PSCR 2020: The Digital Experience Question and Answer Document

Portal Concierge

Q: I submitted a question to the portal concierge, but received an error message. How can I get in touch with the portal concierge?
A: There was a glitch in the system that has since been resolved. Please resubmit your questions to the portal concierge and we will get back to you as soon as possible.

LIVE Sessions
PSCR Program Overview & Public Safety Keynote

Q: What is the name of the PSCR 2020 mobile app available for download?
A: The app is called "Crowdcompass Attendee Hub App", once you've downloaded the app, search for "PSCR 2020: The Digital Experience."

Q: How can participants chat with one another during PSCR 2020?
A: You can chat with other participants through the messaging function of the PSCR 2020 Mobile App. You can also participate in conversations on Twitter and LinkedIn by using the hashtag #PSCR2020.

Q: Did you use a professional "virtual conference" organizer for PSCR 2020? If so, what is the company's name for reference?
A: This content was designed by our programmatic support team, Corner Alliance, and was created from the ground up specifically for this "event."

Q: What is the future of PSCR after 2022?
A: It is our hope and desire to be able to continue to work on these important issues. As of right now, that path is not clear but we are working with leadership to determine a way forward.

Q: Please elaborate on NIST collaboration with international entities like TCCA and Australian Critical Comms Forum.
A: PSCR wants our work to support not just U.S. public safety, but the global public safety community. It's important for us to do outreach to not only U.S. stakeholders, but to the international community to create a global public safety marketplace. The relationships we can build internationally will allow us to receive more input from public safety stakeholders and can also provide our research and content for international entities to use to further their own efforts.

Q: Is there going to be a new PSIAP round of funding, particularly for UI/UX?
A: Yes! The [NIST Public Safety Innovation Accelerator Program Augmented Reality competition (PSIAP-AR)](#) has just been announced. NIST will host a [webinar](#) to provide general information regarding this NOFO, offer general guidance on preparing applications, and answer questions on August 12, 2020 at 10 AM MT.

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

Q: What specific problem were the prize challenge participants trying to solve and what specific technical development did they achieve in their solutions? Where can we see a recorded demo of the solutions?
A: Both prize challenge participants attempted to solve the problem statement: can haptic interfaces help first responders save lives? Prize challenge participants were evaluated on 1) How the prototypes impact a first responder's performance in three virtual reality (VR) scenarios [law enforcement, emergency medical services (EMS), and fire service], and 2) How, once embedded into firefighter personal protective equipment (PPE), the prototypes assist firefighters in a realistic scenario as they navigate and conduct a search and rescue task at a firefighter training facility. Continue reading for a brief synopsis of each solution and where to watch the demo or read more.

Sean Hackett, Carnegie Mellon University:
Our initial prototype used vibration motors attached to the inside of a builders helmet to get an idea of how our solution could work. The motors were controlled by a microcontroller, and a wired USB connection was used to operate the vibration motors from a PC keyboard. For the VR phase of the challenge, the operation of the motors was controlled from outputs in VR software in Unreal Engine (e.g., if a target was behind you, the back motor would vibrate, etc.).

When developing the final system for the live firefighter training course, we had to embed our solution into a firefighter's helmet. We modified the headband of the helmet to contain the vibration motors so the headband could be easily removed and swapped between different helmets. We attached a small control box to the back of the helmet which connected to the motors, contained the motor drivers, and communicated to a hand held RF remote controller to issue the directional commands to the helmet wirelessly, progressing from the wired USB connection in the VR phase.

You can view the Hyper-Reality tech demo in the PSCR 2020 portal here.

<u>Felix Desourdy, Haply:</u>
There were two main technical challenges we faced while creating a device that were not already solved in our previous work as a haptics company. The first was finding a way to make an ergonomic device that could be fitted around the neck or head in a very secure, rigid way to apply maximum force to the skin without compromising the comfort of the device. The second challenge was building a sturdy and reliable communication process that used WiFi from a laptop or tablet to send real-time instructions, provided by the VR game or the guide (in the live demo), to the haptic device and then sending back the absolute orientation from the accelerometer that we implemented in the device itself.

