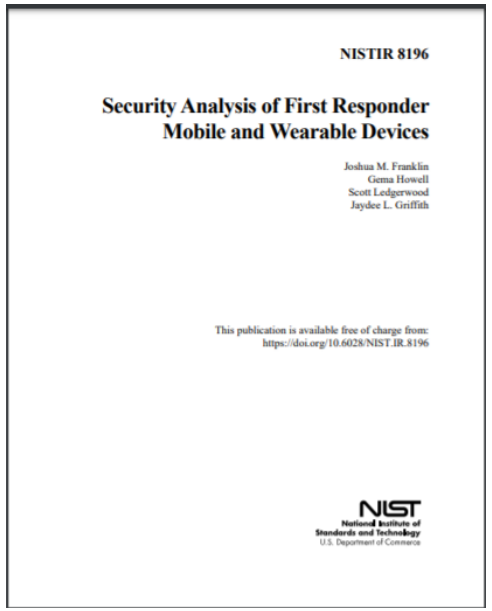
3GPP™
A GLOBAL INITIATIVE

5G™

NCCoE
NATIONAL CYBERSECURITY
CENTER OF EXCELLENCE

Area

Personal


NISTIR 8196

Security Analysis of First Responder Mobile and Wearable Devices

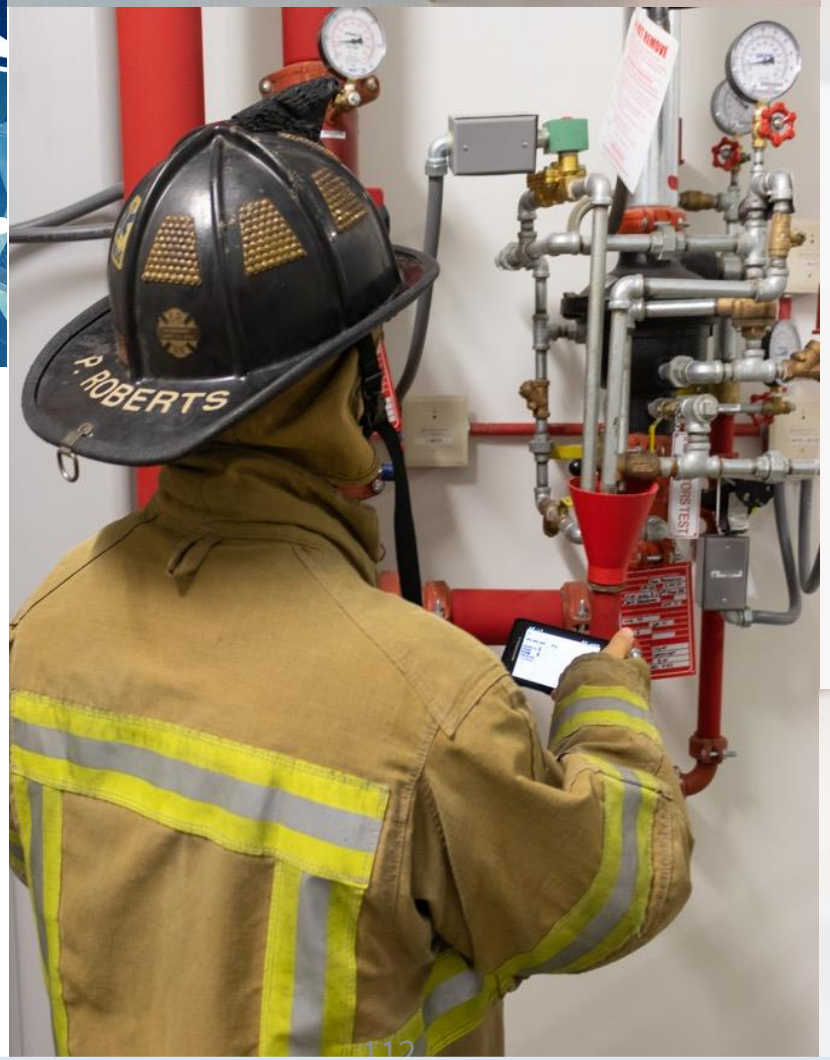
Joshua M. Franklin
Gema Howell
Scott Ledgerwood
Jaydee L. Griffith

