

2019 Public Safety Broadband Stakeholder Meeting

Enhanced User Interfaces for Public Safety



2019 Haptic Interfaces for Public Safety Challenge

#PSCR2019

DISCLAIMER

Certain commercial entities, equipment, or materials may be identified in this document in order to describe an experimental procedure or concept adequately.

Such identification is not intended to imply recommendation or endorsement by the National Institute of Standards and Technology, nor is it intended to imply that the entities, materials, or equipment are necessarily the best available for the purpose.

***Please note, unless mentioned in reference to a NIST Publication, all information and data presented is preliminary/in-progress and subject to change**

Agenda



**PULLING
THE
FUTURE
FORWARD**

The Challenge

**Benefits of Prototyping in
VR
Developing Virtual Scenarios
with Public Safety**

Measuring Usability

**Technology Needs
for Public Safety**

Q&A

Panel Speakers

Enhanced User Interfaces for Public Safety



**Scott
Ledgerwood
UI/UX Lead**



**Megan
Waldock
Yet2
Researcher**



**Jack
Lewis
VR
Developer**



**Yee-Yin
Choong
Usability
Specialist**



Aurora SWAT

The Challenge

Relevancy of Haptic Interfaces for Public Safety Tasks

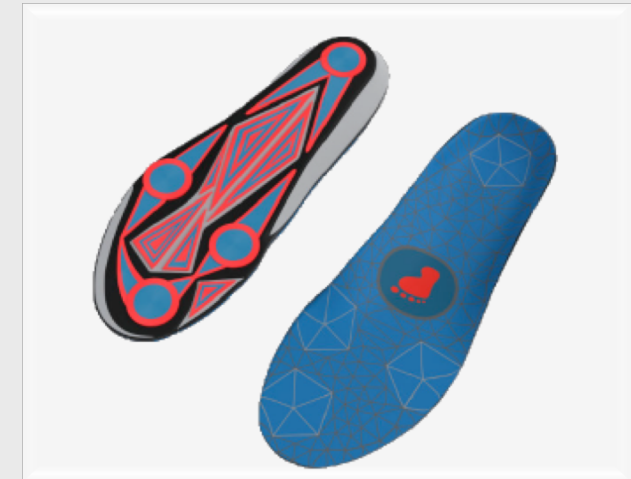
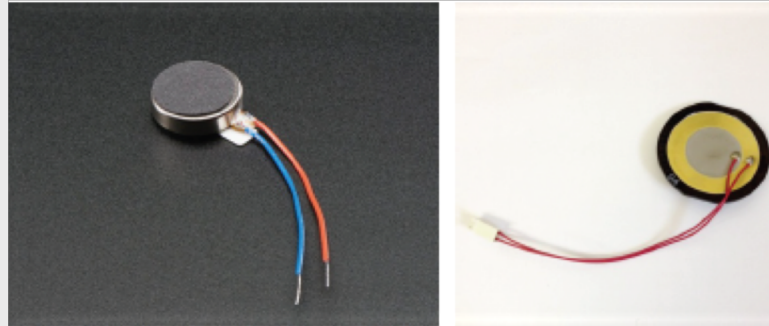
Can Haptic Interfaces assist First Responders?

**3 Virtual Scenarios
1 Live Test**

Prize Purse of \$425,000

Two Different Contestant Types

- Haptic Providers
- Haptic Development Teams



The Challenge

Relevancy of Haptic Interfaces for Public Safety Tasks



Phase 1 Concept Paper



Start: March 18

End: May 10

Phase 2 Teaming



May 13

May 23

Phase 3 Prototyping



May 24

July 9 - 11

Phase 4 VR Evaluation



July 9

September 10

Phase 5 Fire Nav. Course



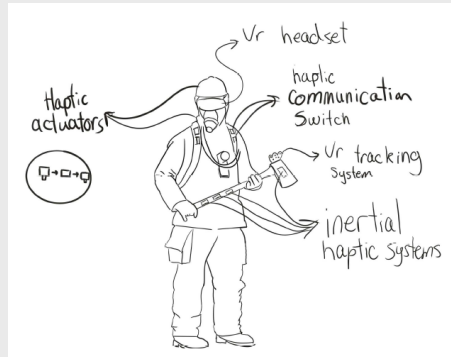
September 10

November 15

The Challenge

Relevancy of Haptic Interfaces for Public Safety Tasks

Concept Phase



VR Prototypes and Demos



Final Competition Search and Rescue with Haptic Integrated PPE



Benefits of Prototyping in VR

Megan Waldock

yet2 Search and Market Feedback

Objective and Metrics

yet2 conducted market feedback on typical R&D cycles for the development of products with significant user interface components (HUDs, wearables, haptics, audio, etc.)



