PSCR 2021

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Design Technology Incorporating the *Voices of First Responders* - Now is the Time!

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The National Institute of Standards and Technology Research Protections Office reviewed the protocol for this project and determined it meets the criteria for “exempt human subjects research” as defined in 15 CFR 27, the Common Rule for the Protection of Human Subjects.

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

TODAY'S PRESENTATION

STUDY OVERVIEW

Review of our in-depth interviews and nationwide survey

SURVEY HIGHLIGHTS

Discipline-specific survey results

DATA IN FOCUS

Statistical differences between first responder demographics

PUBLICATIONS & ONLINE RESOURCES

VOICES OF FIRST RESPONDERS: MIXED METHODS RESEARCH

Phase 1: In-Depth Interviews

1 Goals
- Problem, Purpose
- Research questions

2 Protocol
- Develop protocol
- Identify sample
- Pilot protocol

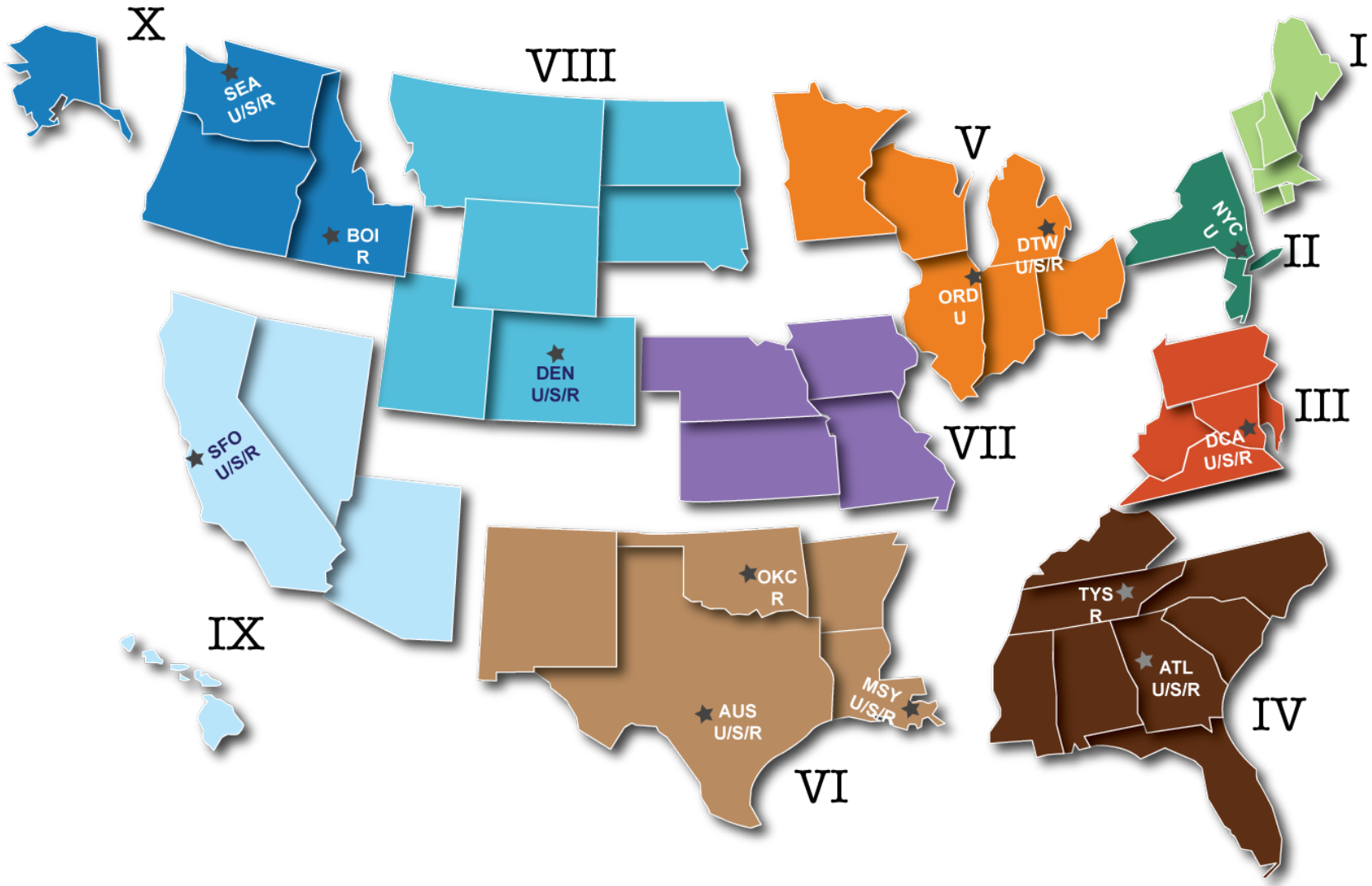
3 Data Collection
- Recruit participants
- Conduct interviews
- Have data transcribed

4 Analysis
- Create initial code book
- Code interview data
- Identify themes & analyze data

5 Results
- Develop relationships
- Identify variables

FIRST RESPONDER INTERVIEWS

PARTICIPATION BY FEMA REGION



U - urban
S - suburban
R - rural

VOICES OF FIRST RESPONDERS: MIXED METHODS RESEARCH

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- Create initial code book
- Code interview data
- Identify themes & analyze data

5 Results
- Develop relationships
- Identify variables

Phase 2: Nationwide Survey

1 Goals
- Problem, Purpose
- Research questions

2 Survey Instrument
- Design survey items & scales
- Reviews: content and survey experts, pseudo-participants
- Refine instrument