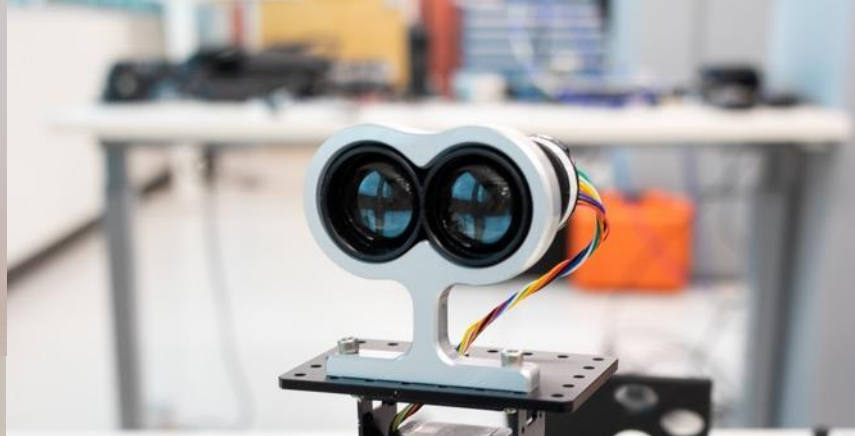
This publication is available free of charge from:
https://doi.org/10.6028/NIST.IR.8196

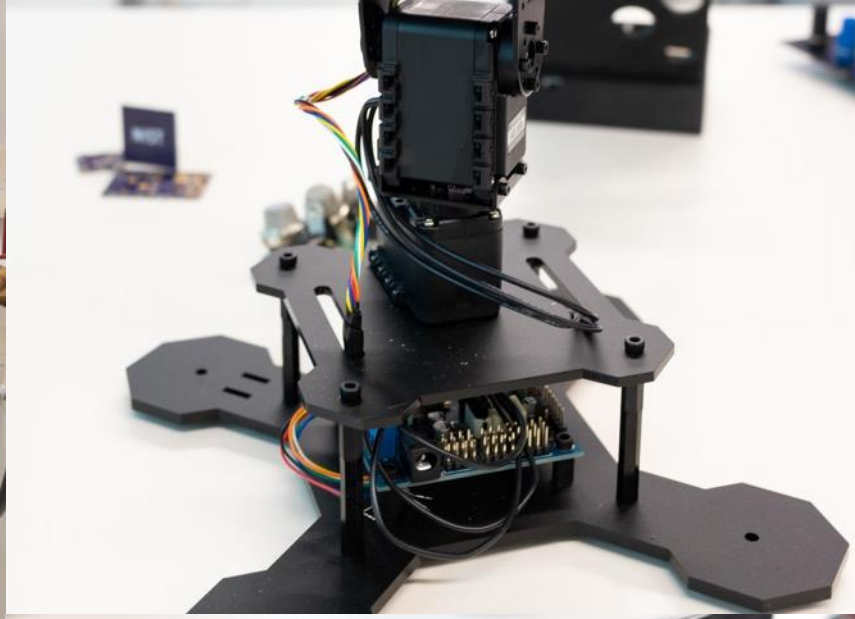
NIST
National Institute of Standards and Technology
U.S. Department of Commerce

