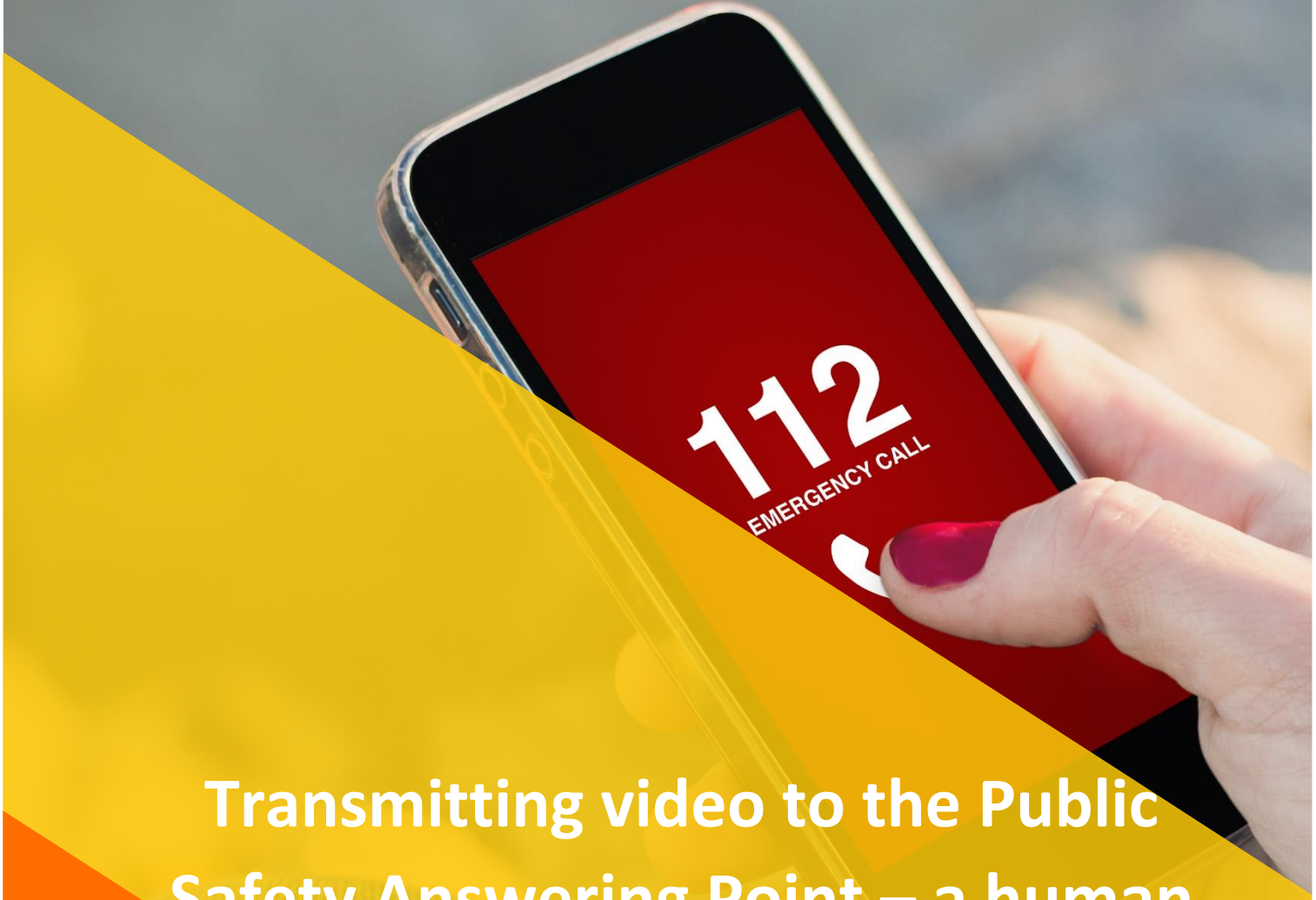


Transmitting video to the Public Safety Answering Point – a human perspective

This document looks at the human experience of using video during an emergency from both the caller and the call-taker's perspective.

eena
EUROPEAN EMERGENCY NUMBER ASSOCIATION

Transmitting video to the Public Safety Answering Point – a human perspective

EENA

European Emergency Number Association

EENA 112

Avenue de la Toison d'Or 79, Brussels, Belgium

T: +32/2.534.97.89

E-mail: info@eena.org

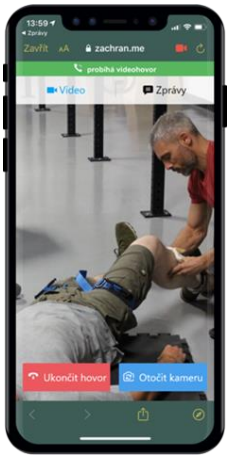
Authors that contributed to this document:

Authors:

David Wales, Customer Experience Expert
Filip Maleňák, Aplikace Záchranka

Contributors:

Cristina Lumbreras, EENA
Ondřej Franěk, EMS Prague



1 | INTRODUCTION

The Public Safety Answering Point (PSAP) is a key part of rescue systems everywhere in the world. It is their emergency operators who have first contact with the patient or caller. The speed of assistance significantly depends on the capabilities of the PSAP operator. They must decide, on the basis of a voice call, to send the correct means of response or coordinate on-the-spot lifesaving procedures including Telephone-assisted First Aid. Obtaining the maximum information from the caller is thus a basic prerequisite for the entire rescue process.

Throughout the history of emergency lines, the only connection between the caller and the PSAP has been a telephone call. Over time, the telephone call has been supplemented with information about the exact location of the caller, their identification and basic classification of the type of incident. This additional information is provided through the implementation of Advanced Mobile Location and through the use of emergency call mobile apps. This additional information can significantly reduce the time needed to deploy the appropriate rescue response. The emergency operator can thus focus more on the patient's condition without having to divert vital time to establishing caller location or identification.

However, the goal of PSAPs can be even more bold – to be able to see the scene of the incident. Not just to rely solely on the telephone call and additional data, but to actually see the situation on the ground as it really is. Video transmission directly from the scene may revolutionise the work of the PSAP. In specific cases, it significantly speeds up and streamlines the overall evaluation of the emergency situation before the crew's arrival on scene. In 2020, several projects were launched with the aim of implementing this method of communication. This document focuses on Video Use Cases – the issues concerning the relationship between technology and the operator/caller during an emergency call rather than just the technology itself.

Based on expert discussions in the field of emergency services and resuscitation, and from the point of view of the emergency medical service, the following types of incidents have been identified as those in which video transmission plays a crucial role for more efficient and faster provision of emergency care.

Traffic accidents and emergency incidents

Traffic accidents and other emergencies are often characterized by both a large number of callers connected to a single incident, together with a large number of casualties. Often, callers cannot accurately describe the severity of the incident, the number of injured people

or their current state of health. Moreover, with these incidents there is the further problem that with each of the callers describing the situation from their own point of view, the descriptions from the same incident may actually contradict one another. The use of video transmission technology by one or more callers can provide the PSAP with essential information about the nature of the emergency, the number of injured people and the severity of their medical condition.

Telephone-assisted First Aid

Telephone-assisted First Aid instructions given before the crews' arrival on scene significantly increase the patient's chances of survival and are now considered one of the basic skills of emergency line operators. As this is via telephone call, however, the operator has only the caller's description to go on when assessing the patient's condition and the adequacy of First Aid provided. The addition of video transmission allows the operator to check both the patient's current state of health in detail (for example, the depth of breathing) and the subsequently provided First Aid. In many cases, video transmission has meant that while providing CPR, any errors in the tilt of the patient's head, or the placement of hands, rate and depth of chest compressions can be spotted and corrected by the emergency operators.

Callers with hearing disabilities

It is not easy for a deaf or hard of hearing caller or patient to pass on information via a regular emergency call. Communication is thus often limited to sending special SMS messages or using emergency mobile apps that can transmit the caller's location, medical history and, through icons, the type of emergency. Supplementing this established communication with video is crucial for deaf and hard of hearing callers when providing the PSAP with more complete information about the incident. By simply pointing their mobile phone camera, the caller can provide the visual information the operator needs to immediately evaluate the situation. Additionally, video communication means sign language can then be used to communicate with deaf and hard of hearing callers (if the PSAP is prepared for this method of communication).

Video transmission for responding rescue crews

The responding crew on their way to the incident usually receives the maximum amount of information about the nature of the incident from the PSAP. However, text and verbal description can be supplemented by a recording or live transmission direct from the scene. The video call between the caller and the PSAP can be simultaneously transmitted directly to the responding crew's vehicle in order to provide comprehensive information about the situation at the scene. The intervening crew can thus be better prepared for the mission while already on their way there.

Rescue of person out of line of sight.

When attending rescues, it is not always possible to visually assess the access to, or immediate area, around the casualty. This can mean that risks to the rescuers are only discovered once they have committed to their deployment. It could also mean that their actions adversely affect the casualty if they are in a precarious or unstable location. If it can be done safely, and without risking loss of the phone from dropping, then the casualty using their camera to survey the scene from their perspective can help to reduce these risks.