UI/UX Usability Testing

Issue #1

**Need
frequent,
iterative
testing**



Once a system is in development, correcting a problem costs 10X as much as fixing the same problem in design.



If the system has been released, it costs 100X as much relative to fixing in design.



Factoring usability into the early stages of design and testing can yield efficiency improvements of over 700%.

Expensive Hazardous Testing

Issue #2

\$40K

-

\$60K

**Testing in
hazardous
scenarios**

\$10K

-

\$30K

**Consumer
testing for
single-
phase,
uncomplex
testing**

\$12K

-

\$20K

**Full service
testing
services
from third-
party firms**

**~\$50
K**

**Rental of
controlled
burn
facilities for
fire testing
(single day)**

Respondent Feedback

Benefits of prototyping in VR



Save costs

- MSA estimated that they might be able to save 20 – 30%



Increase the efficiency of design and development time

- Ability to quickly iterate on ideas
- Blueforce Development estimated that VR testing could reduce the development process by one month



Decrease the complexity of testing

- Reduce the number of prototypes carried forward into hazardous testing
- Limiting the hazard to study participants
- Responder Corp shared that they get better feedback when testing with a range of participants rather than at a single fire station

Conclusions

Based on Market Feedback



VR testing would be valuable in the early stages of development. However, all respondents believed that it could not completely replace real-world testing in the pre-commercialization and

Overall estimates of savings ranged from 1 – 4 weeks of time and 20% - 30% of costs.

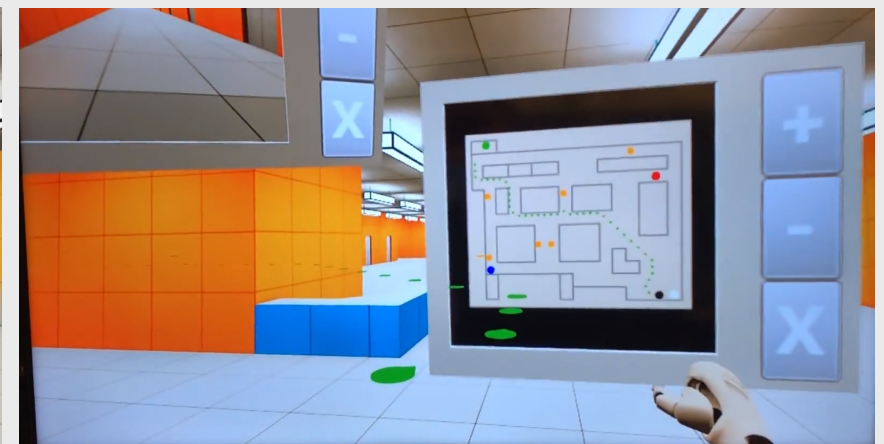
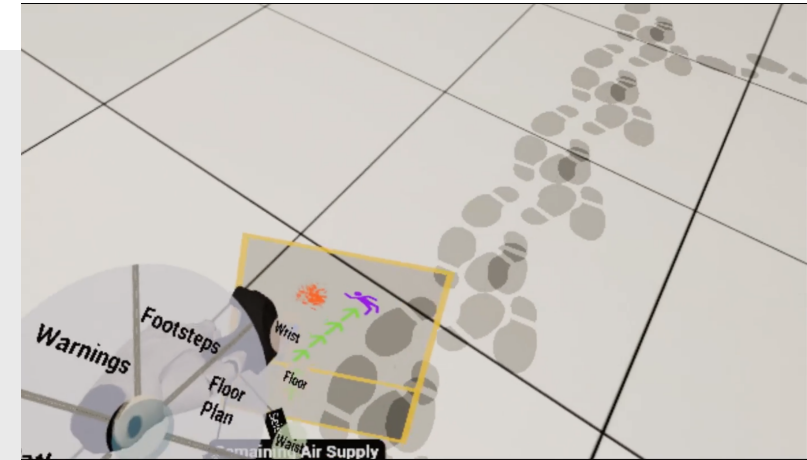
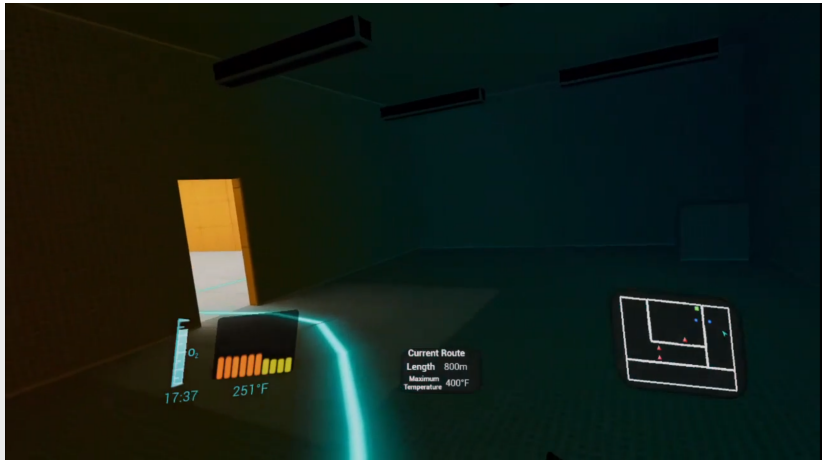