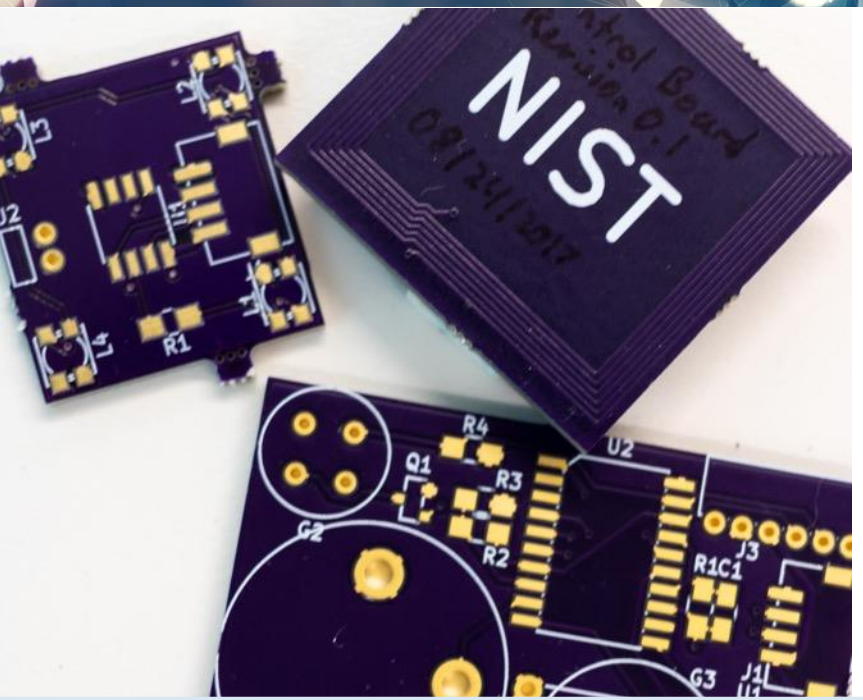
Networks


IoT

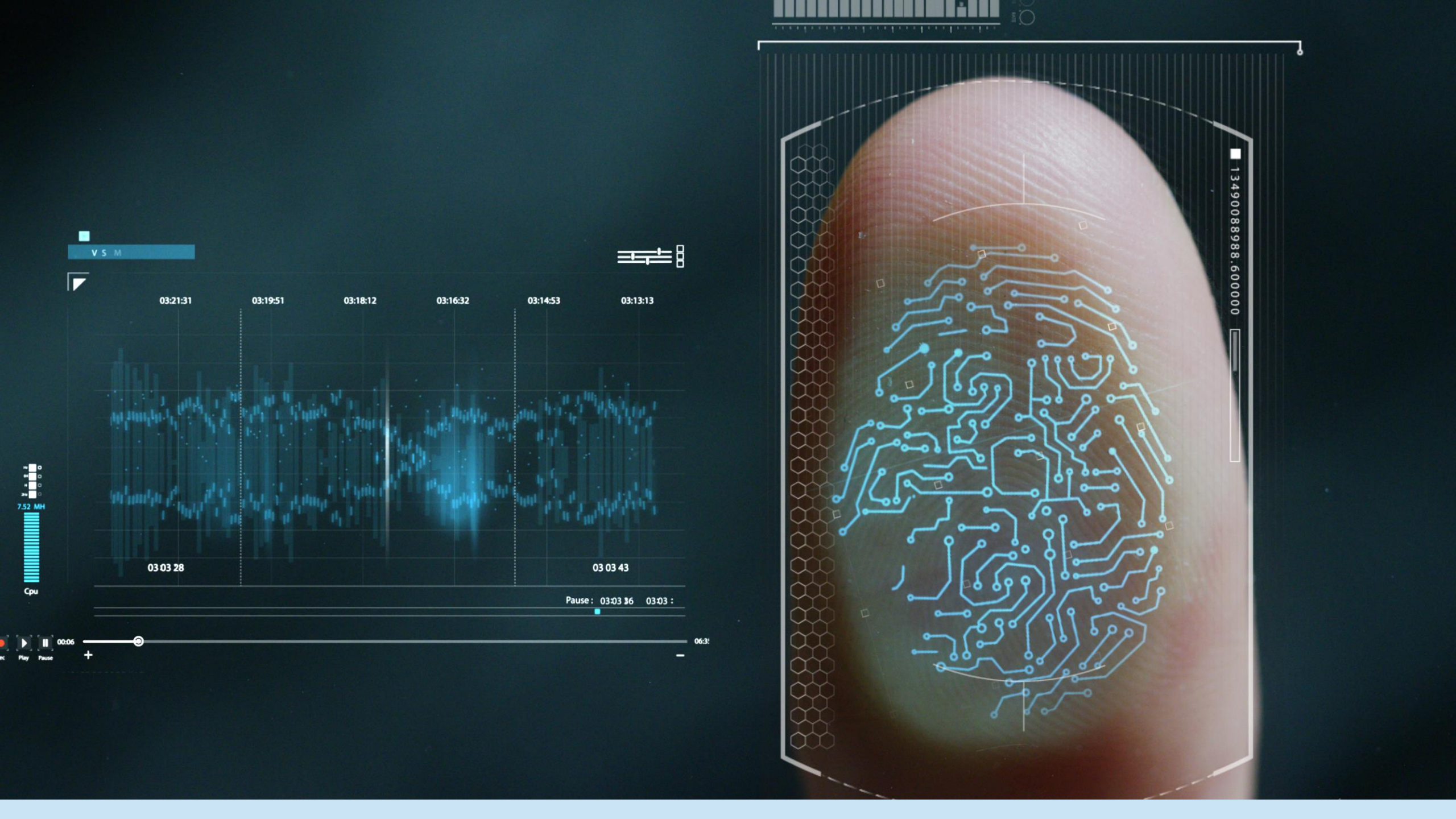

P. ROBERTS






NIST

UAS Challenge


V S M
03:21:31
03:19:51
03:18:12
03:16:32
03:14:53
03:13:13
03 03 28
03 03 43
Pause : 03:03 36 03:03 :
7.52 MH
Cpu
00:06
Play
Pause
13490088988.600000

PSCR SECURITY

Securing the first responder of the future