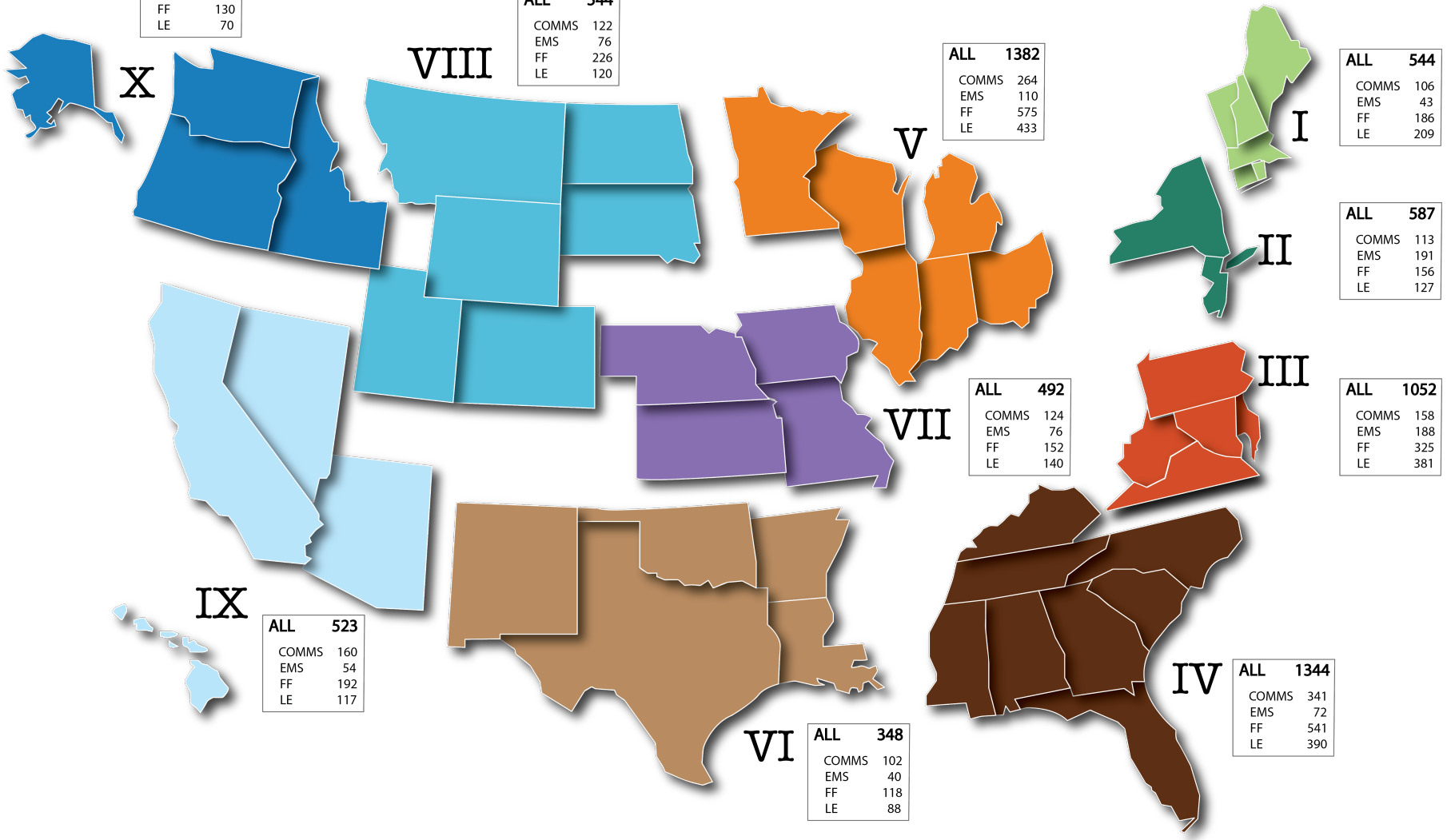
3 Data Collection
- Disseminate survey
- Send reminders
- Monitor responses

4 Analysis
- Perform data analysis
- Quantitative
- Qualitative

5 Results
- Describe sample
- Draw inferences
- Identify usability requirements

FIRST RESPONDER SURVEY

PARTICIPATION BY FEMA REGION



UP NEXT

Survey Highlights

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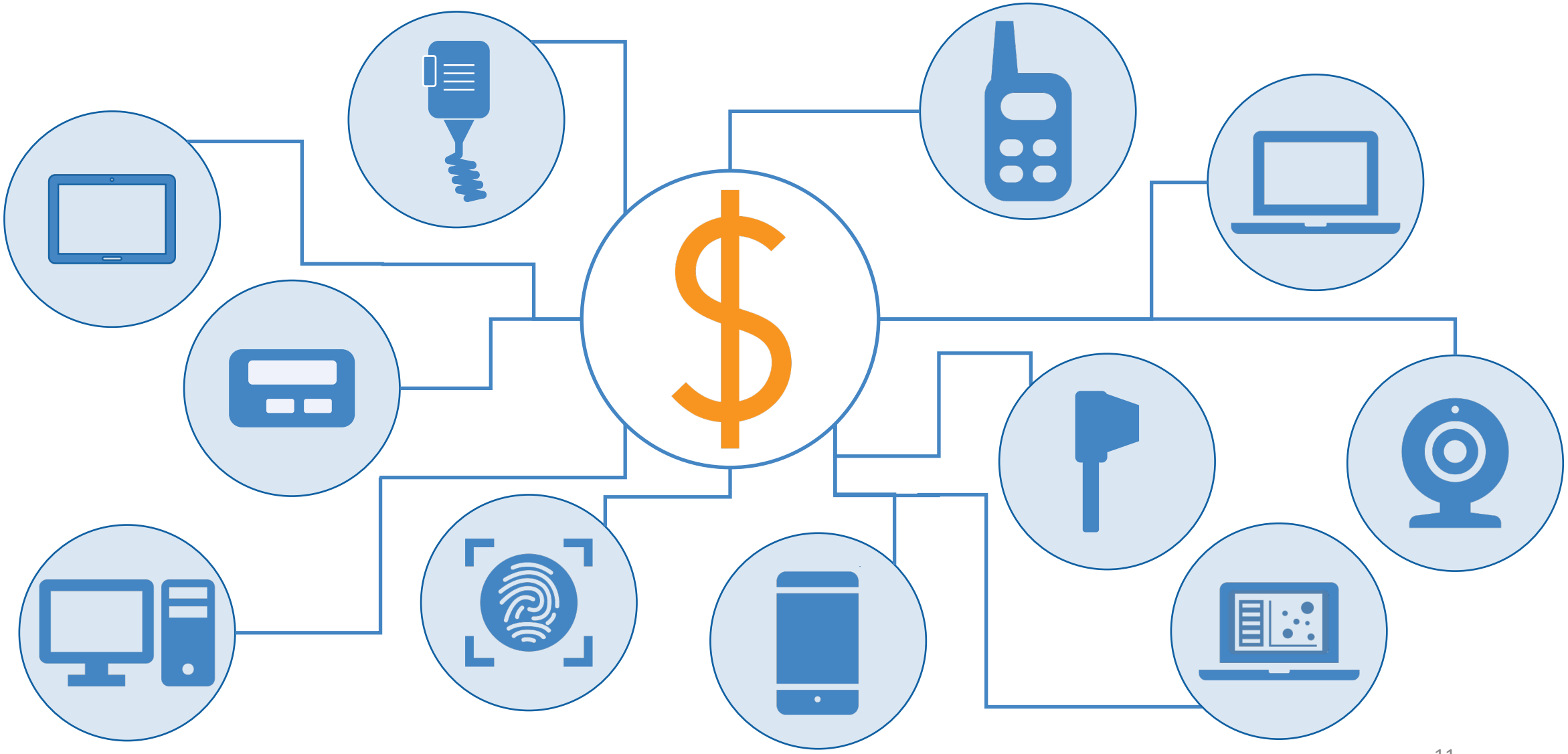
SURVEY HIGHLIGHTS: OVERARCHING PROBLEMS



