

# A Consideration of the Needs of People with Disabilities in the Development of FirstNet Enabled Technologies for First Responders

## Final Report

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## 1 Executive Summary

The goal of FirstNet is to replace current first responder land mobile radios with an interconnected, Long Term Evolution (LTE) based high-speed network for both mission critical voice and high-speed data. FirstNet promises to provide access to a more reliable voice network and, perhaps more importantly, a high-speed data network capable of supporting access to a variety of databases and sensors previously out of reach to first responders. FirstNet technologies will enable access to specialized tools and subject matter expertise in real time that will assist in the execution of their mission. FirstNet has the potential to assist first responders in supporting people with disabilities during emergencies by providing first responders access to services and information critical to interacting with and determining the needs of people with disabilities. A first step in the development of such systems is understanding the needs of people with disabilities by studying their historical interactions with first responders.

This report summarizes the results of a survey conducted to ascertain challenges and unmet needs during interactions between people with disabilities and first responders, focusing on critical information that needs to be shared between the two parties to have a successful interaction. Surveys were designed for each population and deployed via Qualtrics. A total of 153 people with disabilities and 75 first responders were recruited; data analysis included responses from 117 people with disabilities, and 33 first responders after incomplete surveys were excluded.

Three overarching themes regarding unmet needs were identified among responses from people with disabilities: communication, understanding disability, and respect. Two themes were identified among responses from first responders: interacting is the job and accommodations. Several ways that technologies could facilitate the ease of interaction between these populations were identified, including assisting in communication, identifying needs, and a better understanding of disability and best practices for interactions.

## 2 Introduction

In the wake of an emergency, first responders need relevant, up-to-date information about the nature of the emergency, the needs of the people impacted by the emergency, and information necessary to coordinate response efforts. FirstNet will provide a reliable high-speed network to support critical voice communications and will enable connections to data and services that were previously unavailable on slower data networks. Services improving communications with people with disabilities, services assisting in the identification of needs of people with disabilities, and services providing access to real-time subject matter expertise could greatly enhance the ability of first responders to execute their mission.

People with disabilities (PWD) experience communication barriers that are amplified in the event of an emergency, making them an especially vulnerable population. PWD have been excluded from most research studies, and when designing a system to improve their experience

in emergencies, it is critical to understand and accommodate for their needs (Rios et al., 2016). In an effort to ensure that FirstNet is designed to be as inclusive as possible, a project was developed to identify the needs of PWD with respect to interactions with first responders.

First responders have different technology needs in order to perform their duties, and current technology does not fit the needs of all first responder groups (NIST, 2020). Therefore, it is crucial to investigate communication needs across the disciplines (EMS, Fire, Police). In critical, high stress situations, first responders require as much information as technology can provide in a manner that does not distract or increase their cognitive load (NIST, 2018). While first responders receive training appropriate for their discipline, including online simulated game-like courses that demonstrate high learning and satisfaction rates, it's unknown how these courses translate in real-world practice (Wolf-Fordham et al., 2014).

The National Institute of Standards and Technology's (NIST) Voices of First Responders series investigated first responders' use of technology to perform their duties through interviews and surveys (NIST, 2018; NIST, 2020; NIST, 2021). Over 7,000 first responders were surveyed from different disciplines, (law enforcement, EMS, firefighters, and communications/911 dispatch), locations (urban, suburban, and rural), and levels (local, county, state, and federal). Insights were gathered about technology use, common problems and perceptions about technology, and then analyzed by discipline and setting. First responders, as a whole, care deeply about their jobs and the people they serve, so they try to go above and beyond when possible. Technology can be both a gift and a burden in their eyes, so new technology developments must be relevant to the context of use. Outdated technology is very prevalent in this field due to the ever-changing nature of technology, which results in steep learning curves and slow implementation. Cost is another barrier to the adoption of new technology, which was cited by all disciplines as the main reason for using older technology. Besides the initial cost of the technology, costs for maintenance, training, subscription and software must be factored in. The use of outdated technology, including slow computers and work-issued flip phones, poses a safety issue that needs to be addressed. To counter that, it was found that many first responders stick to what they know, and often use their own smartphones to prevent cognitive overload in the stressful and complex situations they encounter on the job. Personal smartphone use was found to be almost double that of work-issued phones. Common technologies used by first responders include: radios, personal smart phones, desktop and laptop computers, tablets, pagers, work smartphones earpieces and mics. However, technology is also not a "one size fits all" approach, meaning that across disciplines, different tools are used to best suit first responder needs. A tool used by law enforcement may not have the same benefit to firefighters or EMS.

Potential improvements to the system may provide an information stream notifying first responders that there is an individual with a mobility disability in the building who will need special egress assistance prior to their encountering the individual, or that an individual who relies on American Sign Language (ASL) is nearby so that an interpreter or remote interpreter service can be provided. FirstNet is in the process of considering user-interface design and development, including understanding what the experiences of first responders are like when

they interact with individuals who have disabilities (sensory or mobility). This will eliminate the need for ‘retrofitting’ the system once it has been established, as first responders have noted frustration with technology being replaced just as soon as they became familiar with it (NIST, 2021).

To this end, research funded by NIST’s Public Safety Innovation Accelerator Program (PSIAP) is underway to create a comprehensive framework for developing, modifying, and evaluating near-future technologies in an augmented reality environment (Fain et al., 2019; Farmer, 2020). The Augmented Reality Testing of Equipment in Multiple Immersive Simulations (ARTEMIS) allows for FirstNet-enabled technologies such as advanced heads-up displays or other wearable technologies to be tested in a simulated environment before investing the time and money required to implement them into a real-world scenario. ARTEMIS can be used for training FirstNet-enabled technologies as well as objectively evaluating new technologies and protocols. The ARTEMIS platform allows both first responders and people with disabilities to trial and provide input for future tech mockups in a manner in which feedback can be rapidly incorporated. For example, in our simulated traffic stop scenario, a mockup of an assistive communications tablet was incorporated to assist a police officer in communicating with a driver with a hearing disability.