Thank You

#PSCR2020

NIST

PSCR

Resilient Systems Portfolio

#PSCR2020

NIST

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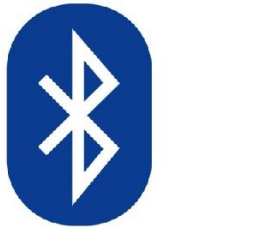
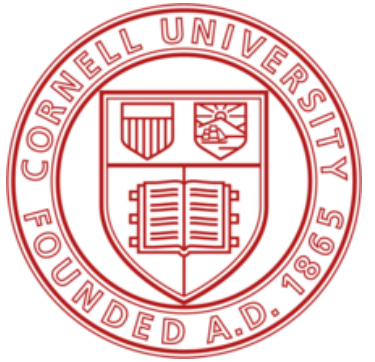
“But can I still communicate?”

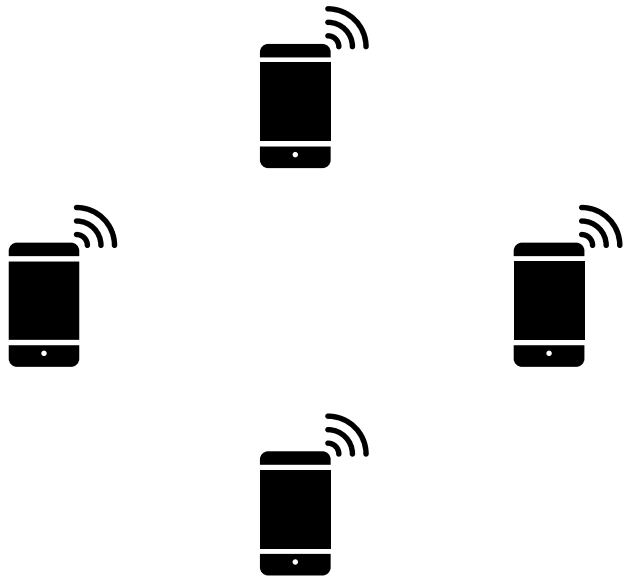
Image used with permission from: engineeringradio.us