2 I VIDEO TRANSMISSION FROM THE CALLER'S POINT OF VIEW

2.1 Overview

Currently, in most cases, the caller contacts the emergency number via a standard telephone call, whether this be by dialling the relevant emergency number directly or via the relevant mobile app.

2.2 Using video as a caller: the human experience

Fortunately, the need to call for emergency assistance is something that most people will never need to do, or it will at least be a rare event. Because of that, the process of doing so can be an unfamiliar and daunting experience involving various considerations.

These may be personal such as wishing to avoid the embarrassment of emergency services attending or not wanting people entering their property. Others may believe that in calling, they will deprive someone in greater need or they will have to pay for the response.

Assessing the need for a response

There are also more practical factors that influence when, or whether, people call the emergency number. For some incidents, the caller will be in no doubt about the need for assistance and will call immediately. This may be where they know that an urgent response is critical and/or that no-one present could safely or effectively intervene.

However, for some events the need for professional assistance is not always as obvious, such as a small fire. In these cases, many people will often attempt to deal with it themselves, and if this proves unsuccessful, they then call for help. It would be tempting to say they should call as soon as they discover it, but all the emergency services rely on some level of public intervention to resolve incidents on their own. Without this, the emergency services could not otherwise manage call demand or respond to every event. The issue, especially where an incident is still developing, is that often the guidance to the public is generic and as such may be unhelpful in informing their decision whether, or at what stage, to call for assistance. Clearly, this is something which could be aided using video to relay at-scene events to the emergency services and provide a better means to guide the public.

Overall impact of being able to understand information and instructions

Trying to describe something without being able to see it impairs effective communication, especially when this relates to a complex or evolving situation. This may also be difficult if the caller has limited appreciation due to their physical location or due to being partially sighted. This can lead to errors or reliance on assumptions (explicit and implicit). The value of video in adding another option or layer of verification will reduce the likelihood that there is a difference between what is being described and how it is interpreted. This is particularly the case where subjective terms are used to describe something.

Many lay persons will often act willingly and instinctively to help others, even where it incurs a risk to themselves. It can often be later, when they have time to reflect, that they wonder if they did the right thing and whether their actions were successful. One way this potential for post-incident distress can be reduced is by using video. This would allow the call handler to provide advice and support during the intervention, thereby improving the chance of a good outcome and reducing the burden on an individual for their actions.

Where this requires knowledge not available to the call handler, it could even be possible to remotely connect them to a specialist resource e.g. an electrician should that be required before the arrival of the physical response.

In an emergency, it is routine for the call handler to ask about other persons likely to be at risk, but less frequently will they ask about pets and very rarely about possessions. And yet, these are often particularly important and the fear of losing them can be a strong driver of people's behaviour[1] and a cause of significant distress. The adoption of video provides a new opportunity for services to consider how they can incorporate these factors and needs into their services.

There is evidence to suggest that when engaged in activity, people report that time seems to go quickly. When just waiting for the emergency response, time seems disproportionally long. As a result, they may then feel the need to 'do something' out of frustration before help arrives, or they may be angry when crews first arrive. Video contact can better reassure them and keep them focussed on beneficial activities until emergency services arrive.

Video also enhances the ability to meet the needs of a diverse community, by introducing the ability to show and not tell. As a result, it is an important to step towards reducing inequality.

Understanding the person

The importance and influence of emotions on both parties of an emergency call is only starting to become fully appreciated. It is not necessary to discuss this at length, but it is sufficient to acknowledge that video will provide additional options.

Whilst many callers will be in a calm state, some will not be. The use of empathy and other techniques have found to be effective ways of engaging with distressed callers. Video enhances this as it allows for the sharing of non-verbal cues, intentional and otherwise. It also provides a means to assess whether what is said is consistent with what is seen. By allowing another set of eyes to see the incident, it reduces the burden and potential anxiety on the caller where they are solely responsible for reporting the events, especially when they may not know what is relevant.

Relying on audio can mean that call handlers must make a lot of assumptions and that may impair the advice they give. For example, in the event of a fire, the caller may be told to get out and stay out. However, often the fires are small and contained, with other parts of the building remaining unaffected and safe. In these circumstances, telling someone to stand outside in the cold or rain could represent a bigger risk to health than the fire. There may also be other factors to consider, for example, would it be easier to manage distressed pets indoors rather than outside. The ability to monitor the options by video may allow the call handler to consider other options that strike a balance between all circumstances and not just the reported emergency.

Whilst process is important, it is always helpful to reflect on the following quote by Angela Mayou that identifies the need to be human as well as professional.

'I've learned that people will forget what you said, people will forget what you did, but people will never forget how you made them feel.'

