**Mission Critical Voice Communications
Use Case Development**

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Working Group
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Hi, I am Chris Kindelspire, Chair of the NPSTC LMR LTE Integration and Interoperability Working Group.
I was asked by Jeb to come give a quick overview of how we develop use cases and how that ties into the need for KPI's

- NPSTC creates use cases as a base component of all working group activity.
  - o Use cases focus and organize the discussion.
  - o Use cases ensure that all aspects of public safety response have been addressed.
  - o Use cases keep the discussion grounded in reality (*sometimes*).

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Almost all NPSTC working groups being their work by creating a series of use cases.

Use cases help the working group focus their attention on specific public safety activities, which is turn organizes the working group discussions. Many of the topics that we discuss are complex and the conversation can wander over a wide range of issues unless you have a roadmap to follow.

Use cases help ensure that all aspects of public safety response have been addressed by the working group. Working through an incident from call receipt, to dispatch and through the arrival of first responders, makes you contemplate all of the factors that may impact public safety requirements.

Use cases usually help keep the discussion grounded in reality and prevent the conversation from expanding to include first responder robots using laser rifles.

Anatomy of a Use Case

– Key components of a NPSTC Use Case:

o **Primary** focus should be on "everyday" incidents, (e.g. burglary, house fire, traffic crash, heart attack) and not disaster events.

– These primary incidents represent 95% of public safety responses.

– Singular focus on infrequent disaster events creates complexity, is hard to address specific actions, and may appear to be unrealistic.

o **Secondary** focus on large scale events is important to ensure that all aspects of public safety response are addressed.

– There are important operational considerations that only occur during major incidents.

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Over the years, NPSTC has found that the best use cases are built around scenarios that occur every day in public safety. These types of events are the bread and butter of what public does and represent about 95% of the incidents that we respond to. If you examine the features and capabilities needed to respond to every-day emergencies you will account for almost all of the requirements. In the past, many of our use cases were built around hurricanes, earthquakes and Mass Casualty Incidents. Those large scale events are complex; its' hard for the working group to organize the discussion and first responders don't always find them realistic. So, our primary focus in building use cases is the common, every day event.

However, there is a value to looking at large scale events later in the process to see if there are any capabilities or requirements that were missed. As we all know, there are certain unique components during disaster response, both in the scale of user communications and in who communicates with who.

– Each Use Case has several elements:

o **Focus Area:** What specific aspect of the incident is to be addressed?

o **Preconditions/Assumptions**: What types of technology, spectrum or operations are the use case based on? (e.g. what type of radio network is being used in the use case).

o **Scenario Description**: The sequence of events for the public safety response to the incident.

o **Scenario Discussion**: Comments to explain and clarify certain aspects of the response or discussion on variations to the response.

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There are many different ways to create a use case.

Some of them are very simple and involve a few paragraphs of text while others require ten pages to document the public safety response.

A good use case has six elements.

#1. Is there a particular focus area for the use case.   For example, is a use case designed to assess how encryption will work, or how the emergency button feature will operate. Trying to account for all public safety activity in a single use case is very hard; because we do so much.

#2. What are the pre-conditions or assumptions with the use case. Does this use case involve first responders using a P25 trunked radio system, an LMR conventional radio network, or an LTE system, or a combination of all three

#3. The scenario description is the bulk of the use case and describes the specific actions taken by first responders.

#4. The scenario discussion provides commentary to explain and clarify various aspects of the public safety response. This is especially helpful for industry participants who may not understand the rationale behind certain actions

Anatomy of a Use Case

– Use Case elements, continued:

o **Operational Capabilities:** Specific actions taken by first responders which are a necessary component of incident management.

o **Technical Requirements**: Specific elements which are required to support the operational capability.

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#5. Operational capabilities represent specific attributes that are required to manage a public safety incident. Many of these revolve around technology components. For example a first responder needs group communications with all other members at the incident scene

#6. Technical requirements are the final stage in the development of the use case and result in the documentation of required and recommended features and capabilities to support public safety

Anatomy of a Use Case

– Use Cases articulate the following:

o How public safety **responds** to an incident.

o **Actions taken** by first responders which become "operational capability" statements.

o Operational capability statements are then used to create technical requirements.

o Technical requirements look at "what" public safety needs and not "how" the solution is architected.

o A technical requirement may result in the creation of Key Performance Indicators (KPI).

o How do we measure that the eventual solution was successful?