Device-to-Device





Mesh Networking



RIVERSIDE

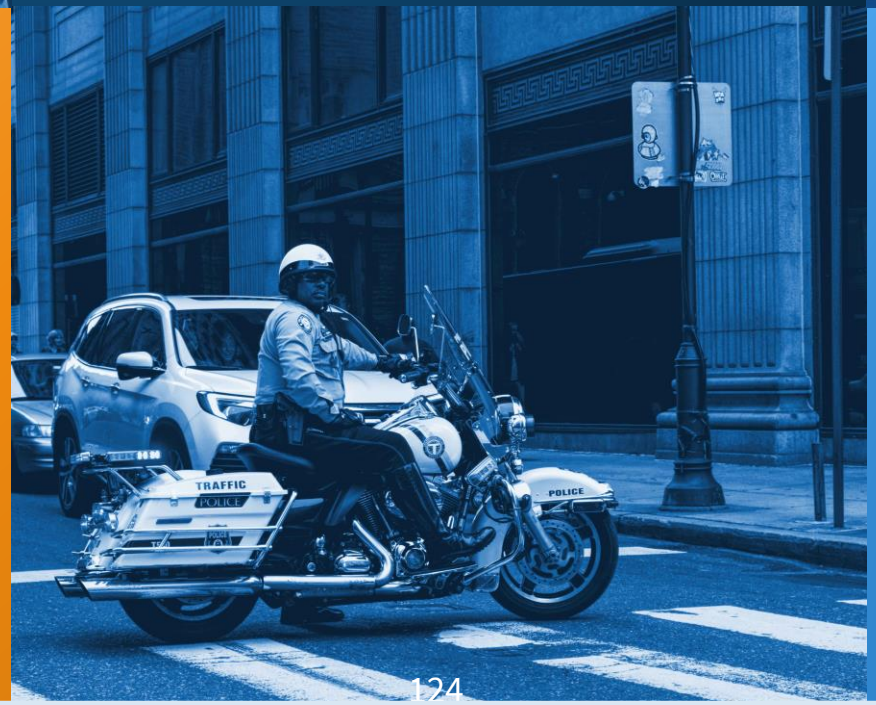
CORNELL UNIVERSITY FOUNDED A.D. 1865

Distributed Computing

RIVERSIDE

Distributed File Systems