SURVEY HIGHLIGHTS: OVERARCHING PROBLEMS

EMERGENCY MEDICAL SERVICES

SURVEY HIGHLIGHTS

SURVEY HIGHLIGHTS: EMS

MOST USED DEVICES

SMARTPHONE

Personal smartphones used by 84% of EMS

RADIO

Portable radios used by 75% of EMS; 73% used vehicle radios

DESKTOP COMPUTER

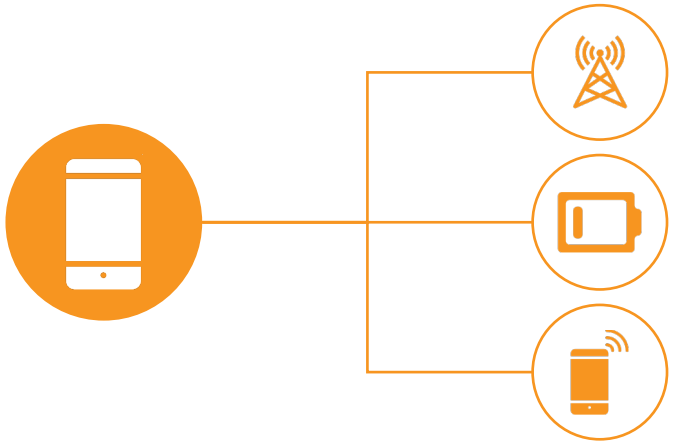
Used by 64% of EMS

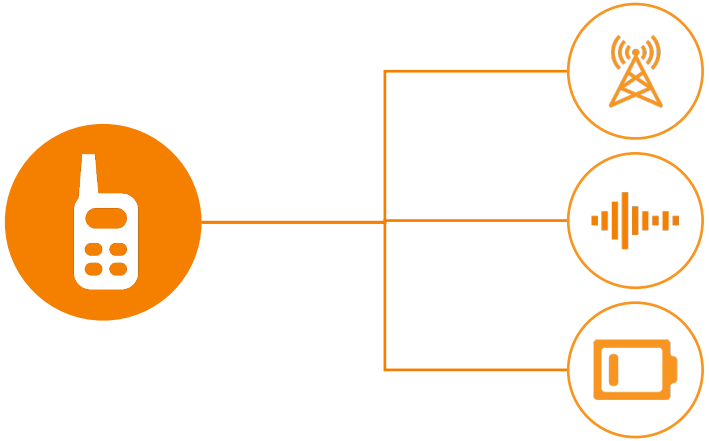
LAPTOP

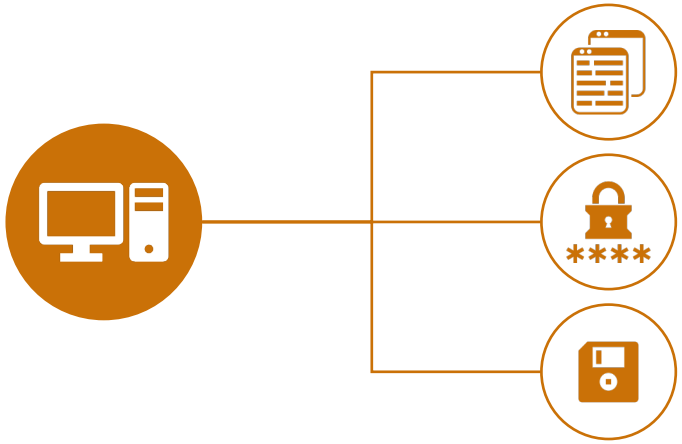
Used by 54% of EMS

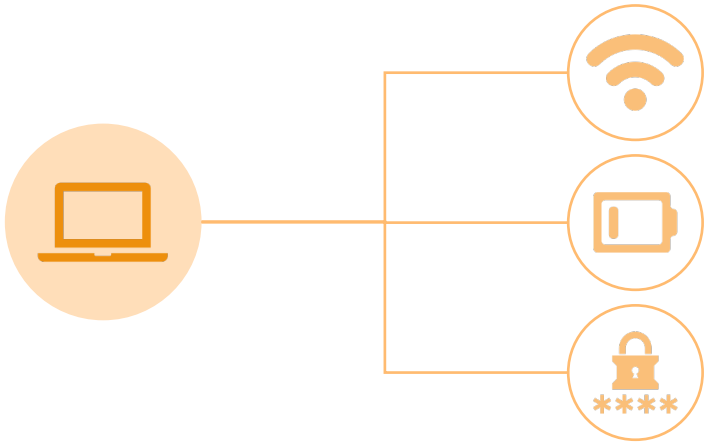
SURVEY HIGHLIGHTS: EMS

TECHNOLOGY PROBLEMS EXPERIENCED









FIRE SERVICE

SURVEY HIGHLIGHTS

SURVEY HIGHLIGHTS: FIRE SERVICE

MOST USED DEVICES

RADIO

Portable radios used by 86% of FF; 77% used vehicle radios

SMARTPHONE

Personal smartphones used by 81% of FF

DESKTOP COMPUTER

Used by 74% of FF

CORDED MIC

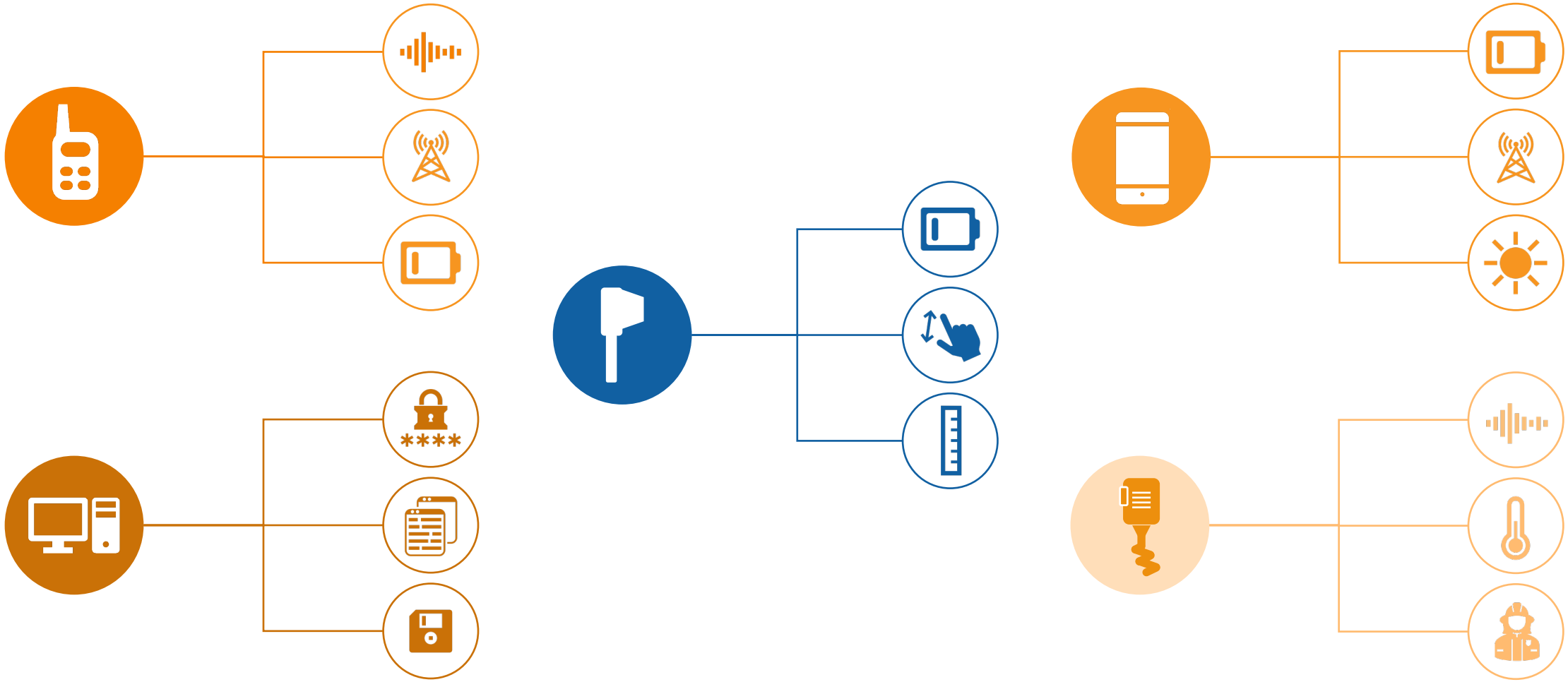
Used by 51% of FF

THERMAL IMAGING CAMERA

Used by 32% of FF

SURVEY HIGHLIGHTS: FIRE SERVICE

TECHNOLOGY PROBLEMS EXPERIENCED



LAW ENFORCEMENT

SURVEY HIGHLIGHTS

SURVEY HIGHLIGHTS: LAW ENFORCEMENT

MOST USED DEVICES

DESKTOP COMPUTER
Used by 83% of LE

RADIO
Portable radios used by 80% of LE; 68% used vehicle radios

SMARTPHONE
Personal smartphones used by 73% of LE

BODYCAM
Body worn cameras used by 26% of LE; 57% of LE did not have bodycams

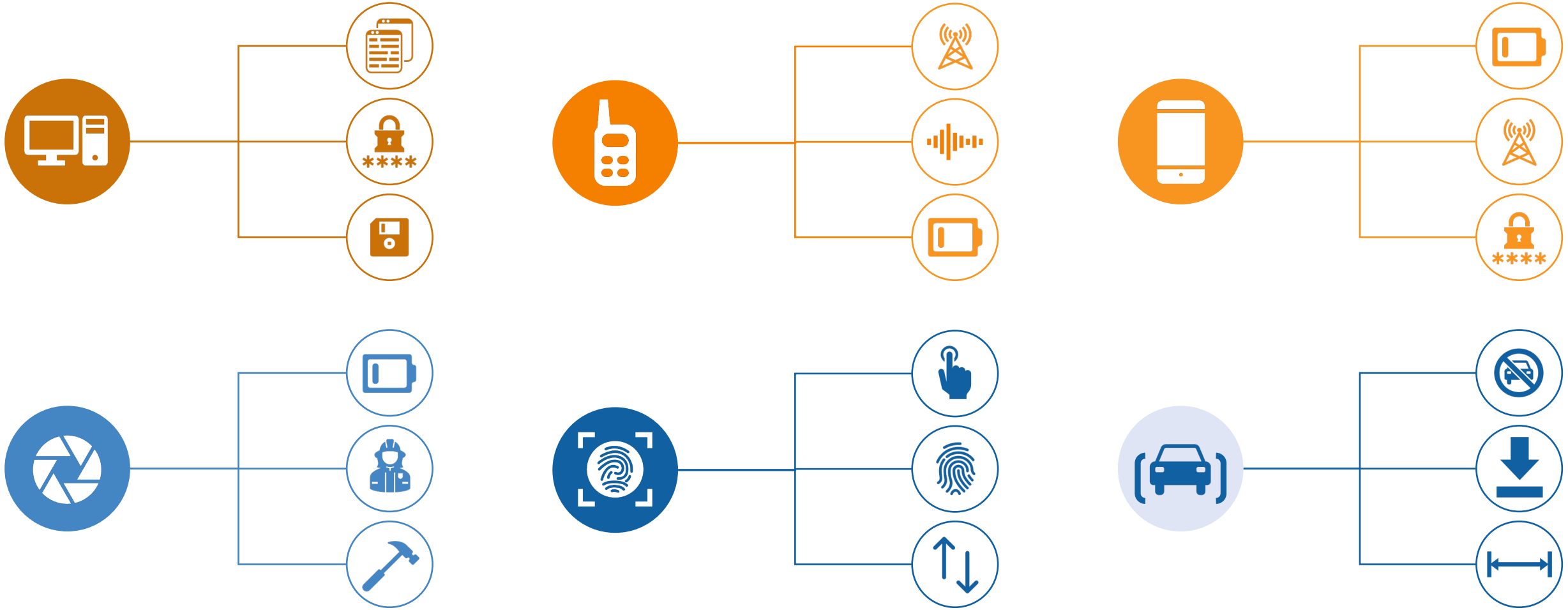
DASHCAM
Dashboard cameras used by 25% of LE; 59% of LE did not have dashcams

FINGERPRINT SCANNER
Fingerprint scanners used by 10% of LE; 63% of LE did not have fingerprint scanners

