Obstacles to Adopting Speech Recognition in Emergency Services Solutions

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Description

Telecommunications was an early adopter of Speech Recognition technology from recognition of speech patterns to decision making processes for services involving traditional operator and assistant services. Despite early adoption, these technologies are excluded from Emergency Services, most notably the national 9-1-1 dialing pattern. This research explores the obstacles to incorporating Speech Recognition into Emergency Services.

Introduction

- Speech Recognition has been deployed since the 1990's for products (Operator '0' [zero] and Directory Assistance '4-1-1').
- The term "Speech Recognition technologies" in this research assumes some Artificial Intelligence (AI) decision capability.
- The National Emergency Number Association (NENA) states "*The intense interest in the concepts of 9-1-1 can be attributed primarily to the recognition of characteristics of modern society, i.e., increased incidences of crimes, accidents, and medical emergencies, inadequacy of existing emergency reporting methods, and the continued growth and mobility of the population.*
- Activities of national and local government since September 11, 2001 have exposed shortcomings in the 9-1-1 service model.
- Emergent technologies are addressed in Standards development. Voice-Over IP and Mobility growth are new challenges for Emergency Services Agencies.
- NENA reports in 2017, the U.S. has 5,793 primary secondary Public Service Access Providers (PSAPs) with an estimated 240 million calls to 9-1-1 in the U.S.
- In many areas over 80% of E-9-1-1 calls are originated by wireless devices.
- The Cellular Telephone Industry Association estimates that 49% of U.S. households are wireless only (CTIA 2018).
- Adoption of New Ideas, Scarcity to Social Proof—Maloney's Rule of 16.

Credits

Thanks to my dissertation advisor, Dr. Catherine Dwyer for her guidance and my wife Christine Strobel for her expertise in graphics, design and editing.

Methodology

Research Question
- "What are the barriers in Emergency Services, 9-1-1 et al., that deter speech recognition technologies from being deployed for Emergency Services?"

Grounded Theory
- The Grounded Theory approach (Glasser and Strauss) was used. This first iteration utilizes primary research by "Interviewing."
- Emergent themes were identified from data collection and analysis.
- Semi-structured interview format was used to ensure quality of data.

Primary Research
- Semi-structured "Interview Guide" is based on the Research Question.
- Interviews focused on 5 primary questions and 14 sub-questions.
- Interviews were transcribed into text exceeding 150 pages.
- The interviews were performed between October and December 2017.
- Questions included open-ended.

Interview Guide Questions

Question	Primary Question	Sub-Questions
1	What are your experiences with Emergency Services?	3
2	What are your experiences with Speech Recognition Technologies?	2
3	Have you considered using Speech Recognition with Emergency Services?	3
4	What are your thoughts concerning Risk vs. Reward with new technologies?	3
5	Would the employment of Speech Recognition for Emergency Services provide benefit that substantiates the risks?	3

Interview Subjects
- Each subject has acknowledged an association with 9-1-1, some with serving in multiple Subject Matter Expert (SME) roles.
- Each subject had 25 years or more experience in the telecommunications industry.

Interview Subjects

Interview	SME - Title	9-1-1 Experience
Subject A	Design and Data Architect	Yes
Subject B	Network Planner-Executive	Yes
Subject C	9-1-1 Product Manager and 9-1-1 Network Planner	Yes
Subject D	IT Internal Auditor E-9-1-1 Software Developer	Yes
Subject E	Product Developer-Executive	Yes
Subject F	Network Planner 9-1-1 Managed Services	Yes
Subject G	Planner – Operator Services (9-1-1)	Yes

Analysis
- This first iteration of analysis of the interview data was performed employing qualitative techniques in Grounded Theory for Coding.
- Open Coding methods were used to begin identifying emergent themes with emphasis on interviewing data collection using semi-structured interviews.
- Readings, annotation and cataloging methods were employed and the introduction of NVIVO software was initiated to develop nodes and extractions.

Results

- Unanimous support for continued research from subjects.
- Consumers are changing and may readily accept implementation in select scenarios deemed desirable.
- Use Cases for law enforcement should be considered as a potential opportunity for public support.
- Sound detection and association with other media and call artifacts are suggested as practicable, but not compatible with the current Standards processes.
- Satisfaction may result from consumer and public safety from the states and their PSAP operational requirements to obtain momentum for national support.
- Universal acknowledgement that callers to E-9-1-1 may experience stress affecting speech quality.

ACTIVE SHOOTER
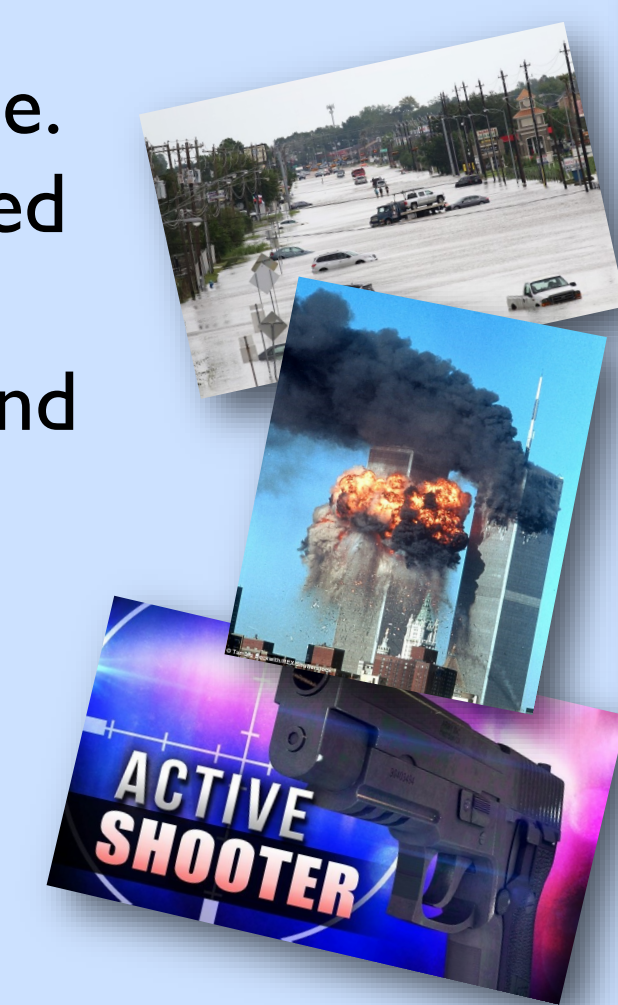
Obstacles

Liability, Legal and Reputation
- Subject noted there exists concern for liability, both legal and loss of reputation. Liability risks emerging from any incident is detrimental to a public company.
- Subject D "*Yes, we're talking 9-1-1 liability… technology… lawyers… that's why I say…it has to bed Gold Plated.*"
- Subject A "*Huge! This is one of the reasons that General Dynamics has taken steps back on investments of almost sure gains…*"

Standards 911
- There is a gap in the standards for Emergency Services versus other technology environments.
- Subject A "*I don't think people understand enough, the typical developers or architects don't understand enough of the value that something like Speech Recognition could bring to the table…*"

Technical Risk and Mitigation
- Six of seven subjects view Speech Recognition as high risk.
- Houston hurricane (AP), 9-1-1 call volume was 8 times normal. Subject C "*I think that could be a Use Case that could work.*"
- Full automation of Emergency Service E-9-1-1 calls was not an acceptable Use Case for most subjects.

Next Steps

- Continued analysis of nodes and extractions with NVIVO.
- Continued literature search, secondary sources.
- Develop proposal for submission and approval for research.

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