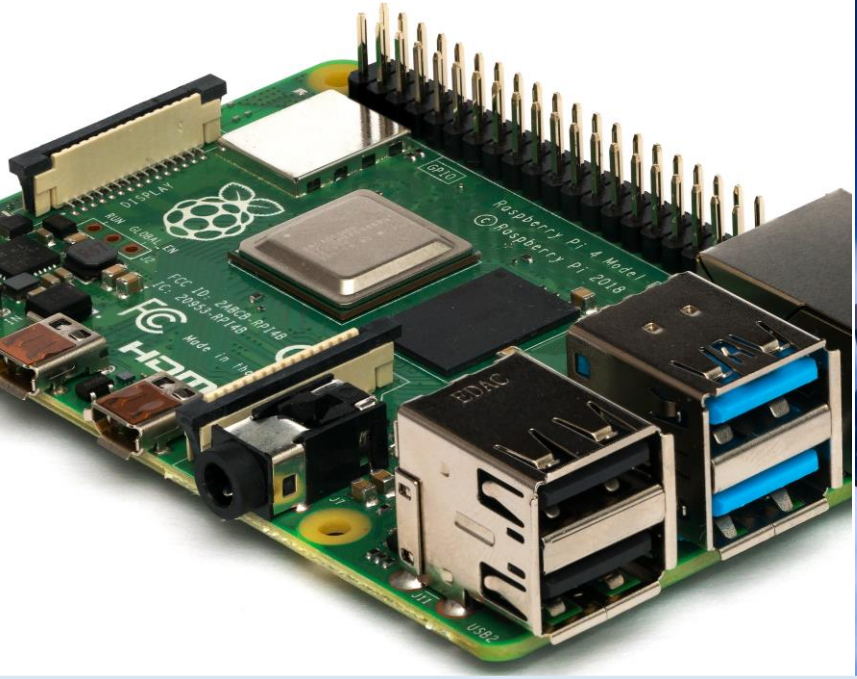
Traceability



Data Ferry

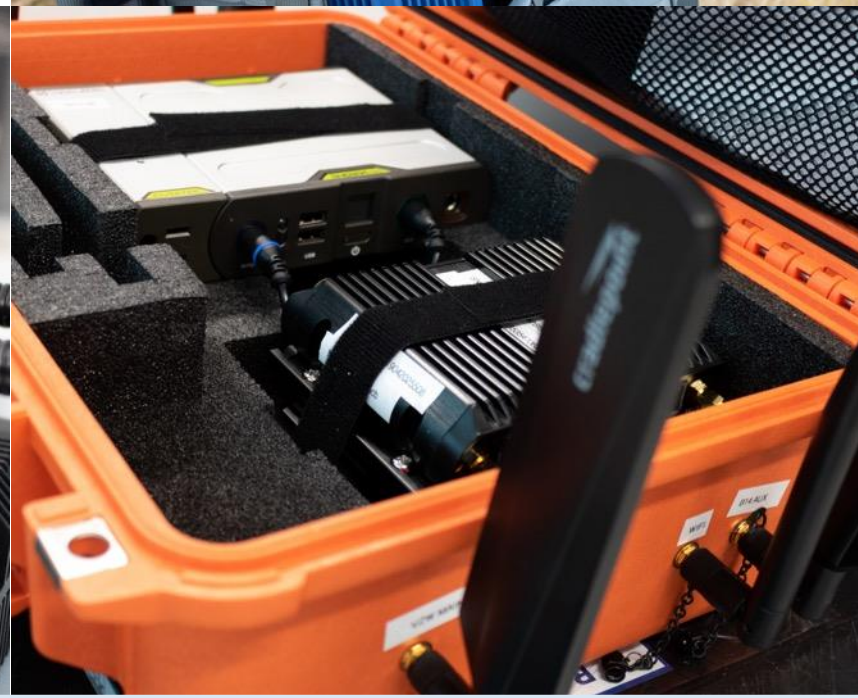
Image from usda.gov

Data Ferry



Michigan Tech
Research Institute

Deployable Networks