You can read more about Haply as a prize challenge winner here.

This is NOT a Game: AR/VR for Good

Q: How do you overcome built-in resistance of new capabilities in public safety agencies?
A: It seems a good place to start is through education and demonstration of quality content, with clean CGI examples to first responders of their leadership and citizenship. We as humans may well be inherently predisposed to avoid change, but in today's world, change is the only constant. To that fact, the VR and AR solutions will prevail — in time.

Q: Agencies are stretched to get the most basic of tools. Where would the funding come for these devices, expanding AFG?
A: First response agencies will remain in a budget-challenged landscape and AFG and other governmental funding sources should be considered. Concurrent alternatives including grants, gifts and scholarships for gaining awareness, equipment and content development are available through enterprise, academia, and philanthropic organizations; monopolizing these opportunities is also recommended. Generally these agencies contribute significant financial expenditures to training and a variety of insurance policies — areas that might benefit from being re-evaluated for associated effectiveness relevant to risks and benefits.

Q: Can anyone discuss how AR/VR being used at/for the incident will require more robust edge computing processing in addition to high speed network and cloud computing?
A: This is a great question. Part of PSCR's research relates to resilient communications for public safety, and the utilization of edge network components is a big part of this. Not only will edge processing allow faster communication by only accessing the greater "cloud" connectivity when needed, but also by utilizing edge components; we can create a much greater situational awareness for first responders by accessing different data at different levels of the network. Utilizing AR/VR as a situational awareness display will require a great amount of network connectivity. In order to

fully achieve the high bandwidth required, it's important to bring as much processing to the edge as possible, and rely only on central cloud connectivity when absolutely necessary.

Q: If someone is interested in getting into this field, what training or skills would you recommend and/or just to stay abreast of what's going on?
A (Alison): I recommend paying attention to human factors design as these are critical for any device to be used. If we're talking about first responders specifically, I would have an understanding of the communication interfaces that would be used in the field so that you can understand the various levels of bandwidth and connectivity that you may need to work with. The best interface in the world won't do any good if you don't have the connectivity needed to access it. I would also look into some of the incident management standards available, such as the National Incident Management System, to understand how first responders operate.
A (Greg): If you're interested in developing user-facing solutions, it's important to have a strong understanding of 3D spatial design concepts and human factors. As AR/VR is wearable technology, the most successful and disruptive applications will be built by those who develop a deep understanding of how these technologies work and how they can enhance and amplify human physiology. I'd also recommend building a deep working knowledge of Unity or Unreal as these development tools are essential in building real-time 3D spatial applications and they have integrated support for AR/VR platforms today.

Q: As public safety is a niche market, how could we build an international interoperable competitive AR/VR market that supports information exchange independent of device and solution?
A: Regarding information exchange, the biggest opportunity I see for the tech industry is to standardize around IoT protocols, regardless of device. Standardization (and by extension, security) is critical to enable some of the more compelling use cases we discussed in the panel, where first responders can leverage contextual data delivered by a number of interconnected devices in real-time.

Q: Can we expect the gaming/consumer industry to find the core solutions for form and human factors?
A: There are innovative and encouraging UX and human factors breakthroughs happening across consumer and enterprise verticals, but as AR/VR is wearable technology, it is not one-size-fits-all so, I don't believe human factors will be solved exclusively by the consumer market. Magic Leap is enterprise-focused and for our customers there are many considerations that are unique to industrial use cases. For example, when designing solutions for frontline workers, we need to consider the conditions of their operating environment, along with the physical and cognitive load the end-user is under. The challenge is to deeply understand the unique requirements for different kinds of users and build products that can accommodate the needs of customers in your target market(s).