The purpose of this study was to determine what information individuals with disabilities wish that first responders know prior to arrival at the scene. Additionally, we were interested in capturing what information first responders want to know about individuals with disabilities prior to their arrival at the scene. The information contained in this report will be used to test new technologies and data sources in ARTEMIS for their ability to increase mission effectiveness of first responders and service to PWD in general.

## 3 Methods

### 3.1 Participants

We developed a detailed survey instrument for both PWD and first responders in order to collect information about the way PWD interact with first responders. By looking at historical interactions, we hoped to gain knowledge useful in developing the information requirements for the design of future FirstNet enabled technologies and services. We recruited a total number of 153 individuals with disabilities and 75 first responders. Eligibility requirements were as follows:

For people with disabilities

- Must be age 18 years or older
- Must be fluent in English
- Must not be located in the European Union (EU) at time of the survey
- Must have a hearing, vision, mobility, and/or dexterity disability

For first responders

- Must be age 18 years or older

- Must be fluent in English
- Must not be located in the European Union (EU) at time of the survey
- Must be an active first responder (fire, police, or EMS)

Participants provided their informed consent prior to beginning the survey. Participation for this study was voluntary, and participants had the right to withdraw at any time without reason and without penalty. The survey took approximately 10-15 minutes to complete. This study was approved by the Georgia Tech Institutional Review Board (IRB).

### 3.2 Recruitment

Participants were recruited through word of mouth, targeted email recruitment, Twitter posts, Reddit posts, and via a webpage on the Center for Advanced Communications Policy CACP's site. The surveys were conducted online via Qualtrics from June 25th – August 26th, 2021.

### 3.3 Survey Instruments

The survey developed for first responders included eligibility screening questions, a set of questions about line of work (what field, job title, length of time serving as a first responder, and zip code in which participants work), questions about past interactions with people with disabilities in the line of duty, a question inquiring about any training specific to interacting with people with disabilities, and a set of questions inquiring about technologies currently used or desired in aiding interactions with people with disabilities. Question formats included a mix of multiple-choice, multiple response, Likert-type scale, and open-ended (see Appendix A).

The survey developed for people with disabilities included eligibility screening questions, a question about types of disabilities participants currently experience, a set of questions about past interactions with first responders, and a set of questions inquiring what information participants wish they could share with first responders prior to interactions. Question formats included a mix of multiple-choice, multiple response, Likert-type scale, and open-ended (see Appendix B).

## 4 Results

Quantitative data were analyzed using SPSS statistics and Microsoft Excel. A cut-off point was determined to categorize responses into complete and incomplete responses, with only complete responses analyzed for this study. Responses were deemed complete if respondents answered at least one of the research questions (i.e., not demographic or eligibility questions). For people with disabilities, this included questions 7-12; for first responders, this included questions 11-18.

Qualitative data were analyzed using a thematic analysis approach. Researchers coded the data, and relevant coded data was then extracted into themes. The themes were then further refined and analyzed to determine whether they formed a coherent and complete representation of the data as a whole.

#### 4.1 People with Disabilities

Data analysis included 117 complete responses.

Respondents were asked to select any conditions that have lasted or are likely to last for six months or longer. These responses were grouped into the following categories: visual disability, hearing disability, speech disability, cognitive disability, physical disability, and other (Figure 1; respondents were able to select more than one response). Responses were analyzed by disability type, but no clear patterns emerged either from the quality of interactions with first responders or with the unmet needs and desires of the respondents.

