

Podcast Transcript: Combining Technology and Training to Protect Workers

[Theme music]

Ashley Ahearn (Narrator): You're listening to Environmental Health Chat – a show from the National Institute of Environmental Health Sciences that explores the connections between our health and our world.

I'm Ashley Ahearn.

[Music fades out]

When disaster strikes – whether it's a hurricane, a toxic spill or pipeline leak, a bombing, flood, or wildfire – brave men and women go to the frontlines to help clean up the mess and make sure people and communities are safe.

Over the past 34 years Mitchel Rosen and his colleagues have trained *750,000* of those brave men and women.

Rosen is the director of the Center for Public Health Workforce Development at the Rutgers School of Public Health. He's also the head of the Atlantic Center for Occupational Health and Safety Training – which is funded by the NIEHS Worker Training Program.

Rosen has dedicated his career to empowering emergency and hazardous materials response workers with the training they need to stay safe while doing important and often dangerous work.

Mitchel Rosen: We've done training for Hurricane Sandy, we've done training for Ebola, we've done COVID training, and just about every other disaster that has occurred over the last 30 years – we've been involved with training workers to protect themselves from those hazards that they face, whether it's terrorist attack, whether it's a natural disaster or other, we've been there to help those workers.

AA: The skills and equipment needed to respond to one hazard may not be the same for another. Responding to an oil spill, for example, or safely cleaning up a Superfund site requires different types of protective gear and knowledge than, say, responding to a wildfire or a flood...

MR: So it ranges from simple things that you see every day on workers like steel toed boots and safety vests and hard hats through all kinds of heavy duty personal protective equipment that includes respiratory protection and chemical protective clothing.

AA: But no matter the disaster or cleanup at hand, the core approach is the same, Rosen explains.

MR The thing that we try and focus on is that model of hazard identification, hazard assessment, and hazard control. If you can identify the hazards, you can assess them – how it's going to impact you. And then, how do you control them? How do you make it better?

AA: Through collaborations with various organizations, and with funding from the NIEHS, the Atlantic Center has conducted trainings all over the United States and in Puerto Rico. In 2017,

after Hurricane Harvey hit Houston, Rosen went down to provide training to workers and communities based on the lessons he and his team had learned from responding to Hurricane Sandy five years before.

MR: One of the things that was really needed was to reach the day laborers who were out on the corners or out at the home stores looking for a job. And we went to a lot of different places to teach those day laborers how to put on safety equipment. And we actually gave them some safety equipment so that they can take it with them. And we provided resources that were in English and Spanish so they can understand it. Some of them were graphics that showed them how to do it, not just with words, but with pictures. So finding different ways to meet the populations that you serve, and meeting them where they are, and giving them the tools that they need to protect themselves.

AA: Many of the people who have come through the Atlantic Center's worker training programs over the years have found pathways into new careers. The NIEHS Worker Training Program focuses on underserved and underrepresented communities in many of its programs, enabling unskilled laborers or those who were perhaps previously unemployed, to find meaningful careers that also pay well.

MR: These types of programs make a difference in people's lives. From the importance of understanding hazards and controlling hazards in the workplace so that you remain safe and go home at the end of the day, to providing sustainable jobs that enable you to support your family and to become self-sufficient in the way that you're living your life.

AA: Rosen and his colleagues have implemented a tried-and-true training approach over the decades. It's a 40-hour, in-person classroom session that can be tailored for all different kinds of hazardous materials or natural disaster responses.

But one of the things that has made Rosen so effective for so many years is his ability to get creative, find new collaborators, and adapt and incorporate changing technologies into his training approach.

And he's had a longtime partner and kindred spirit in that.

Cesar Bandera: My name is Cesar Bandera. I have a Ph.D. in electrical engineering, and I am co-founder of CellPodium LLC, located in the small business incubator of the New Jersey Institute of Technology.

AA: Rosen and Bandera met back in 2006 through one of Rosen's colleagues at Rutgers. Bandera was a small business owner. He'd started his company, CellPodium, a few years before.

CB: As the name CellPodium implies, we develop primarily software for mobile devices that fall in the category of mHealth, mobile health. Our clients tend to be institutions that have public health outreach as part of their mission. NIEHS, the Centers for Disease Control, NIOSH – all these organizations have some need for mobile devices and using mobile devices to communicate with their stakeholders or their communities. That's where we come in.

AA: Rosen's colleague told him that Bandera was looking to apply for a Small Business Innovation Research grant through the NIEHS and asked if he'd be willing to chat with him.

MR: And I said, of course, always happy to expand our connections and collaborations and looking for good projects that will help us do training better, and to provide information that is easily communicated to workers and any way that we can do that better, I'm happy to have those discussions.

AA: So, the public health expert and the electrical engineer get together and they walk into a bar... just kidding, this isn't the start of a joke. But it is the story of a HAZMAT training match-made-in-heaven. At least that's how Cesar Bandera, the electrical engineer, felt when he met Mitchel Rosen.

CB: Yes, yes, Mitch is unique in that he's not an engineer, but he can express his needs, his requirements in terms that an engineer can understand – not just in the language of HAZMAT trainers, but in the language of technologists. That really was what sealed our relationship. He can wear many hats.