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So, a use case should document how public safety responds to an incident and the actions taken by first responders. These actions create operational capability statements which are then used to create technical requirements.

It is always important to quote Andy Theissen and say that technical requirements look at "what" public safety needs and not "how" the solution is architected.

Technical requirements may also lead to the creation of Key Performance Indicators. Technology solutions should be created around public safety requirements. How does an agency confirm that the offered solution will meet their needs?

The LMR LTE working group has completed its assessment of eight use cases which examined how these technologies can simultaneously support public safety operations.

Each use case described an emergency response and focused in on a particular feature or capability. This allowed the working group to fully examine how these features would translate across and LMR LTE interface.

Use Case Example

- First responder action:
  - o A first responder becomes entangled in debris while fighting a house fire and must call for help.

- Operational Capability Statement:
  - o A first responder SHALL be able to activate an emergency alarm on their device.

Here is a quick example that illustrates the elements of a use case.

During an emergency response, a firefighter becomes entangled in debris inside a house fire.

The operational capability associated with this problem is that the first responder shall be able to activate an emergency alarm to notify other firefighters of their situation.

Use Case Example

– Technical Requirements:

o The Emergency Call Button behavior SHALL be configurable by the local agency, including automatic reassignment to a dedicated Emergency TalkGroup or having the first responder remain on the selected talkgroup. Those features should be configurable on a talkgroup by talkgroup basis to allow consistent behavior with neighboring agency policies.

o The alert SHALL contain similar information that is contained in the PTT Talker ID, including the identity of the first responder (Badge #, Vehicle #, CAD Radio ID), and from which LTE device the emergency alert originated.

o The emergency call button SHALL send the data alert to other LTE devices on the same talkgroup and to their home LTE PSAP dispatcher console. (LTE to LTE)

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That operational capability statement is then examined to determine what specific requirements are necessary to achieve this action.

Our working group identified a dozen unique requirements associated with a radio emergency alarm. Three of them are displayed here. As you can see, these requirements describe what public safety needs to support this feature.

They include specific statements on how the emergency call button can be configured, what type of data elements should be transmitted during the emergency, and who should receive the emergency alert

Technical Complexity

– Public safety participants in working groups need to understand the technical operating environment when developing requirements.

  o This is particularly true with LTE technology since most pubic safety personnel base their expectations on LMR systems.

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In the past, our use cases have focused on basic components involving first responder communications and we have avoided a deep dive into the technology and how these systems work. Our focus has been "what does public safety need" regardless of the technology in use.

However, we have had to change that approach as we started looking at LTE. Most of our public safety participants understand LMR and try to equate LMR centric concepts to LTE operations. So, we have spent some time working with PSCR and industry to educate everyone on how LTE works.

Knowing how LTE works lets public safety define requirements. If we weren't aware that certain capabilities existed in the LTE network, we would never try to leverage them to support public safety.
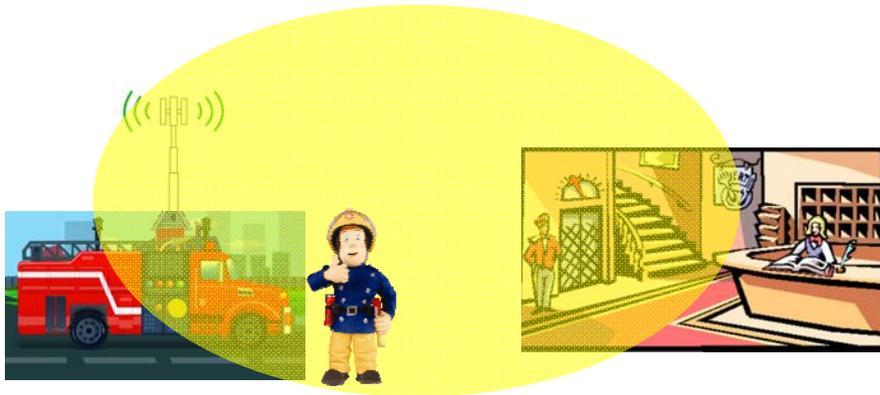
Macro Network Coverage

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An example of technical complexity came out of a recent use case involving group communications at an emergency.