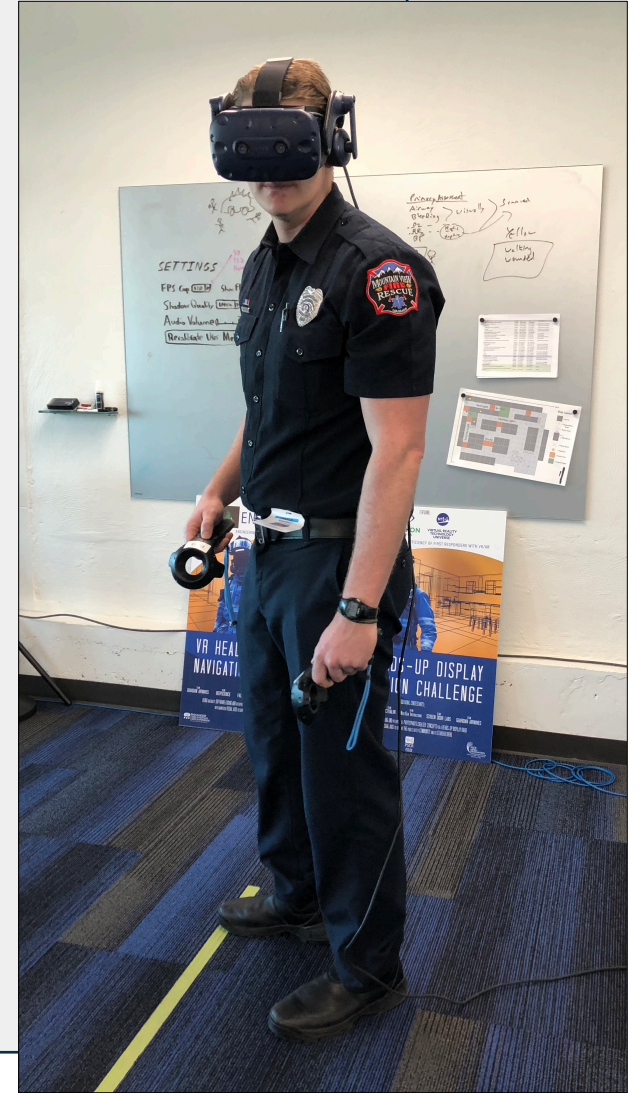


Developing Virtual Scenarios with Public Safety

Jack Lewis

2018 - Heads-up Display Navigation Challenge Finalists





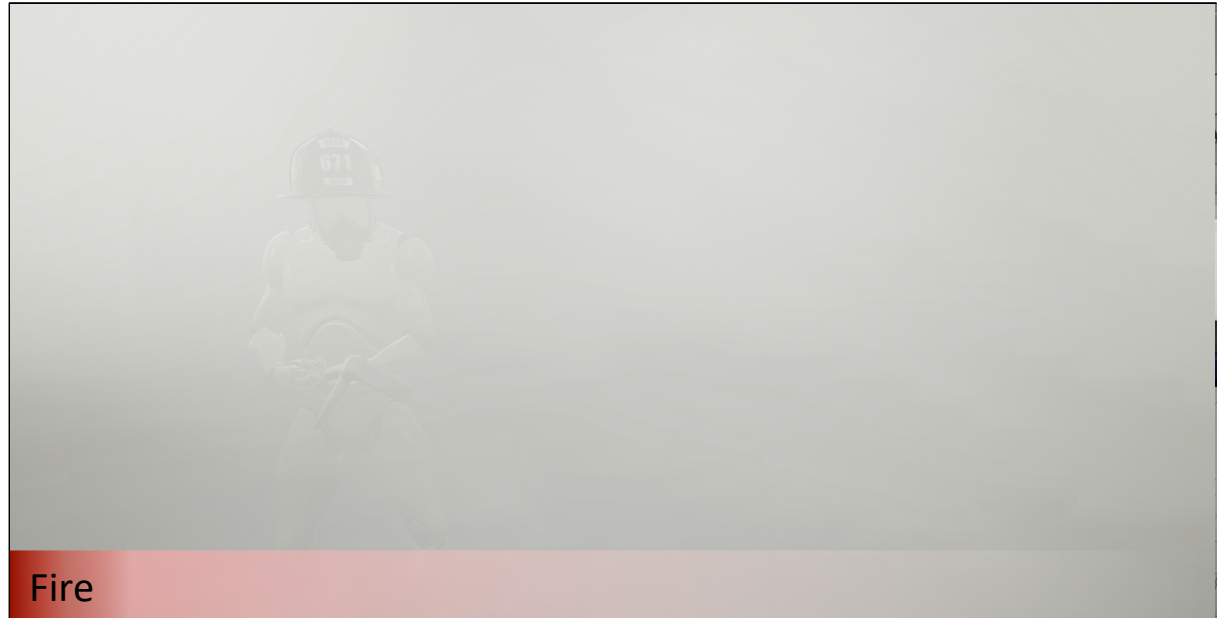
Our plan for what's next:



Emergency Medical Services



Law Enforcement



Fire

PSCR UI/UX at work:



Measuring Usability

Yee-Yin Choong

Human Factors & Usability Engineering

PSCR Technology

What it is NOT Just

~~Common Sense~~

~~Touchy
Feelings~~

~~Pretty User
Interfaces~~

~~Designers/Developers
= Users~~

First Responder
Centered



What it IS

Target Users

User characteristics, abilities, and limitations

Specified Tasks

User goals and objectives

Specified Context

Physical and organizational

Metrics

Efficient, effective, safe, and comfortable to use

Technology to Support Users' Tasks

First Responder-Centered Approach

If users **CANNOT FIND** or **USE** the *functionality*,

the *functionality* does **NOT EXIST**.