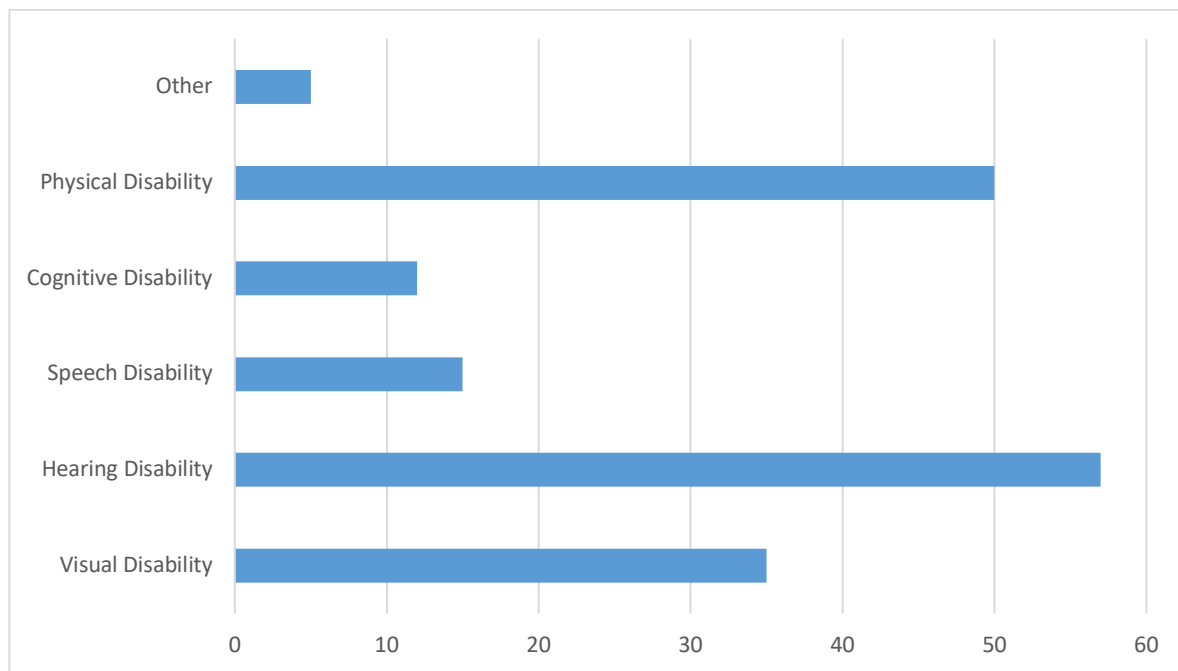
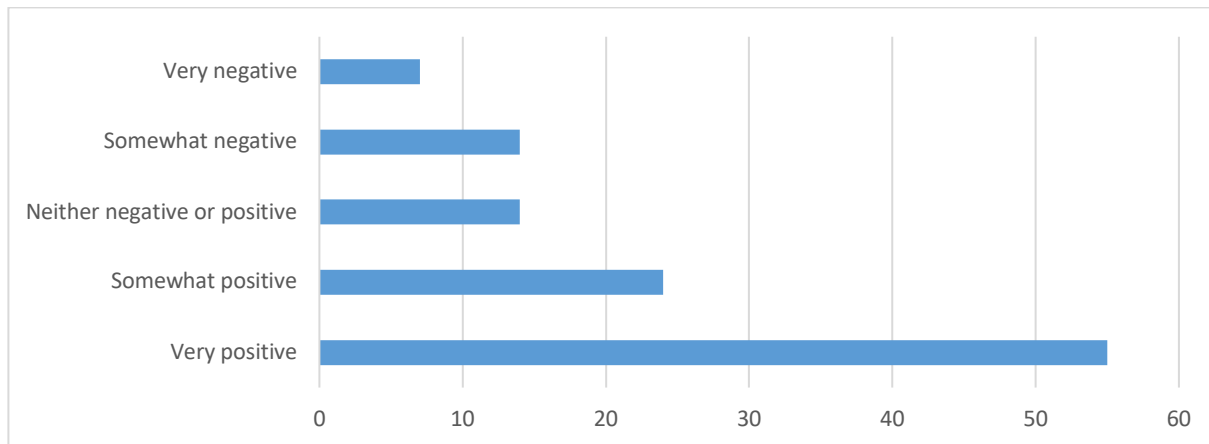


Figure 1. Types of disability.

The majority of participants have had interactions with first responders; 99 out of 117 participants who responded to the question indicated that they had had past interactions with first responders. Of these, most participants indicated that the interactions were somewhat or very positive (Figure 2).

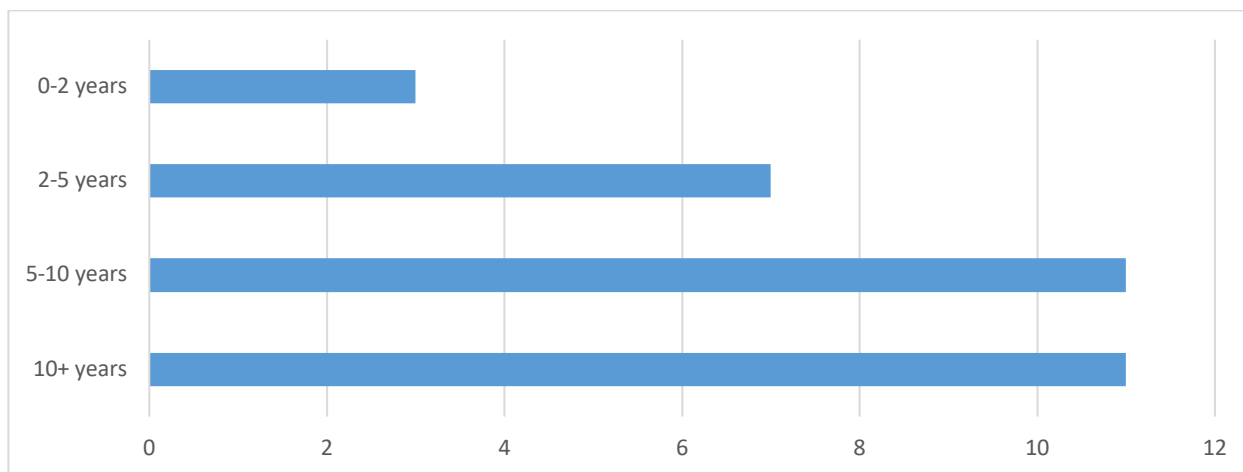




**Figure 2. Quality of interactions.**

## 4.2 First Responders

Data analysis included 33 complete responses. Participants consisted of firefighters/EMS (n= 17), police officers (n= 13), and “other” (n=3; peer counselor for first responders, disability integration manager, and field engineer) and varied in the length of time in their current field (Figure 3).



**Figure 3. Length of time in field.**

When asked to what extent interacting with people with disabilities impacts the execution of their duties, the majority of participants responded that there was some or extreme impact (Figure 4).