LPR
License plate readers used by 6% of LE; 78% of LE did not have LPRs

SURVEY HIGHLIGHTS: LAW ENFORCEMENT

TECHNOLOGY PROBLEMS EXPERIENCED



COMM CENTER & 9-1-1 SERVICES

SURVEY HIGHLIGHTS

Photo: Fairfax County, VA

SURVEY HIGHLIGHTS: COMM CENTER & 9-1-1 SERVICES

MOST USED DEVICES

DESKTOP COMPUTER

Used by 99% of COMMS

RADIO

Radios used by 90% of COMMS

LANDLINE PHONE

Landline phones used by 88% of COMMS

HEADSET

Headsets used by 73% of COMMS

SURVEY HIGHLIGHTS: COMM CENTER & 9-1-1 SERVICES

MOST USED DEVICES

PERSONAL MONITOR

Personal monitors used by 96% of COMMS

SHARED MONITOR

Shared monitors used by 60% of COMMS

34%

use 4-5

PERSONAL MONITORS

30%

use 2-3

SHARED MONITORS

SURVEY HIGHLIGHTS: COMM CENTER & 9-1-1 SERVICES

INFORMATION PROBLEMS EXPERIENCED

CALLER INFORMATION
Inaccurate or missing information

CELL PHONE TRACKING
Inability to track caller location

OVERLOAD
Too many calls or information all at once

MAPS / DATABASES
Inaccurate or missing data

UP NEXT

Data in Focus

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Credit: Shutterstock/Sean Pavone/Ben Carlson/faboi

SUBGROUPS

AREA

Rural compared to urban/suburban

ROLE

Frontline responders compared to chief/management

DISCIPLINE-SPECIFIC

Volunteer compared to career Fire Service

SUBGROUP ANALYSIS

INFERENTIAL STATISTICS

- Consider each question separately
  - Day-to-day device use
  - Device problems
- Multinomial regression
  - Identify significant differences between subgroups