Evaluation – Haptic Interfaces Challenge

Two rounds of evaluation

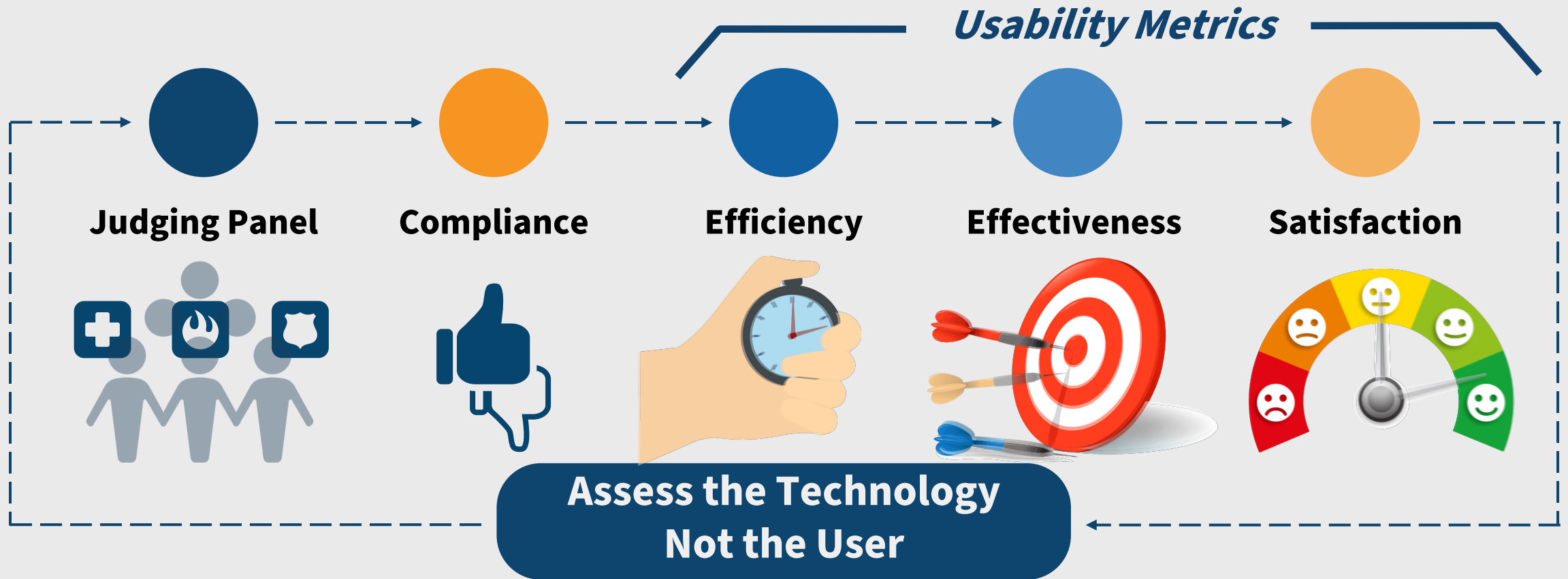
1



2



Evaluation – Haptic Interfaces Challenge



The background of the slide is a blue-tinted photograph of a firefighter. The firefighter is seen from behind, wearing a helmet with a cross symbol and a vest with "SHERIFF" written on it. They are suspended in the air, holding onto a rope, with a cloudy sky in the background.

Technology Needs for Public Safety

Dave Krieger

Technology Challenges for Public Safety: The Environment

Public safety personnel are tasked with performing in a variety of challenging environments.



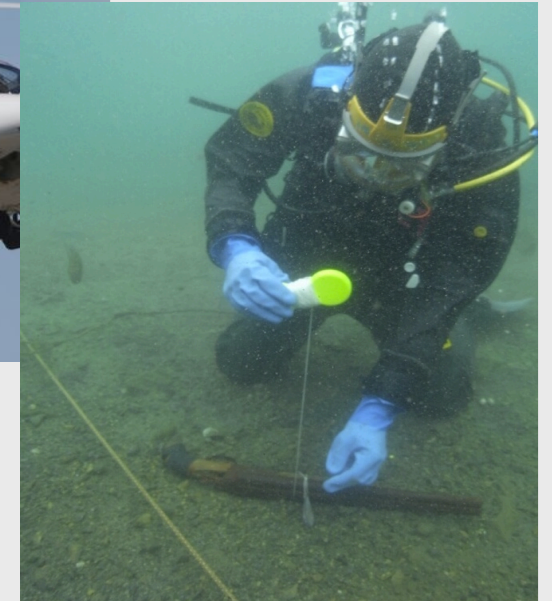
In the heat



and the cold



In the air



and in the water

Technology Challenges for Public Safety: The Environment



Surrounded by noise



and in complete silence



In low-visibility environments...