[1] Thompson OF, Wales DG. 2015. A qualitative study of experiences, actions, and motivations during accidental dwelling fires. Fire and Materials 39(4):453-465

2.3 Considerations for the use of technology from the caller's point of view

2.3.1 Technical considerations

It is clear from the above points that in order to establish video communication with the caller, several technical conditions need to be met:

- The caller needs to be using a smartphone
- The caller's smartphone needs to have current Internet access
- The caller must be able to multitask on their smartphone

The above conditions can be a barrier, especially for callers who are not used to routinely using these features in everyday life.

2.3.2 Considerations from a human perspective

The potential to use video represents a significant step forward for the emergency services. However, it must always be borne in mind that we exist within a society that is itself constantly evolving. A recent study found that the use of video is in fact already well established in the public's mind.

'People increasingly like – and expect to have access to – video chat with 85% saying they'd like to engage with organisations over video.'[2]

There is also a recognition that the public are less inclined to make allowances for different sectors and instead their expectations are set by their experience with the best organisations, regardless of what category they are in.

Video technology is still relatively new but, in response to commercial pressures, many organisations have had to accelerate its adoption. This is helpful as their experience could be a great resource to the emergency services when considering procurement and implementation. The pandemic has also forced far greater use of video, which has also made it something people are more familiar and comfortable with.

When viewed from this wider perspective, the use of video must quickly become a core part of the emergency call. Whilst there are some important considerations for the emergency services, these must be seen as problems to quickly solve and not obstacles leading to prolonged or deferred implementation. It is unlikely the emergency services will encounter any problems that are truly unique and have not been addressed elsewhere.

Familiarity

The act of making an emergency call can invoke strong emotions for some callers. This is in part due to considerations about asking for help (or the consequences of it) but also due to uncertainty about the process and what will be required.

[2] Source: BT Global Temperature Check of Customer Priorities for Customer Experience, February 2021.

Most people will only ever make these calls rarely and so education or personal experience are not appropriate options to address caller anxiety. Rather than routing them through emergency call systems they are unfamiliar with, it will increasingly be possible for the emergency services to accept calls (including video calls) through social media or apps that they use regularly. It is not without its challenges but again, other sectors will offer many solutions from their experience of having done the same.

This approach may also reduce the time before the public call as it removes a barrier to doing so. It should also be noted that increasingly, emergency call technology and functions are being developed in other sectors. For example, many vehicles now have in-built emergency assistance functions, and it is likely that these will develop from audio to video over time as well. Not only may this mean the first call is not directly to the emergency service, but it may mean the commercial sector set different expectations for how emergency calls and assistance are provided.

Relationship between call handler and caller

Historically, the emergency call infrastructure has been developed from the perspective of the statutory services. This has important consequences for the hardware and scripts adopted. That distinction is now shifting and increasingly recognition of the needs and contribution of the caller will have to be built into future developments. This is a broad subject that requires further consideration. However, in introducing video, the caller must be understood as an individual and not seen just as a resource for the services to direct as required. This will include physical features such as the caller having the ability to control some of the video functions. It also includes adopting an appropriate tone of voice and language with the caller as well as establishing joint goals where possible. Video should help this.

One way video

It is likely that in its initial deployment, video will provide the ability for the call handler to see what the caller is seeing, but not the other way round. Given people's more usual experience of two-way viewing this may create some frustrations for the caller as it places them at a disadvantage in the call.

One way viewing may also limit the ability to exploit some of the benefits of video. For example, call handlers will be unable to demonstrate techniques physically and will still have to rely on describing them or trying to adjust the caller's actions from observation. In the longer term, this may also limit the ability to incorporate emerging technologies such as augmented reality.

Whilst it is not always the case, there will be regular calls in which it is helpful or necessary to create a strong bond with the caller. This can be for many reasons including, to reduce their distress or to build rapport so that they share information or follow guidance. Enabling the ability for the caller to see who they are talking to, would be very helpful in such situations. It would also allow for non-verbal techniques such as 'mirroring' to be used to benefit the caller.

Safety

One of the key questions that needs to be considered from the caller's point of view is the safety of a video call compared to a standard telephone call. If the emergency is a heart attack in a home environment and there are two or more bystanders present, video transmission has clear advantages with negligible chances of the bystanders themselves getting into danger due to their use of technology. However, this changes if the caller is on a busy road, for example, following a traffic accident. The situation may arise where the caller is so focused on their mobile device that they forget about their own safety. Unlike a standard telephone call, the caller's eyes are not directly focused on the situation itself but on watching their mobile phone's screen depiction of this. Here it is extremely important for the emergency operator to assess the situation and monitor the caller's possible need for consistent guidance during the call.