Credit: Shutterstock/Sean Pavone/Ben Carlson/faboi

SUBGROUPS

AREA

Rural compared to urban/suburban

ROLE

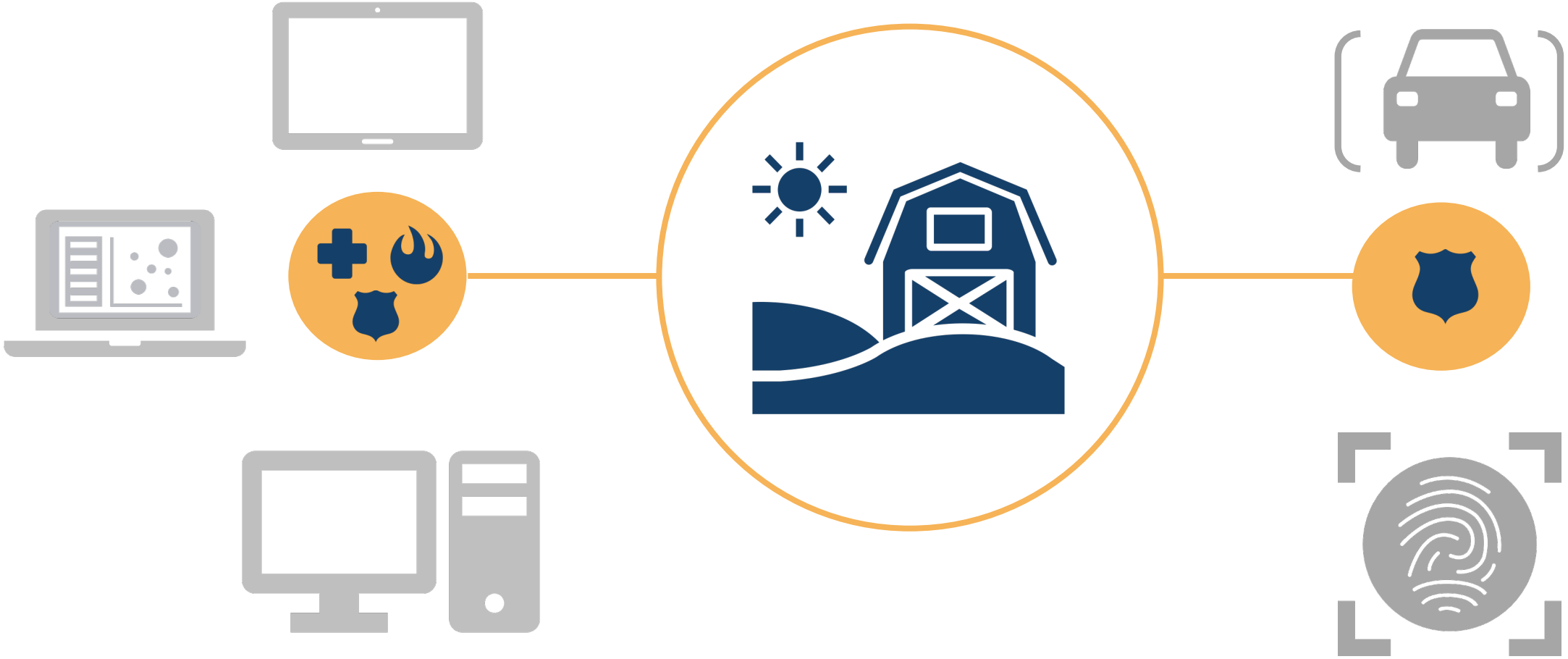
Frontline responders compared to chief/management

DISCIPLINE-SPECIFIC

Volunteer compared to career Fire Service

DATA IN FOCUS: RURAL AREAS

DEVICE USE



DATA IN FOCUS: RURAL AREAS

DEVICE USE

DATA IN FOCUS: RURAL AREAS

TECHNOLOGY PROBLEMS EXPERIENCED

DATA IN FOCUS: RURAL AREAS

TECHNOLOGY PROBLEMS EXPERIENCED

Credit: Shutterstock/Sean Pavone/Ben Carlson/faboi

SUBGROUPS

AREA

Rural compared to urban/suburban

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DISCIPLINE-SPECIFIC

Volunteer compared to career Fire Service

DATA IN FOCUS: CHIEF/MANAGEMENT ROLE

DEVICE USE

DATA IN FOCUS: CHIEF/MANAGEMENT ROLE

DEVICE USE

DATA IN FOCUS: CHIEF/MANAGEMENT ROLE

TECHNOLOGY PROBLEMS EXPERIENCED

Credit: Shutterstock/Sean Pavone/Ben Carlson/faboi

SUBGROUPS

AREA

Rural compared to urban/suburban

ROLE

Frontline responders compared to chief/management

DISCIPLINE-SPECIFIC

Volunteer compared to career Fire Service

DATA IN FOCUS: VOLUNTEER FIRE SERVICE

DEVICE USE

DATA IN FOCUS: VOLUNTEER FIRE SERVICE

TECHNOLOGY PROBLEMS EXPERIENCED

UP NEXT

Summary of Study Findings

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SUMMARY: CURRENT TECHNOLOGY

CURRENT

Fix current tech – it must be usable and reliable

"…You think newer technology is going to be better… More user-friendly and it's just not- - It's not the case…If someone calls you on the radio and you didn't catch what they said-- with our old system we could just go in and double click on the last radio transmission and play it back." (INT-COMMS-S-004)

SUMMARY: AFFORDABLE TECHNOLOGY

AFFORDABLE

Cost can be a prohibitor for technology adoption

"Buying a radio is cheap, but changing the repeater and all of the other stuff that goes along with it is very expensive" (INT-FF-U-014)

SUMMARY: UNIQUE TECHNOLOGY

UNIQUE

Needs and problems may depend on areas and roles

"We try to stay updated but with tight budgets and changing technology and software and govt requirements with no funding for requirements it's not easy for volunteer depts. Radios are something we just can't keep updates on not to mention purchasing new ones." (EMS:R:3347)

SUMMARY: FOCUS ON USER NEEDS

RESPONDERS

Needs must drive all technology R&D

"That's the biggest thing with a lot of the stuff is you make it, but you never test it out on the real person who's going to use it. And then will it get lost in translation, and then it becomes useless. You may have thought it was a great idea. And it might be a great idea, but there's a few tweaks that don't make it useful at all." (INT-LE-U-036)

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Publications & Online Resources

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PUBLICATIONS

Voices of First Responders, Phase 1: Findings from User-Centered Interviews

- Volume 1 – Identifying Public Safety Communication Problems (NISTIR 8216)
- Volume 2 – Examining Public Safety Communication Problems and Requested Functionality (NISTIR 8245)
- Volume 3 – Examining Public Safety Communication from the Rural Perspective (NISTIR 8277)
- Volume 4 – Examining Public Safety Communication from the Perspective of 9-1-1 Call Takers and Dispatchers (NISTIR 8295)
- Volume 5 - Applying Human Factors & Ergonomics Knowledge to Improve the Usability of Public Safety Communications Technology (NISTIR 8340)