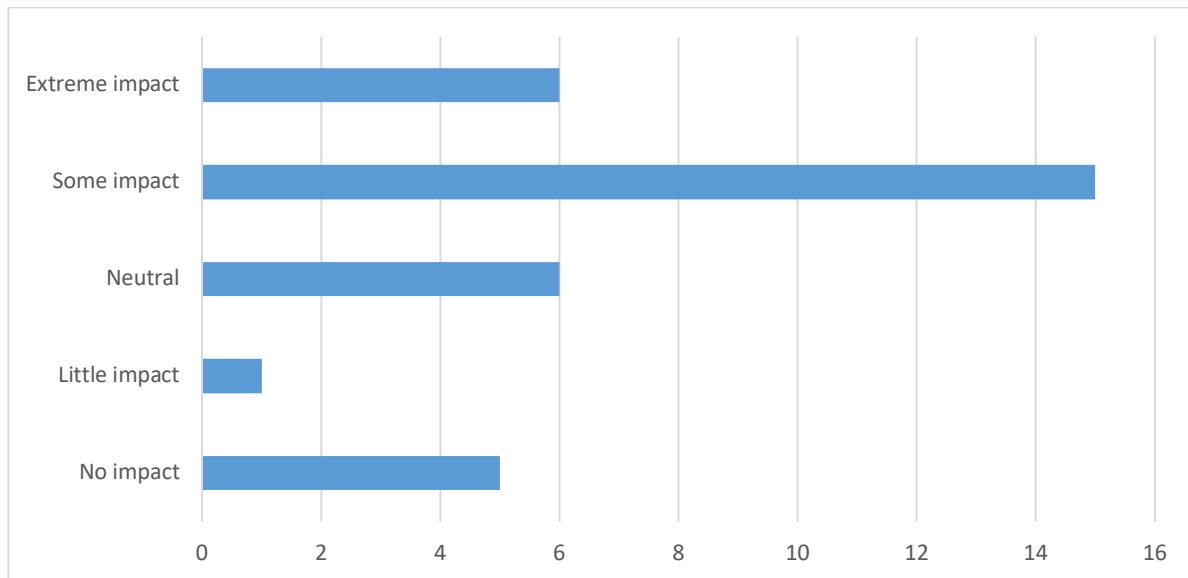


Figure 4. Impact on duties.

#### 4.2.1 Training

First responders were asked what, if any, training they had received concerning interacting with people with disabilities while on the job. Of those who responded to the question, 9 out of 12 Fire/EMS respondents received training of some kind (Figure 5; some respondents indicated receiving multiple types of training). While the majority describe their training as learning from peers or learning on the job, two respondents reported received training on interacting with individuals with dementia. Two respondents received what they termed continuing education.

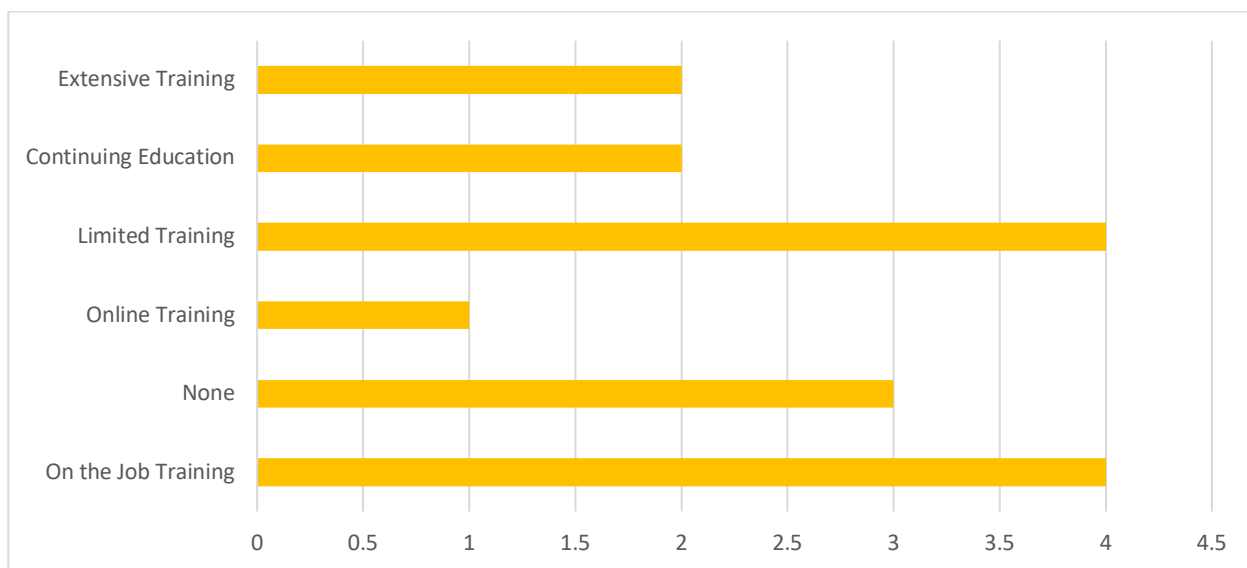


Figure 5. Fire/EMS: types of training.

Of those who responded to the question, 8 out of 10 police respondents received training of some kind, the majority of which centers around mental illness, including Crisis Intervention

Training (CIT; Figure 6). One respondent learned “some ASL.” One response mentioned autism awareness, and one mentioned “developmental disabilities.”