Lack of public awareness

In a minority of cases, people in the surrounding environment can react hostilely to a person filming the entire situation on a mobile phone. Sending video to the rescue service PSAP is such a new thing that other witnesses to the incident may at first mistake the caller for an opportunist taking a video for their own social networks. Consistent and widespread education and public awareness programmes are the only possible solution here.

Data usage

The caller's willingness to start a video call can also be affected by the demands of video transmission on their data tariff. So far, in practice, we have not encountered a caller refusing to initiate a video call due to data usage. However, it is advisable to prevent these situations, for example, by including video calls to the emergency number in the category of tariff-free services. This has been achieved by Vodafone for their customers in the Czech Republic. All data transfers that take place between EMS and the relevant web apps are not charged to users' data tariffs.

Summary

The use of video has the potential to improve communication between the caller and the call handler, as a person in distress is able to not only tell but show what it happening. This added information may help to create a better understanding between the caller and the call handler. The call handler can also watch over any intervention taken by the caller and advise as appropriate. For the caller, knowing that someone else sees what they see may help to relieve the burden of being the only eyes on scene.

The technology and process of a video call between the emergency line caller and the PSAP places much greater demands on the caller than just a telephone call itself. The user must be sufficiently conscious and aware of their surroundings and adequately equipped in terms of technology. Furthermore, the question of caller safety during the video call needs to be addressed.

3 I VIDEO TRANSMISSION FROM THE EMERGENCY OPERATOR'S POINT OF VIEW

3.1 Overview

Receiving an emergency call in the current emergency line infrastructure is primarily done by answering a telephone call. The call can be supplemented by location information and other information integrated with the PSAP. From the operator's point of view, video transmission technology should be integrated as much as possible with the software used for operations management.

3.2 Initiating a video call as the primary step in receiving a call

This method is used particularly in situations where a video call can play an essential role in assessing an emergency call and the subsequent deployment of the responding crew to the scene.

From the emergency operator's point of view, the following would describe an example of the steps necessary to start the image transfer from the scene of the incident.:

1. Receiving an emergency call, establishing location.
2. Assessing the need to supplement the emergency call with video transmission as part of incident classification.
3. Verifying the technical prerequisites for video transmission.
    a. The caller has contacted the emergency number via mobile app – this means the operator has the current battery level and Internet connection status.
    b. The caller has dialled the emergency number directly - it is necessary to verbally verify their current battery level and Internet connection status.
4. Video initiation – for example through WebRTC activation or sending the URL link for connection.
5. Establishing video communication with the caller while still maintaining the telephone call.
6. Deploying the appropriate crew and subsequent operations management.

At the same time, this method can be used when the PSAP receives more than one telephone call from a single emergency situation, such as a mass casualty incident. The basic functional scheme for receiving an emergency call (location, incident classification, caller identification, operations management) is already running and the second caller's video call provides the PSAP with more clarity of the situation at the scene, and if deployment of other rescue system units is required.

3.3 Initiating a video call as part of Telephone-assisted First Aid

In situations where all steps according to established procedures for crew deployment to the scene have taken place during a standard emergency call, it is possible in many cases for the PSAP to then use video to monitor the situation until the crew are on scene. In such cases, the caller is sent a video call connection link and any First Aid provided (e.g. CPR)

can be monitored until the crew arrives. Transmission is also important in situations where there is a risk of rapid deterioration in the patient's condition and the PSAP needs to carefully monitor this until the crew's arrival. The steps for making a video call would then be as follows:

1. Receiving an emergency call, establishing location, incident classification, and caller identification.
2. Crew deployment and subsequent operations management.
3. Assessing the need to supplement the emergency call with video transmission.
4. Verifying the technical prerequisites for video transmission.
5. The caller has contacted the emergency number via mobile app – this means the operator has the current battery level and Internet connection status.
6. The caller has dialled the emergency number directly - it is necessary to verbally verify their current battery level and Internet connection status.
7. Video initiation – for example WebRTC activation or sending the URL link for connection.
8. Establishing video communication with the caller while still maintaining the telephone call.

3.4 Using this technology from the emergency dispatcher's point of view

Assessing whether to use video

From the dispatcher's point of view, it is always a question of assessing whether to supplement the standard telephone call with video calling in a given situation. Based on more than six months' experience of using the system in the Czech Republic, we have found that defining the types of incidents when a video call should or shouldn't be initiated is not actually useful. The cases presented in the introduction above should only be seen as ideal cases; the list of specific situations is much broader. It is always essential to evaluate the effectiveness of a video call in the context of the entire situation, starting with the expert side of things, the caller's characteristics, the surrounding environment and lighting conditions at the scene, and the technical prerequisites, such as the caller's battery status and Internet connection.