PUBLICATIONS

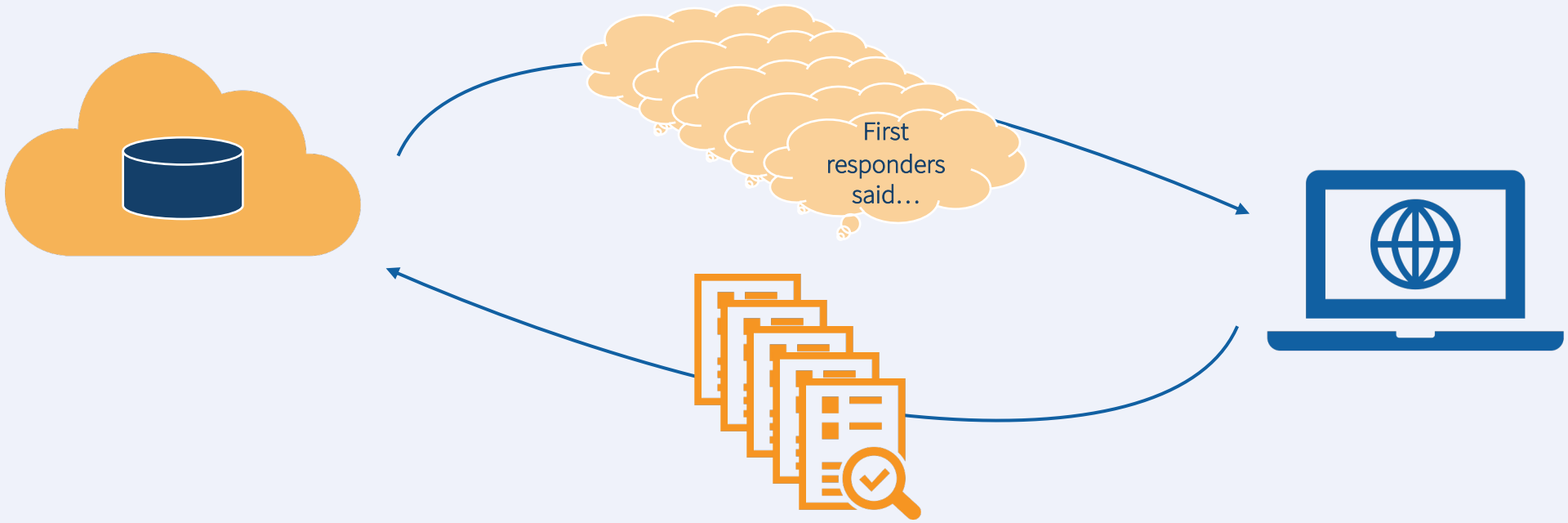
Voices of First Responders, Phase 2: Nationwide Public Safety Communication Survey

- Volume 1 – Methodology: Development, Dissemination, and Demographics (NISTIR 8288)
- Volume 2 - Findings: Mobile Devices, Applications, and Futuristic Technology (NISTIR 8314)
- Upcoming publications - Volumes 3 and 4 coming soon!

Incident Scenarios Collection for Public Safety Communications Research: Framing the Context of Use (NISTIR8181)

Usability Handbook for Public Safety Communications – Ensuring Successful Systems for First Responders (NIST Handbook 161)

FULL DATASET ONLINE



publicsafety.nist.gov

PSCR Usability Results Tool: Voices of First Responders

Results of a large-scale survey and in-depth interviews with first responders across the U.S. about their communication technology use.

Survey Results

Interview Quotes

The Usability Team of the National Institute of Standards and Technology's (NIST) Public Safety Communications Research (PSCR) program works to identify issues faced by first responders surrounding the use of their existing and emerging public safety communication technology. The Usability Team conducted a series of in-depth interviews with approximately 200 first responders about their views on communication technology. The results of these interviews informed a nationwide, large-scale survey completed by over 7,000 first responders. This tool provides public access to over 20,000 first responder quotes from the first responder interview data, as well as the 7,182 survey responses.

The survey results, accessed via the *Survey Results Tool*, and the interview quotes, available via the *Interview Quotes Tool*, can be freely used to influence the research, design and development of communication technology in the public safety domain. Any interview quotes or survey results used in published materials should properly attribute this tool as well as the appropriate NISTIR reports in the series of volumes published as detailed in the *Interview Quotes Tool FAQ* as well as the *Survey Results Tool FAQ*. Information about the research methodology and instrument design for both the interview and survey protocols, as well as instructions on how to interpret the results, can also be found in these FAQs.

For more information about the NIST PSCR Usability Team research, or for questions regarding the PSCR Usability Results Tool, please send an email to usability@nist.gov. More information about the PSCR program can be found at pscr.gov.

ONLINE RESOURCES

INTERVIEW QUOTES

NIST

PSCR Usability Results Tool - Interview Quotes

Home Survey Interviews FAQ Contact

Show/Hide Columns:

Discipline | Area | Role | Age | Experience | Gender

Showing 1 to 100 of 6,871 quotes (filtered from 20,189 quotes)

Show 100 quotes

Previous 1 2 3 4 5 … 69 Next

Filter by:

Clear all filters

- Discipline (Clear)
  - [x] FF
  - [ ] EMS
  - [ ] LE
  - [ ] COMMS
- Area
- Code/Subcode
- Role
- Age (Years)
- Experience (Years)
- Gender

Export PDF | Expand All

Code - Subcode	Discipline	Area	Role	Age	Experience	Gender	Transcript ID	Quotes	
Change	FF	S	Other Public Safety Personnel	36-45	11-20	Male	PS-S-001	But, within the [City] area, as part of the EBRCS system, we have kind of migrated to a digital platform. And I don't know a whole lot about whether…	+
Change	FF	S	Other Public Safety Personnel	36-45	11-20	Male	PS-S-001	Back in 1950, we had a very, very small fire department of about 20 people. It was volunteer, and we had a very, very small police department of…	+
Change	FF	S	Field Responder	18-25	5 or less	Male	FF-S-039	But there is definitely a push for people to follow their SOPs, their standard operating procedures more. And to communicate less of the stuff that…	+
Change	FF	S	Field Responder	18-25	5 or less	Male	FF-S-039	So, yeah. Man, it's kind of hard to track it exactly. But the most recent change is there's now this-- there's different systems for the computers…	+
Change	FF	S	Field Responder	18-25	5 or less	Male	FF-S-039	…The other interesting thing that I don't think it's always been there, but I just recently learned about it with the new roll out and the training…	+
Change	FF	S	Field Responder	18-25	5 or less	Male	FF-S-039	There is an app that already exists that our county doesn't use where you can actually listen to the radio on the app… so if I'm sitting right here,…	+

ONLINE RESOURCES

SURVEY RESULTS

NIST

PSCR Usability Results Tool - Survey Results

Home Survey Interviews FAQ Contact

Show/Hide Question Topics:

Devices | Problems | Apps / Software | Futuristic | Large Events | Virtual Reality | 9-1-1 / Dispatch Call Center Information | EMS Medical Technology | Final Comments | Demographics

Showing 1 to 100 of 678 records
(filtered from 7,182 records)

Export

Show 100 records

Previous 1 2 3 4 5 6 7 Next

Filter by:

Clear all filters

Discipline Clear

- 9-1-1 / Dispatch
- EMS
- Fire Fighting
- Law Enforcement

Area Clear

- Urban
- Suburban
- Rural
- Tribal

State

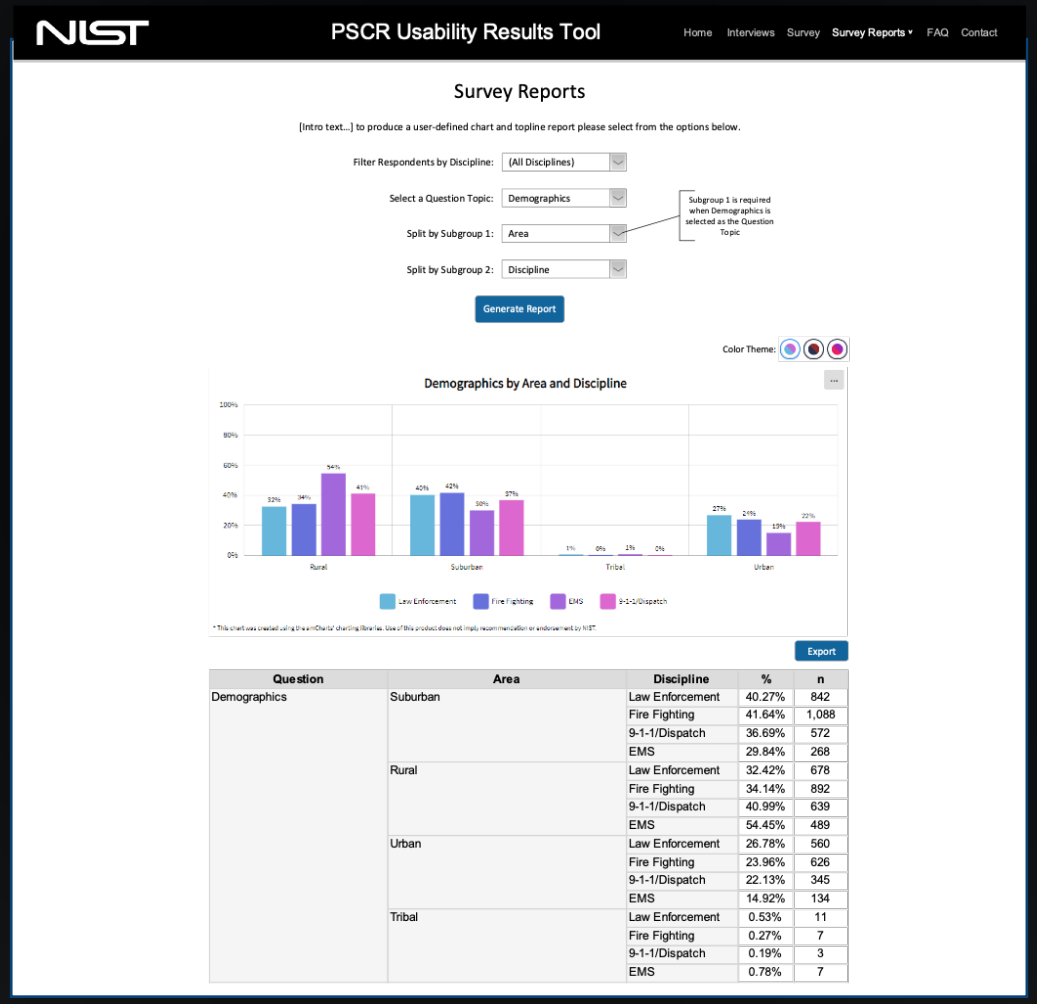
FEMA Region

Jurisdiction

Response ID	Discipline	Device: BodyCam	Device: Desktop	Device: Laptop	Device: DashCam	Device: Earpiece-Self	Device: Earpiece-Work	Device: Earpiece-Corded	Device: Fingerprint Scan
4	Law Enforcement	Do not have	Use a lot	Use occasionally	Use occasionally	Do not have	Do not have	Use occasionally	Do not have
65	Law Enforcement	Have, but do not use	Use a lot	Use a lot	Do not have	Use a lot	Use a lot	Use a lot	Use a lot
67	Law Enforcement	Have, but do not use	Use a lot	Use occasionally	Do not have	Have, but do not use	Have, but do not use	Have, but do not use	Have, but do not u
73	Law Enforcement	Use a lot	Use a lot	Use a lot	Use a lot	Use a lot	Use a lot	Use a lot	Do not have
77	Law Enforcement		Use a lot	Use occasionally	Do not have	Do not have	Do not have	Use occasionally	Use occasionally
105	Law Enforcement	Do not have	Use a lot	Use a lot	Do not have	Use occasionally	Do not have	Use occasionally	Do not have
127	Law Enforcement	Do not have	Use a lot	Use a lot	Do not have	Do not have	Use occasionally	Use occasionally	Have, but do not u
158	Law Enforcement	Do not have	Use a lot	Use a lot	Use a lot	Do not have	Do not have	Use a lot	Have, but do not u
174	Law Enforcement	Use a lot	Use a lot	Use a lot	Use a lot	Do not have	Do not have	Do not have	Do not have
183	Law Enforcement	Do not have	Use a lot	Do not have	Do not have	Do not have	Do not have	Do not have	Do not have
234	Law Enforcement	Do not have	Use a lot	Use occasionally	Use a lot		Do not have	Use a lot	Use a lot
252	Law Enforcement	Use a lot	Use occasionally	Do not have	Use a lot	Do not have	Do not have	Do not have	Do not have
258	Law Enforcement	Use a lot		Use occasionally	Use occasionally	Do not have	Do not have	Use a lot	Use occasionally
261	Law Enforcement	Use a lot	Use a lot	Have, but do not use	Do not have	Do not have	Do not have	Do not have	Do not have
267	Law Enforcement	Use a lot	Use a lot	Do not have	Use a lot	Do not have	Use a lot	Use a lot	Do not have

ONLINE RESOURCES

INTERACTIVE TOOL



Question	Area	Discipline	%	n
Demographics	Suburban	Law Enforcement	40.27%	842
		Fire Fighting	41.64%	1,088
		9-1-1/Dispatch	36.69%	572
		EMS	29.84%	268
	Rural	Law Enforcement	32.42%	678
		Fire Fighting	34.14%	892
		9-1-1/Dispatch	40.99%	639
		EMS	54.45%	489
	Urban	Law Enforcement	26.78%	560
		Fire Fighting	23.96%	626
		9-1-1/Dispatch	22.13%	345
		EMS	14.92%	134
	Tribal	Law Enforcement	0.53%	11
		Fire Fighting	0.27%	7
		9-1-1/Dispatch	0.19%	3
		EMS	0.78%	7

ONLINE RESOURCES

INTERACTIVE TOOL

Survey Reports

[Intro text…] to produce a user-defined chart and topline report please select from the options below.