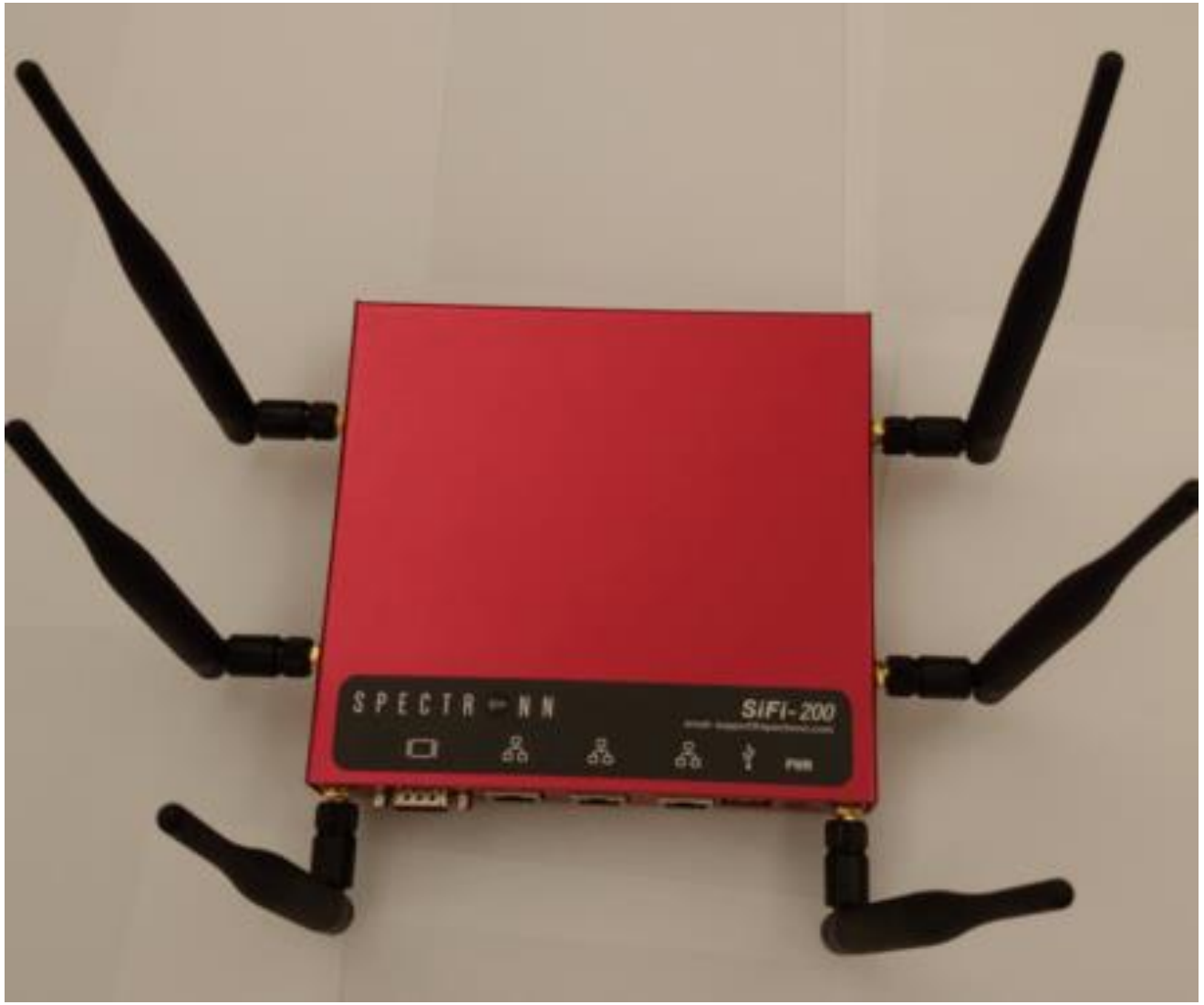




Mobile Edge Computing

Dynamic Edge Routing

SPECTRONN



SPECTRONN

Unmanned Aerial Systems Challenges

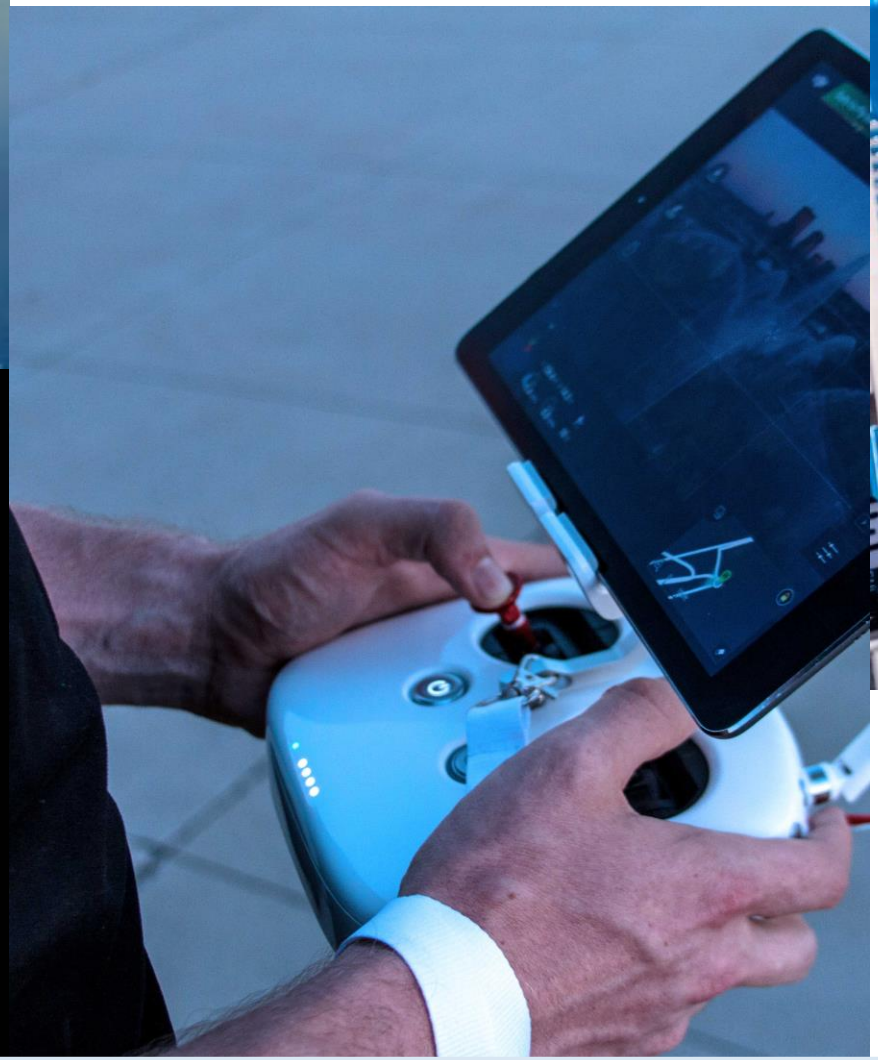