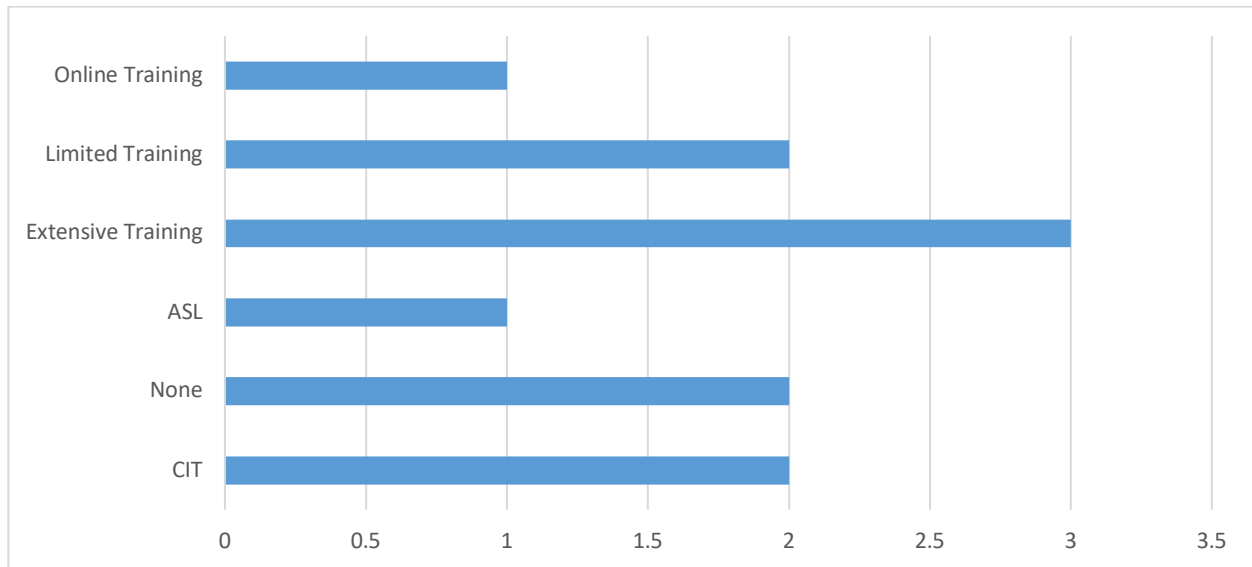


Figure 6. Police: types of training.

### 4.3 Thematic Analysis

Open-ended responses were analyzed using thematic analysis, and coded data were organized into themes. Three overarching themes were identified for each group of respondents.

#### 4.3.1 Themes for People with Disabilities

Three overarching themes were identified from survey responses: communication, understanding of disability, and respect.

##### 4.3.1.1 Communication

Participants indicated that they prefer to communicate directly with first responders rather than have a third-party assist; they are the experts on their abilities and limitations and want to be treated as such. Face-to-face communication and eye contact is important to them to ensure understanding and respect.

Participants want first responders to be creative and open in regard to communication.

*“First Responders, please be patient and be creative when it comes with communication and cultural differences.”*

For example, individuals with hearing disabilities use a combination of ASL, written communication, lip-reading, hearing aids/cochlear implants, and digital technology. Access to an ASL interpreter is important and often lacking for those individuals who use ASL. There is no universal solution for communication with people with hearing disabilities. The population is

highly variable in their communication requirements and compensatory strategies (i.e., lip reading). Many individuals do not know any ASL, cannot lipread, or lack the dexterity required for written communication; communicating with this population requires flexibility and creativity.

The setting and environment also have the potential to impact communication. Individuals who rely on lip-reading are going to have more difficulty in the dark or with masks obstructing the face.

*“Get clear masks for first responders. Lip readers cannot read lips through dark masks.”*

Noisy environments (e.g., road-noise, sirens, many people talking at once) can be distracting or stressful. It can be difficult for individuals to identify what direction from which sound is coming. Sun in an individual’s eyes, back lighting, or other visual distractions may impact the ability to read lips.

Participants emphasized the need to talk through what is happening during interactions with first responders. For those with visual and physical disabilities, verbally communicating the process step by step is important in reducing anxiety.

*“...I have low vision and am not completely blind. And that they need to explain what they are doing so I know what is happening to me so that I am not surprised or scared of what is happening.”*

#### 4.3.1.2 *Understanding Disability*

Respondents expressed the desire for first responders to recognize and understand their abilities and limitations. Limitations and abilities differ from person to person and are not one size fits all, even among a common disability. For example, some people with visual disabilities can drive, while others cannot. Some disabilities are invisible, while others are more apparent. Disability does not render the person incompetent.

*“Mostly in the incidents that go poorly, it is assumed that blindness means either helplessness or inability.”*

Paralyzed individuals reported that they experience different levels of sensation and require gentle care when being handled or moved.

*“...I had polio and was 80% paralyzed. And that treating me roughly would be painful.”*

Many individuals rely on assistive devices to maintain independence. Individuals may use wheelchairs, walkers, canes, and/or guide dogs, and they must be transported with the individual.

*“Please never let my cane be far from me; it is my way to see my surroundings.”*

Additionally, aspects of disability may be out of their control. Individuals feel that first responders often make false assumptions: impaired balance does not imply intoxication; slower comprehension does not indicate that the individual is dodging the question. Respondents reported feeling that first responders sometimes react as if people with disabilities exaggerate or fake aspects of disability.

Respondents suggested more training for first responders to understand how to treat people with disabilities.

*“I have a good friend who is autistic and police do need knowledge of how to handle this”*

*“Clearly, police departments that invest in training, engage with the disability communities and have oversight do better”*

*“First responders absolutely need more training in disability awareness and non-violent crisis prevention interventions.”*

#### *4.3.1.3 Respect*

Respondents stressed the importance of respect when engaging with them. Many respondents indicated that they expect to experience anxiety during interactions with first responders, which impacts the interactions. Interacting with a first responder in a stressful situation can impact communication. Individuals with hearing loss reported that anxiety can further limit hearing abilities.

Respondents expressed that they wish first responders would approach interactions with respect and a willingness to adapt behavior and actions to the individual. As every disability is unique, it is important to accommodate individual needs. First responders should ask individuals about best practices and listen to them. Consult them on what care they require.

*“My needs / priorities / choices may be different than the usual person they encounter and should be honored and respected.”*

Additionally, respondents urge first responders to react with patience; it may take longer to communicate with a person with a disability due to misunderstanding, comprehension speed, lack of interpreter, or other barriers. Accommodating individuals with physical disabilities may take more time than non-disabled individuals.

Respondents reported that there is a higher level of trust with EMS/firefighters than with police officers. Individuals with disabilities fear they may be perceived as non-compliant due to their disability, the repercussions of which are more severe when interacting with police officers.