Technology Challenges for Public Safety: The Environment



...and high above the ground

Technology Challenges for Public Safety: The Environment and the Equipment



...and high above the ground

Equipment is often
restrictive

and frequently
makes
communication
difficult.



Technology Challenges for Public Safety: The Environment and the Equipment



Hands are frequently occupied.



Dexterity and ergonomics matter.

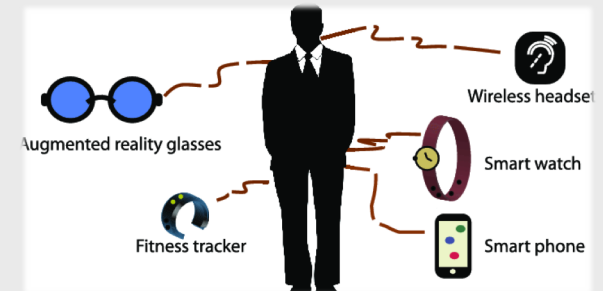
Addressing Responders' Technology Needs

Important Design Considerations

Durability, power efficiency, and compatibility



**End user-centric:
Unobtrusive,
intuitive, reliable**



**Must be a device /
hardware already
with the
responder***

Technology Challenges for Public Safety: Communication

Timely, accurate and thoroughly understood communication is vital for all involved.
Visibility on a common operational picture is imperative.