Familiarity with the technology

It would be advisable to integrate the video transmission system directly within the operations management software.

Above all, the dispatcher should familiarise themself with the technology before using it in practice. Knowing the technical limitations and connection methods from the caller's own perspective means they are more able to guide the caller. Awareness and practical experience of the technology is the best way to put it to good use as soon as possible.

Mental health

An interesting phenomenon that some dispatchers have raised is the fact that so far, their only connection to the scene has been via telephone call. The operator thus had an idea of the nature of the injury and the entire situation at the scene solely on the basis of what they heard.

Moving from an audio system to the adoption of video will understandably raise concerns about the potential for adverse mental wellbeing for the call handler. In practice it is likely to create some new risks but also some positive mental wellbeing. Each service must make its own assessment and the following is offered for consideration.

Again, it is helpful to take a wider context. Very few people joining the emergency service in any capacity do so in the knowledge of how they will respond to seeing or participating in traumatic events that they have not been exposed to before. This is largely a leap of faith, regardless of which service you join. In comparison, the introduction of video to an emergency call centre is an incremental change (adding a layer) and so should represent a lower level of risk.

That is not to downplay any concerns but simply to offer a perspective. Emergency services must ensure that the wellbeing of their personnel is a high priority. A range of informal and formal support must be readily available.

Research may have a role to play in understanding the potential risks, but caution is offered against making this a pre-requisite before adoption. This is because it may take time to complete (and will be unable to study long-term effects yet), the results cannot be guaranteed upon to provide the certainty sought, the study may be disputed, and the findings may not be sufficiently representative to adopt universally. As previously mentioned, finding other organisations that have practical and similar experience of introducing video is a more pragmatic, robust and cost-effective approach.

For example, the use of video for customer interactions has seen a significant increase in commercial contact centres, many of whom will also deal with vulnerable or distressed customers. It is important to remember that this is not a unique issue for the emergency services and by looking to other sectors, practical insight and resources can be accessed that will both speed up adoption and reduce issues for the emergency services and their personnel.

Situational awareness

Gaining an early and shared situational awareness is beneficial to both the call handler and caller. The use of audio has limited the ability of call handlers to visualise the scene as described and it will be rare that they view images even after the event, except for the more serious events. As such, their perception of what is happening will be primarily formed by their own experience, that shared by colleagues, organisational messaging and training.

In some workshops organised by the Kent Fire and Rescue Service with fire control operators, this was explored with interesting results. When divided into groups, the one comprising newer recruits was found to be more accurate in their description of a 'typical' incident. It was identified that for those longer serving members, the impact of organisational messaging skewed to worst case planning and more attention given to more serious incidents (enhancing recall) amongst other factors, meant that they often believed the risks during typical incidents to be greater than was typically true. This is mentioned not as a conclusive statement, but just to highlight that greater use of video would assist with creating a better alignment between the real and believed scenario.

It will also reduce some of the frustration for the caller handler of trying to paint a picture from the caller's description, the ability for which varies significantly. As a result of their training and experience, call handlers will be able to guide the caller to view the important features, something which the caller may not intuitively know. When using audio only the additional features may not even be known to the handler.

Additional tool to manage

Clearly, the introduction of video represents another tool to learn and manage. Better integration and user-centred design means that technology is generally becoming more intuitive and less onerous. Ensuring any burden is reduced can be a feature throughout the process from specification and procurement through to training and coaching once adopted.

Whilst this report focusses on the use of video, technology is (and will continue to) rapidly changing all workplaces. This will provide a range of benefits and challenges. As such, it is suggested that the use of video should be considered more widely as part of an IT and workforce strategy. This would mean helping personnel to be comfortable with the increasing rate of change in general as well as having the skills to adopt specific change such as video.

3.5 Examples from practical experience

Practical experience reveals various different scenarios. We may have a caller present during resuscitation in a home environment, equipped with a smartphone and there are more bystanders present – an ideal situation for a video call. However, the user is not in a capable enough state to do anything more demanding than hold the phone to their ear. On the other hand, we have also encountered a case where a participant in a traffic accident responded to a video call link by then asking the operator to send it to a different phone number; this turned out to be a phone with a better camera and more data. We also encountered a case where the image of the accident was transmitted from the motorway by a truck driver who had a local Wi-Fi hotspot in their cabin.

Video-assisted CPR

In several cases, the video call was used to monitor CPR in incidents where several bystanders were present. The ideal number is three: two to take turns in providing CPR and the third to communicate with the PSAP via video call. The operator was able to verify in great detail the CPR providers' correct hand placement, frequency of chest compressions, and turn-taking until the crew's arrival on scene.