Q: Does Magic Leap view and support public safety first responders' need for "heads up and hands free" operating mode?
A: Yes and with Magic Leap 1, we are able to accommodate a number of "heads-up and hands-free" use cases as our device supports a number of input methods such as full hand-tracking, eye-tracking, and voice input.

On-Demand Sessions
Mission Critical Voice

- **LMR Data Collection**

    Q: Is it PSCR's intent to make some of the collected data available to industry to aid them in the development of their solutions? Examples of useful data would be the distribution of call rate, duration and direction (dispatch to responders, vs responders to dispatch) for each type of PS discipline (law, fire, EMS).
    A: Generally, yes. We want this data to be available for the advancement of public safety telecommunications technology. However, certain data may be deemed sensitive and will not be published. Currently, we have only collected data from an analog system. The data we have now is transmission time and duration, frequency/channel (relates to a call group: fire; ems; police; sheriff; etc.), and location estimate. When we collect from a digital system, we expect more data to be available (e.g., radio GPS for greater location accuracy, group IDs (more refined than frequency/channel data), and call IDs, which relate to specific individuals and we will NOT publish), and other data the system transmits.

- **LMR to LTE**

    Q: In your lab, are you able to encode/decode CTCSS on the air and use this to help gate audio (rather than relying purely on carrier squelch)? This may be expected of a final solution as pure carrier squelch can result in false traffic.
    A: Yes, in fact using the "CTCSS squelch" GNURadio block is a better practice. We are hoping to further quantify how much better CTCSS is for triggering the system overall.

    Q: In-band signaling, enhancements were mentioned to improve feature parity between MCPTT and Analog FM. FYI, there are several in-band schemes already employed that provide PTT-ID and Emergency status (e.g. MDC-1200, GStar, Fleetsync). Ideally the SDR/GNURadio can be improved to encode/decode this in-band signaling.
    A: We are aware of the signaling you mention and agree that these are next steps for the solution. We are specifically looking at including MDC-1200 into our test bed.

Q: I understand that the NIST-funded MCOP project was to create an open-source MCPTT client. Why was this not used in your project? If there were unacceptable limitations, what were they?
A: As far as I know MCOP does not provide a "normal" PC client but is instead an Android SDK. As my target platform is not Android but a linux server I chose to go with the C++/python based PJSIP project instead. Additionally the functionality needed to support the LMR side is out of scope of the MCOP client SDK.

Q: How would I participate in these efforts? I am a federal LMR tech and innovator.
A: If you are a federal agency, contact Gabriel Martinez at DHS (Martinez, Gabriel A. (CISA) <gabriel.a.martinez@cisa.dhs.gov>) about getting involved with the Advanced Technology Working Group, as we're involved with that activity.

Q: Would PSCR be interested in collaborating with industry on improvements to existing LMR standards that would meet the goals of your project? The Public Safety Technology Alliance (PSTA) may be interested in such collaboration.
A: Thank you for your interest. Please contact us at pscr@nist.gov with any collaboration ideas.

Q: Can you please explain what the Non-MCx client is that you refer to?
A: Apologies, the term "Non-MCx users" is not explicitly defined, but MCX clients and groups are documented in the 3GPP standards. Non-MCx users are implemented at the MCPTT server to allow the LMR based users to register and make calls though the MCPTT system via a traditional SIP stack. This pre-standardized solution was implemented for research purposes.

- **Multicast and Unicast in Serving Public Safety Traffic**
  Q: Does PSCR have open or public safety network traffic models or traces that may contribute to realistic scenarios for research and M&S?
  A: We currently do not have traces publicly available. As we continue to develop more accurate traffic models and scenarios, we incorporate real data when available. Some examples can be found in last year's Stakeholder Meeting presentation.

- **The Evolution of Direct Mode in 3GPP**
  Q: Have you had any discussions with chipset manufacturers on their work with C-V2X sims?
  A: We have not engaged with manufacturers regarding their C-V2X simulations. Companies typically use in-house simulators, but we will rely on results shared in 3GPP specifications to validate our implementation.