Incident Command



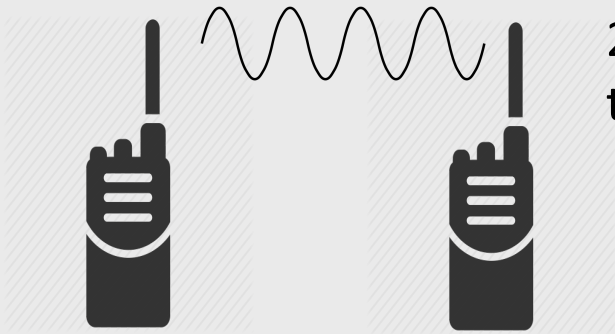
Responders on the ground



Citizen Reporters / Victims

Technology Challenges for Public Safety: Communication Limitations and Possibilities

What we already know about communicating during critical incident responses:

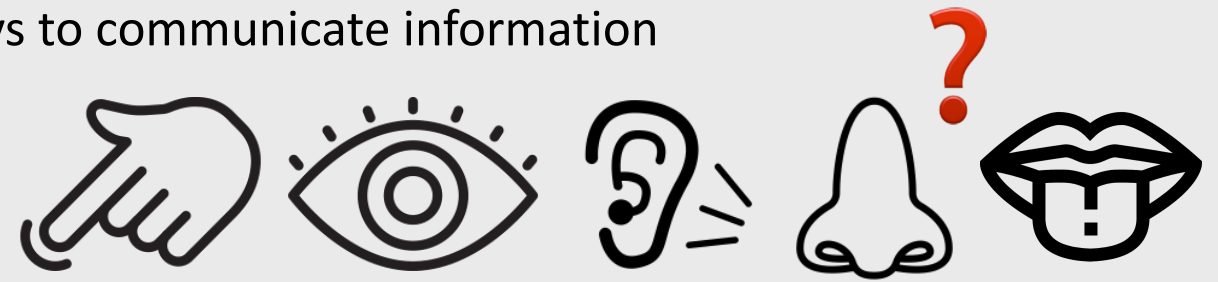


2-way radios are an inefficient and often unreliable way to communicate timely, accurate information.

- High volume of radio traffic
- Inability to visualize verbal-only communication
- Very limited situational awareness tool

Meaningful future technologies will find effective ways to communicate information

- Touch – haptics
- Sight – Augmented Reality
- Enhanced Audio Cues
- Other senses?



Technology Challenges for Public Safety: Bridging the Gap



Engineers



Responders

Technology Challenges for Public Safety: Bridging the Gap



Bridging the gap

Haptic Interfaces for Public Safety Challenge

Help first responders by developing haptic interfaces, prototyped in virtual reality and embedded in firefighter equipment for a live competition

Haptic Providers:

- Engineering Acoustics, Inc.
- Contact Control Interfaces
- Janus Research Group, Inc.

Haptic Development Teams:

- Brilliant Sole, Inc.
- Carnegie Mellon University
- Engineering Dynamics LLC
- IFTech Inventing Future Technology Inc.
- Team ASA-VR
- Team DSGN
- Team Haply
- Team WEAR Lab.



First Responder
Network Authority®

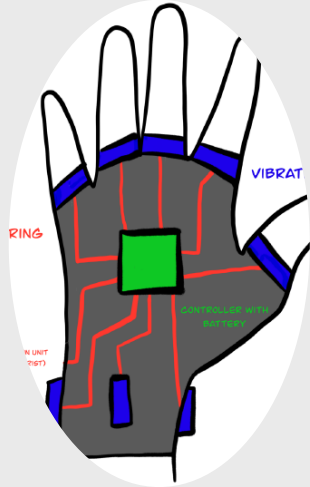


West Metro
Fire Rescue



The Challenge

PSCR Stakeholder Meeting



Contestant Demos

Haptic Prototypes Demonstrations

Teams Rotate Daily!

Your feedback improves their solutions and could impact the final submissions!

Final Phase November 2019

Results will be posted on PSCR.gov - stay tuned for updates!



NIST



THANK YOU

#PSCR2019

Break for
Lunch
BACK AT
1:00PM