Information from a traffic accident – better situational overview

Video calling was also used to deal with multiple casualty traffic accidents. One caller was always asked to supplement their call with video transmission. The operator could thus better assess the situation at the scene. These situations highlight the importance of reminding the caller to focus on their own safety and not just on providing video footage.

Verifying the patient's state of health

Other cases in which video was used successfully were to monitor the patient's health. For example, in evaluating the extent of burns affecting a child, or the overall condition of a spontaneously breathing biker after a fall. In both cases, the rescue crew was deployed, and the patient's state of health was monitored by the PSAP until the crew arrived on scene.

We also encountered a case where video transmission meant the crew did not need to be sent. During the initial phone call, the caller complained of a knife wound to their hand. Following assessment, the dispatcher decided to refer the patient to the nearest hospital ER department. The follow-up video call was used to verify the actual condition of the wound and to confirm the decision not to send the crew was correct.

Confirmation of death

A runner out in the woods came across an unexpected situation when they discovered a lifeless body. Through contacting the rescue services and subsequent video call, the post-mortem signs were clearly assessed, and the standard follow-up procedures were initiated.

Response to fire
When responding to a fire, the initial caller may only be able to see one view of a large or complex building or scene. If multiple calls are received from persons at the scene, and where safe to do so, they can be asked to take up position at different point around the premises. This allows for better monitoring prior to the crews arriving and can ensure that any significant indicators (e.g. direction and colour of smoke) or a change in conditions are more likely to be spotted.

3.6 Video transmission vs. photo images

In some cases, a photo may replace the video call itself, and a static image may be sufficient. What can be currently stated, however, is that for mountain rescue services, the ability to transfer compressed photos is much preferred over fully-fledged video. In mountainous terrain, several photographs are often sufficient to show the surroundings of the incident or the condition of a climber stuck on a rockface, etc. Here, a photo clearly may take precedence over video.

4 I CASE STUDY

Austria, Hungary, Czech Republic & Slovak Mountains

An official mobile app is used to support the Emergency Medical Service (EMS), the Mountain Rescue Service, and the Water Rescue Service in the Czech Republic, Austria, Hungary and the Slovak mountains. The system was introduced in 2016 with the aim of using the capabilities of smartphones to communicate more effectively with the emergency line. This is achieved through efficient location, caller or patient identification, and incident classification.

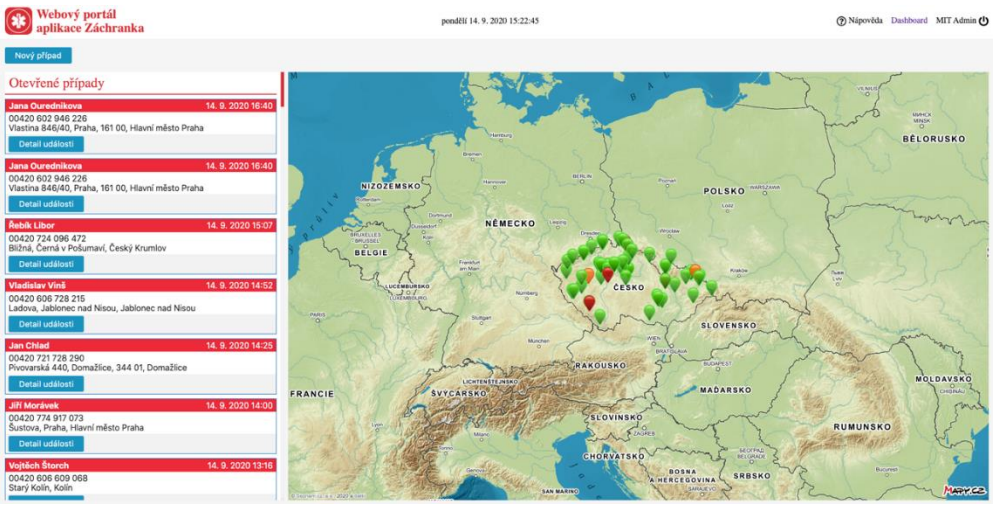
When the Alarm function is activated, the emergency number is dialled and at the same time, information about the caller's exact location is sent automatically, along with a complete incident classification and patient or caller identification. The new system enables video transfer direct from the scene of the incident. The system is currently used by more than 2,000,000 users in 4 different countries. The rescue services have so far received more than 100,000 emergency calls made through the app.

In hundreds of cases, the system has significantly helped rescue people not only in open terrain, but also in built-up areas. An integral part of the system is the national AED database, including the possibility to report new devices directly from within the app. Plus, it features an Emergency Alerts system, medical points of interest database, a First Aid encyclopaedia and other modules for accident prevention and awareness. The cross-border functionality of the system is also important, as the user needs just a single app to contact the foreign emergency lines throughout all supported countries (Austria, the Czech Republic, Hungary, and the Slovak mountains).