*"yes, afraid of police bc if they order me to do something, I cant comply if I dont understand. many deaf people in US have been shot for that reason. that's big problem!! [sic]"*

*"I worry that police officers may gesture to me or give visual signals that I can't perceive. I may not see well enough to recognize that a zone is blocked off, and I may be penalized for not cooperating if I'm not able to see blockades or visual directions."*

*"I trust firefighters and EMS, but definitely not the police."*

*"As above, I trust EMTs and Firefighters for the most part - but I don't trust police officers at all. EMTs will listen and process when I state I am autistic, but police officers will dismiss that info and fail to use it in a productive manner."*

Lastly, respondents indicated that interactions with first responders can be alienating. If an individual loses access to their accommodations or assistive tech, it can be incredibly isolating.

*"We couldn't write or anything. In jail, we don't have access to videophone while other jail inmates get phone calls. We don't get interpreters during processing and in front of Judge. We don't get read of our rights. We get punished when officer tells you to do something but can't understand. No access to any form of communication. No pen or pencil. No interpreter. It's worst feelings to be isolated and afraid to make any move or risk the punishment."*

#### 4.3.2 Themes for First Responders

Two overarching themes were identified from survey responses: interacting with people with disabilities is the job and providing accommodations.

#### 4.3.2.1 Interacting with people with disabilities is the job

Many first responders indicated that they do not view their job as being impacted by interactions with people with disabilities, as these interactions are part of the job.

*“My job is to help these people directly so it does not ‘impact’ my work. It ‘is’ my work.”*

*“It does not impact the execution of my duties, the expectation is my duties are to interact with people with disabilities.”*

#### 4.3.2.2 Accommodations

Many respondents reported attempting to best accommodate people with disabilities when interacting with them to reduce discomfort and anxiety. Respondents identified many ways in which they do this, which were grouped into two key areas: transport and communication.

##### 4.3.2.2.1 Transport Accommodation

Respondents reported several methods of accommodating needs during travel. Police respondents report utilizing an accessible van to transport people in wheelchairs, as they do not always fit into typical patrol cars. EMS utilizes a MegaMover portable patient transport unit to transport patients when a traditional stretcher is not accessible. Firefighters utilize their aerial basket equipped with a ramp in order to evacuate individuals in wheelchairs. Stretchers may be used in cases of limited mobility.

##### 4.3.2.2.2 Communication Accommodation

First responders, like people with disabilities respondents, report that communication is a challenging aspect of interactions. Several methods of accommodation were mentioned.

Respondents report allowing more time for gathering information.

*“It can be time consuming if they need multiple officers to assist them.”*

They attempt to slow down communication and remain calm; taking more time to explain what is occurring; utilizing a smartphone or pen and paper for typing messages; utilizing a sign language app; utilizing a pain scale; and video relay.

#### 4.4 Improving Interactions

First responders were asked what improvements to technology, policy, or procedure would assist them in interacting with and providing services to people with disabilities. Respondents identified several ways to improve their interactions with people with disabilities.

Communication between first responders and people with disabilities is often a barrier, impacting the ability to recognize and identify a disability. Because people with disabilities report worrying that their disability will go unnoticed or be misidentified, it is crucial for first responders to identify and understand different disabilities.

*“In at least one case, ambulance attendants assumed I was on some sort of hard drugs.” – Person with disability*

*“I try and recognize the disability and be cognizant of it while providing my care and treatments” – Fire/EMS*

One first responder proposed an app that could utilize video functionality to interpret ASL into speech, as well as translate speech to an avatar signing virtually.

Other areas of improvement that were mentioned included: continuing education and additional training; more ASL interpreters or apps to help translate ASL; and an easier way to access medical history.

## 5 Conclusions

The data identified several pain points in interactions between people with disabilities and first responders: barriers to communication, lack of understanding about disabilities, abilities, and limitations, and failure to identify needs. These pain points are opportunities for technological, practice, and policy intervention to improve interactions.

Communication challenges were the most frequently cited barriers for both groups of respondents. People with disabilities may utilize various communication methods such as written word, ASL, lip-reading, and technology-mediated communication. Of note, ASL is the third most used language in the US. And, communication challenges are often compacted during interactions as a result of stress and anxiety experienced by the individual with a disability, the environment, and other factors. People with disabilities typically have their preferred method of communication but may find it challenging to communicate that to first responders due to the existing barrier. Incorporating technologies that could facilitate communication into the FirstNet network would vastly improve interactions and open the doors for improving pain points.

When asked what information people with disabilities wished first responders knew before interacting with them, the most common response was a better understanding and awareness of their disability, their abilities, and their limitations. They often felt they were denigrated by first responders, or their disabilities were mistaken for intoxication, avoidance, or rudeness. Providing first responders with more information about disabilities, how to identify disabilities, and how to respectfully interact with people with disabilities would ease interactions between these groups. This may come in the form of increased training, easing communication barriers, and providing additional information via technology.

Lastly, first responders need a better way to identify the needs of people with disabilities. This



includes needs associated with communication, transportation, compassion, and respect. Many first responders cited providing accommodations in their responses, yet people with disabilities often reported feeling misunderstood and at times mistreated. This is likely due to lack of awareness of the unmet needs of people with disabilities during interactions. Improving communication and understanding of disabilities and their associated limitations will help improve this pain point, but needs are individualized and may vary even within a single type of disability. Better training on various accommodations and when they need to be utilized, and potentially a technological intervention that would help make these decisions, would greatly improve this pain point.

As new technologies and policies surrounding these interactions are developed, it is important to include people with disabilities in the conversation. As the respondents reported: they're the experts on their abilities, limitations, and needs. As FirstNet-enabled technologies are developed to assist first responders on the job, people with disabilities should also be included in the user-centered design process. For example, virtual reality training and evaluation platforms allow first responders to simulate emergency situation interaction with PWD during the execution of their mission in ways that would be difficult to replicate in real world training exercises. The development of FirstNet tools and services should consider the needs of PWD during their development to avoid potential gaps in services to PWD and increase the effectiveness of first responders.