Indoor Localization

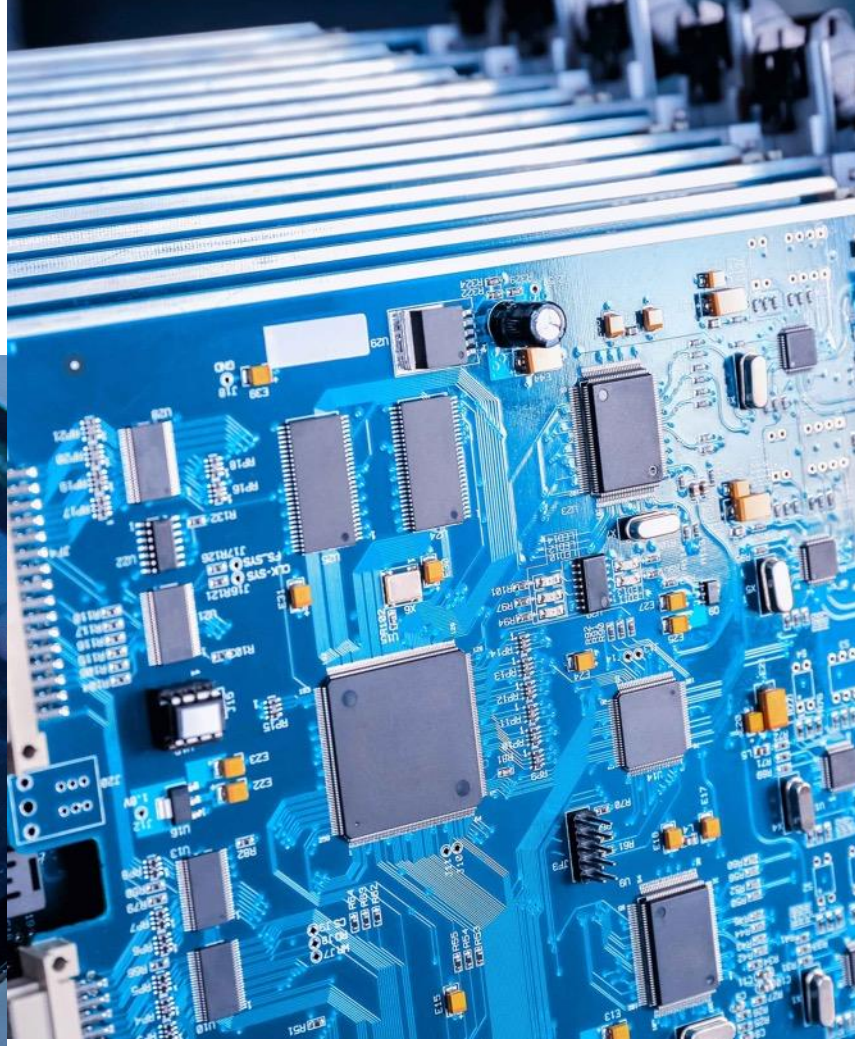
Outdoor Location and Mapping

Images from nasa.gov and nwcg.gov

UAS Security

Image from nasa.gov






Thank You
#PSCR2020
NIST
PSCR