AA: Rosen explained to Bandera the challenges of responding to an emergency and trying to train workers on the fly, often with limited access to internet or even classrooms in which to hold traditional training sessions. Bandera and his team were excited to help solve that problem using the technology platform they'd developed for CellPodium. Together they came up with what was called the Just-In-Time-Training-Emergency-Incidents-System.

CB: That first collaboration was a method of broadcasting short videos, to any cell phone, anywhere in the world – short just-in-time training videos. And of course, this was a decade before we had mobile YouTube or even video cameras on cell phones.

AA: The technology platform enabled response workers to get training videos and share information like itineraries, floor plans, and maps in real time via text. CellPodium also enabled workers to share that information with one another over cellular signal – no internet required.

And this technology was critical to the response efforts after Hurricane Sandy hit the east coast a few years later.

Bandera lives in New Jersey and the storm ripped several holes in the roof of his house. He had to climb into his attic and literally stick umbrellas up through the holes and then open the umbrellas to stop the rain from coming in. So, he's got his umbrellas plugging the holes in his roof – problem solved for the moment – and he gets a call from one of his collaborators at the Centers for Disease Control. The CDC was helping with the disaster response...

CB: He said, Cesar, how are you doing? I said, 'I'm fine, I'm fine, you know, we survived the storm and I'm in the middle of putting things back in order, let me give you a call as soon as we're out of this.' And he said, 'No, no, no! You don't have to call me, I'm calling from in front of your house [Bandera laughs]. We need your technology to help coordinate our rapid response teams that are here in New Jersey.'

AA: So Bandera and his team deployed to a college gymnasium-turned-emergency-response-command-center and put their technology to work.

CB: And we started sending and receiving multimedia messages from there to all the participants. And actually, once a responder received one of these messages from CellPodium,

they were able to edit it and forward it to others. So it was not a centralized network anymore, it was a peer-to-peer with multimedia because text still worked. But when you're trying to send these very complicated agendas or maps, room layouts, that simple text messaging would not do it. That's where our value proposition came in.

AA: Seeing Bandera's successful deployment of the technology after Hurricane Sandy got Rosen thinking about how to build on that and take a broader look at how mobile learning could add to traditional HAZMAT training practices.

MR: You know, my thought process earlier on was that training is delivered in a classroom and is instructor led. But looking at how we can deliver training in bite sized pieces that are able to be delivered in different ways really changed my perception of how training could happen.

AA: So Rosen and Bandera put their heads together to figure out how to use mobile technology to enhance the traditional 40-hour HAZMAT course. And they got a grant from NIEHS to explore the usage of augmented reality in training scenarios.

Traditionally, at the end of the course, students would go through a mock HAZMAT response scenario at a training facility. They'd suit up in HAZMAT gear and have to navigate a simulated disaster zone.

MR: And so we've got drums of hazardous waste and other things like that, that are on this mock hazardous waste site. So clearly, there's no real hazards, or no real chemical hazards at these sites.

AA: But the goal is to give trainees the feel of a real emergency response. Traditionally, the course instructors yell out information to the trainees as they're navigating the site – like, "you've got 20.9% oxygen in your air monitor" – to simulate the conditions of a real disaster zone. Rosen knew they could take the student experience to a whole new level by using augmented reality.

MR: So, what we wanted to do is to create something that was a little bit more realistic so that the instructor didn't need to shadow the workers, but they would be able to use – through their cell phone and the pods that were set up – this system that would give them real-time readings that simulated the hazards that we wanted them to be exposed to. So, while they're walking through the site their holding the cell phone and they are getting real-time readings that are simulated but set up the way that we want them. And then this would allow the workers to react in real-time, and not have the instructor over their shoulder telling them, 'yeah, you should probably back away because those readings are too high that I just told you.'

AA: With guidance from Rosen and his colleagues, Bandera was able to create a whole system, using smartphones and Bluetooth sensors set up throughout the training site, to simulate the toxic readings for exposures the trainees might experience in a real disaster response. It wasn't virtual reality, like with VR goggles in a controlled environment, it was augmented reality: technology making the physical experience of navigating a simulated toxic site more real to the trainee.

CB: We are combining reality – you know, these are real people in a real field with real with real drums, releasing real smoke – with a simulated component. But the two parts – the real world and a simulated component – must coexist in real-time. In other words, when a person

approaches what looks to be a leaking drum the exposure readings have to change instantly as if that exposure was real.

AA: The ability to train workers using augmented reality has applications far beyond the Atlantic Center. Public and private organizations – like police departments, utilities, or oil companies for example – can license the technology to better equip their workers to respond to a disaster. Bandera says NIEHS funding via the Small Business Innovation Research program was key to getting technology like this out into the world.

CB: None of these commercial markets would invest in the research and development of this technology. They would eagerly buy the product once finished and vetted. But not the R&D phase of it.

AA: Traveling all over the country to conduct trainings after emergencies or taking calls from the government to coordinate the tech side of a disaster response in your home state after a superstorm is all part of the job for Mitchel Rosen and Cesar Bandera. And their partnership – between public health and technology – has made hundreds of thousands of workers more safe. Bandera says he wouldn't have it any other way.

CB: It's hard work, you have to be prepared, but at the end of the day, you do wrap things up with a pretty good feeling that you wouldn't get from a traditional engineer desk or lab job.

[Music comes up]

AA: I'm Ashley Ahearn. Thanks for listening to Environmental Health Chat.