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## Wireless RERC- (First Responders)

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### Start of Block: Informed Consent

Q1

**What am I being asked to do?** You are being asked to be a volunteer in a research study. This page will give you key information to help you decide if you would like to participate. Your participation is voluntary. As you read, please feel free to ask any questions you may have about the research.

**What is this study about and what procedures will I be asked to follow?**

The purpose of this research study is to better understand the experiences of the first responders and people with disabilities, and how individuals from these two groups interact. You will be asked to participate in a virtual interview or to complete a virtual survey. Research staff at Georgia Tech will work with you on this project.

**Are there any risks or discomforts I might experience by being in this study?** Participation in this research study involves minimal risk or discomfort to you. Risks are minimal and do not exceed those of daily activities.

**What are the reasons I might want to volunteer for this study?**

We hope that by your participation in this study, we'll be able to identify and mitigate barriers to successful interactions between these two stakeholder groups.

**Do I have to take part in this study?** It is fully your decision if you wish to be in this study or not. If you choose not to participate, or choose to participate and later determine you no longer wish to, you will not lose any rights, services, or benefits as a result of your withdrawal. The study is completely voluntary.

**Benefits:** While no direct benefit is expected, the information captured during this research will inform the design of near-future technologies that will benefit first responders and people with disabilities.

**Compensation to You:** There is no compensation for participation.

**Confidentiality:** Consent Form Approved by Georgia Tech IRB: January 29, 2021 - Indefinite We will comply with any applicable laws and regulations regarding confidentiality. Your name and contact information are paired with a code number. To protect your privacy, research data will be stored by code number only. Contact and administrative data will be stored separately. This

information is stored on a computer that is password protected. Only research staff may access these records. Your identity will not appear in any presentations or publications. No personal information will be revealed. Only Georgia Tech research staff responsible for this research can access the information stored in the computer.

**Costs to You:** There are no costs to you, other than your time, for being in this study.

**Participant Rights:** Your participation in this study is voluntary. It is entirely your choice. You do not have to be in this study if you don't want to be. You have the right to change your mind and leave the study at any time without giving any reason and without penalty. We can provide a copy of this consent form for you to keep. Feel free to take your time thinking about whether you would like to participate. Do not accept this consent form and continue with the interview unless you have had a chance to ask questions and get answers that make sense to you. You do not waive any of your legal rights by participating in this research project. Any new information that may make you change your mind about being in this study will be given to you.

**Conflict of Interest:** No one on the research team has a conflict of interest in this study.

**Questions about the Study:** If you have any questions about the study, you may contact Emily Gleaton by email at [emily.gleaton@cacp.gatech.edu](mailto:emily.gleaton@cacp.gatech.edu).

**Questions about Your Rights as a Research Participant:** If you have any questions about your rights as a research participant, you may contact Consent Form Approved by Georgia Tech IRB: January 29, 2021 - Indefinite Ms. Kelly Winn, Georgia Institute of Technology Office of Research Assurance, at (404) 385-2175.

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Q27 By consenting, you are indicating that you would like to participate in this research study. You acknowledge that you have read the information given in this consent form, or that it has been read to you, and all of your questions have been satisfactorily answered. Do you provide consent to participate in this research study?

Do you provide consent to participate in this research study?

Yes (1)

No (2)

*Skip To: End of Survey If By consenting, you are indicating that you would like to participate in this research study. You... = No*

End of Block: Informed Consent

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Start of Block: Age

Q4

Are you over the age of 18? If not, you are not eligible.

Yes, I am over the age of 18. (1)

No, I am under the age of 18. (2)

End of Block: Age

---

Start of Block: Language

Q5 Are you fluent in English? If not, you are not eligible.

Yes, I am fluent in English. (1)

No, I am not fluent in English. (2)

End of Block: Language

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Start of Block: EU

Q6 Are you currently, or will you be at the time of the survey or interview, located in a country in the European Union? If you are or you will be, you are not eligible.

- No, I am not located in the European Union. (1)
- Yes, I am located in the European Union, therefore I am not eligible. (2)

End of Block: EU

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Start of Block: First Responder

Q7 Are you currently, employed as as a first responder? Select all that apply.

- Police Officer (1)
- Firefighter (2)
- EMS (3)
- Other (6)
- None of the above (7)

*Skip To: End of Survey If Are you currently, employed as as a first responder? Select all that apply. = None of the above*

---

*Display This Question:  
If Are you currently, employed as as a first responder? Select all that apply. = Other*

Q8 Please indicate job title below.

\_\_\_\_\_

End of Block: First Responder

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Start of Block: Length of employment

Q9 How long have you worked as a first responder?

- 0-2 years (1)
  - 2-5 years (2)
  - 5-10 years (4)
  - 10+ years (5)
- 

Q10 Please provide the Zip Code in which you work.

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End of Block: Length of employment

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Start of Block: Interview Questions

Q11 Have you ever had any interactions with a person with a sensory or mobility impairment while in the line of duty? If so, please describe those interactions.

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Q12 To what extent does interacting with people with disabilities at work impact the execution of your duties?

- Extreme impact (1)
  - Some impact (2)
  - Neutral (3)
  - Little impact (4)
  - No impact (5)
-

Q13 Please describe how interacting with people with disabilities at work impacts the execution of your duties?

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Page Break 

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Q14 What do you do differently when interacting with individuals with disabilities while at work?

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Q15 What training have you received concerning interacting with people with disabilities while at work?

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Q16 What technologies do you use to assist in interacting or providing services to people with disabilities?

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Q17 What improvements to policies, technologies, or procedures could improve your ability to effectively interact with people with disabilities?