Filter Respondents by Discipline: (All Disciplines)

Select a Question Topic: Devices

Select one or more Questions:
Clear
(If you select more than 3 questions, only the topline data table will be displayed)

- [x] Device: BodyCam
- [ ] Device: Desktop
- [x] Device: Laptop
- [ ] Device: DashCam

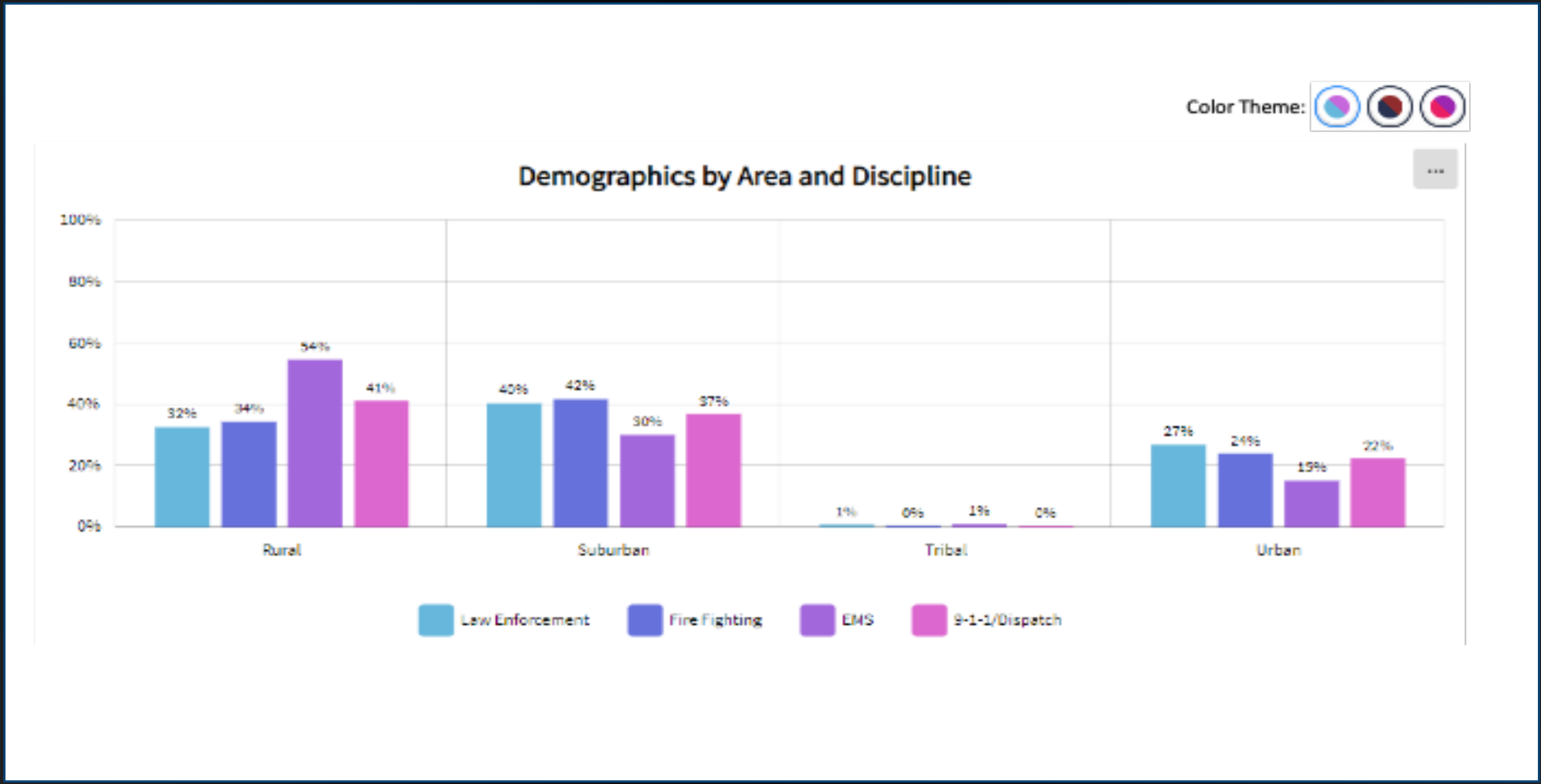
Split by Subgroup 1: Gender

Split by Subgroup 2: None

Generate Report

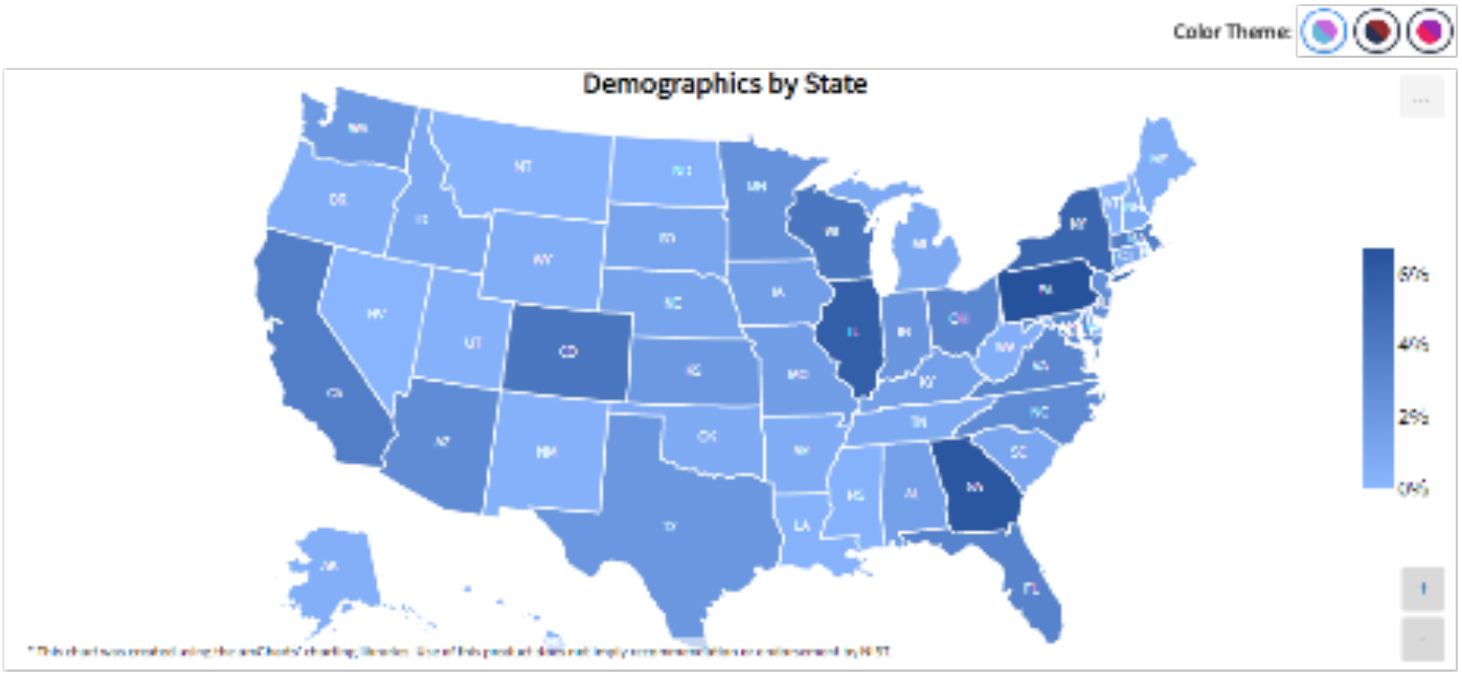
ONLINE RESOURCES

INTERACTIVE TOOL



ONLINE RESOURCES

INTERACTIVE TOOL



ONLINE RESOURCES

INTERACTIVE TOOL

Export

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https://www.nist.gov/ctl/pscr/research-portfolios/user-interfaceuser-experience

THANK YOU

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