In this first slide, Firefighter Bob arrives at the scene and is assessing the emergency. He is receiving coverage from an LTE radio tower.

There are unique considerations with how first responders communicate on the macro network.

In this next slide, Firefighter Bob has moved inside the building and is now using a Deployable System on the fire truck. This is the VNS concept that FirstNet has spoken of. There are many unique considerations involving how first responders might use these systems.

Direct Mode Communications

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This slide shows Bob and another firefighter in the sub basement of the building, where there is no signal penetration by the network. They are using Direct Mode communications to organize their response. There are a lot of variables in how Direct Mode communications work and Jeb gave a presentation on just this aspect of LTE last year at the PSCR stakeholders meeting.
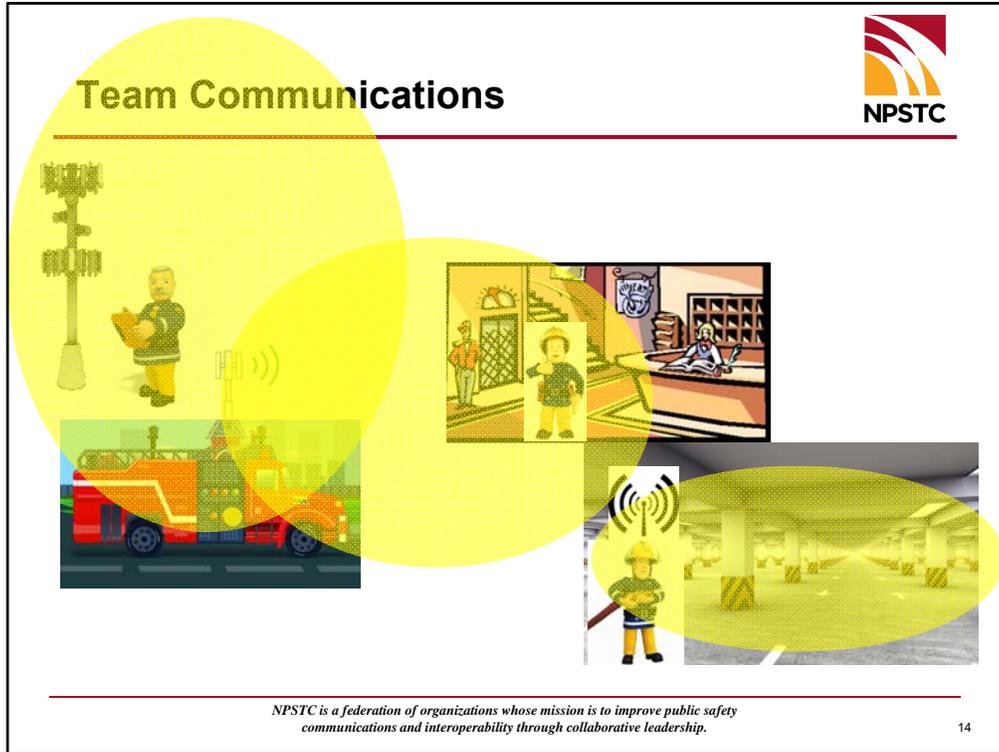
And then, you have to consider how all of these systems come together so the incident commander outside can communicate with the firefighter inside who can communicate with the firefighters in the basement.

So, the complexity of this incident reinforces why a use case must be divided up into manageable chunks to let you examine each of these various environments, which may all end up with unique requirements.

Summary

- Use Cases educate first responders on technology issues and inform industry on public safety operations.
- Use Cases identify public safety technical requirements.
- Requirements may lead to standards.
- Successful outcomes for public safety rely on a measurement system to validate compliance with requirements and standards (e.g. KPI).

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So, in summary, use cases help us create technical requirements, which can lead to standards and which can lead to the creation of a KPI to measure the success of the technology that supports the requirement.

They also help educate first responders and industry on the intersection between public safety operations and technology.

Thank you!