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Q18 Is there any other information you would like to share?

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End of Block: Interview Questions

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## Wireless RERC- (Individuals with disabilities)

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### Start of Block: Informed Consent

Q1

**What am I being asked to do?** You are being asked to be a volunteer in a research study. This page will give you key information to help you decide if you would like to participate. Your participation is voluntary. As you read, please feel free to ask any questions you may have about the research.

**What is this study about and what procedures will I be asked to follow?**

The purpose of this research study is to better understand the experiences of the first responders and people with disabilities, and how individuals from these two groups interact. You will be asked to participate in a virtual interview or to complete a virtual survey. Research staff at Georgia Tech will work with you on this project.

**Are there any risks or discomforts I might experience by being in this study?** Participation in this research study involves minimal risk or discomfort to you. Risks are minimal and do not exceed those of daily activities.

**What are the reasons I might want to volunteer for this study?**

We hope that by your participation in this study, we'll be able to identify and mitigate barriers to successful interactions between these two stakeholder groups.

**Do I have to take part in this study?** It is fully your decision if you wish to be in this study or not. If you choose not to participate, or choose to participate and later determine you no longer wish to, you will not lose any rights, services, or benefits as a result of your withdrawal. The study is completely voluntary.

**Benefits:** While no direct benefit is expected, the information captured during this research will inform the design of near-future technologies that will benefit first responders and people with disabilities.

**Compensation to You:** There is no compensation for participation.

**Confidentiality:** Consent Form Approved by Georgia Tech IRB: January 29, 2021 - Indefinite We will comply with any applicable laws and regulations regarding confidentiality. Your name and contact information are paired with a code number. To protect your privacy, research data will be stored by code number only. Contact and administrative data will be stored separately. This

information is stored on a computer that is password protected. Only research staff may access these records. Your identity will not appear in any presentations or publications. No personal information will be revealed. Only Georgia Tech research staff responsible for this research can access the information stored in the computer.

**Costs to You:** There are no costs to you, other than your time, for being in this study.

**Participant Rights:** Your participation in this study is voluntary. It is entirely your choice. You do not have to be in this study if you don't want to be. You have the right to change your mind and leave the study at any time without giving any reason and without penalty. We can provide a copy of this consent form for you to keep. Feel free to take your time thinking about whether you would like to participate. Do not accept this consent form and continue with the interview unless you have had a chance to ask questions and get answers that make sense to you. You do not waive any of your legal rights by participating in this research project. Any new information that may make you change your mind about being in this study will be given to you.

**Conflict of Interest:** No one on the research team has a conflict of interest in this study.

**Questions about the Study:** If you have any questions about the study, you may contact Emily Gleaton by email at [emily.gleaton@cacp.gatech.edu](mailto:emily.gleaton@cacp.gatech.edu)

**Questions about Your Rights as a Research Participant:** If you have any questions about your rights as a research participant, you may contact Consent Form Approved by Georgia Tech IRB: January 29, 2021 - Indefinite Ms. Kelly Winn, Georgia Institute of Technology Office of Research Assurance, at (404) 385-2175.

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Consenting By consenting, you are indicating that you would like to participate in this research study. You acknowledge that you have read the information given in this consent form, or that it has been read to you, and all of your questions have been satisfactorily answered.

Do you provide consent to participate in this research study?

- Yes (1)
- No (2)

End of Block: Informed Consent

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Start of Block: Age

Q4

Are you over the age of 18? If not, you are not eligible.

- Yes, I am over the age of 18. (1)
- No, I am under the age of 18. (2)

End of Block: Age

---

Start of Block: Language

Q5 Are you fluent in English? If not, you are not eligible.

- Yes, I am fluent in English. (1)
- No, I am not fluent in English. (2)

End of Block: Language

---

Start of Block: Location

Q6 Are you currently, or will you be at the time of the survey or interview, located in a country in the European Union? If you are or you will be, you are not eligible.

- No, I am not located in the European Union. (1)
- Yes, I am located in the European Union, therefore I am not eligible. (2)

End of Block: Location

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Start of Block: Disability

Q20

Please select any of the following conditions you have that have lasted or are likely to last for six months or longer.

- Slight vision impairments not corrected by glasses or contact lenses (2)
  - Hearing impairments (3)
  - Speech impairments (4)
  - Blackouts, fits, or loss of consciousness (5)
  - Difficulty learning or understanding things (7)
  - Limited use of arms or fingers (8)
  - Difficulty gripping things (9)
  - Limited use of legs or feet (10)
  - Any condition that restricts physical activity or physical impairments (eg. back pain or migraines) (11)
  - Any physical disfigurement or deformity (12)
  - Any mental illness for which help or supervision is required (13)
  - Other (14)
  - None of the above (15)
-

*Display This Question:*

*If Please select any of the following conditions you have that have lasted or are likely to last for... = Other*

Q21 If you answered "other" please elaborate below.

---

End of Block: Disability

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Start of Block: Interview Questions

Q7 Have you ever had any interactions with a first responder (police officer, firefighter, or EMS) as a person with a disability?

- Yes (5)
- No (6)
- Not sure (7)

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*Display This Question:*

*If Have you ever had any interactions with a first responder (police officer, firefighter, or EMS) a... = Yes*

Q8

Please describe the reasons for the interactions and how the interactions went

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Q9 Overall, how would you rate your interactions with first responders (police officers, firefighter, or EMS)?

- Very negative (23)
  - Somewhat negative (24)
  - Neither negative or positive (25)
  - Somewhat positive (26)
  - Very positive (27)
- 

Q10 What do you wish first responders knew about you before interacting with you?

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Q11 If you had the ability to share information with first responders, what information about your impairment would you want to share?

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Q12 Is there anything else you would like to share?

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End of Block: Interview Questions

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