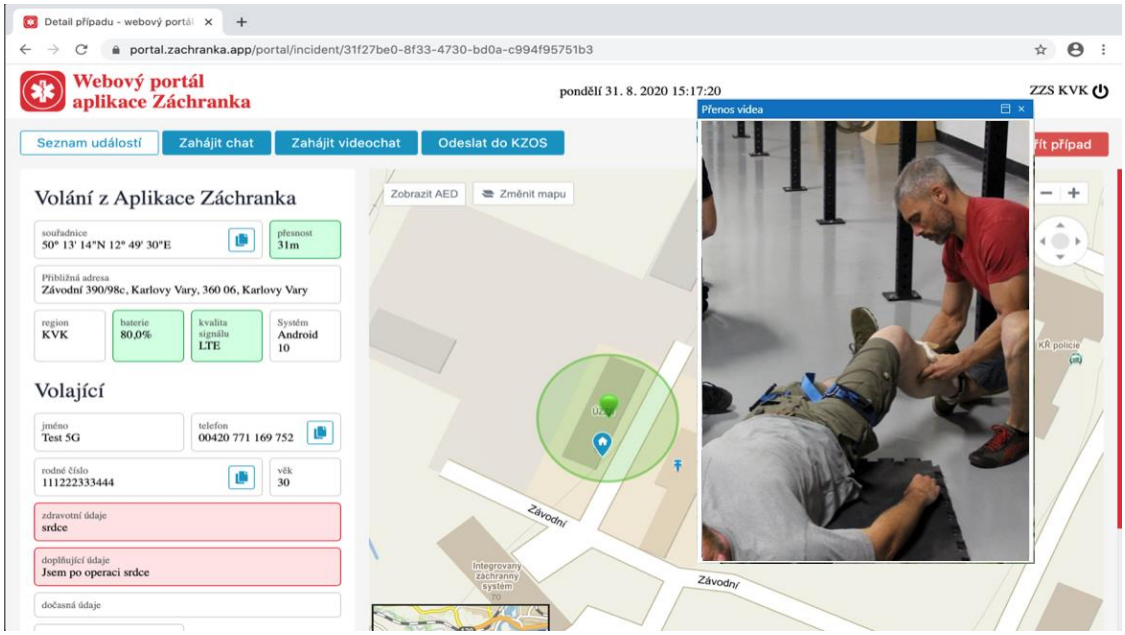
The video transmission solution is based on WebRTC technology. It allows for continuous transmission of location, image, and text between the caller and the Operations Centre. Contacting the emergency line takes place in the usual standard way, i.e. by dialling a telephone number or via an app. Video transmission is initiated by the operator, via a special SMS or push-notification sent to the caller. In accepting and opening the link, a direct connection is set up between the mobile phone's camera and the PSAP, and all without having to interrupt the standard telephone call. Undoubtedly, a significant benefit of this technology is the fact that it is fully functional not only for existing emergency mobile app users, but also for all emergency callers equipped with a smartphone and Internet

access. The basic functional element is the operator's web portal open at their workstation in the PSAP. The web portal includes the following functionalities:

- An overview of all incidents from the app within that EMS region, including details of data sent by the app (mobile Operations Centre).
- Option to create and add a new incident report for callers who do not have the mobile app.
- Continuous caller location updates from the incident, including map views.
- Continuous chat function with the caller if voice communication is not possible.
- Image transmission from the scene of the incident and subsequent sharing with the responding EMS crew.
- Incident filtering for app calls and a simple analytics tool.



App Web Portal



Data and image transmission from the scene of the incident in the new Web App portal

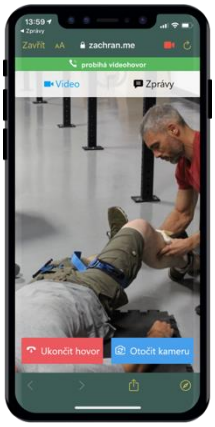


Image transmission and chat from the scene of the incident – as implemented in the mobile app

5 I RESEARCH

It is a reasonable and growing expectation that policies and practices are demonstrably informed by evidence. The term 'evidence' covers a wide range of potential material including, but not limited to, academic research and industry sources. The relevance, quality, and objectivity of these will vary and care is needed when assessing the strengths and limitations of any evidence, individually and collectively. The use of evidence assessment frameworks from organisations such as NESTA can help this.

The type and standard of evidence required will vary and should be proportional to the issue being addressed.

For those services considering the adoption of video there will be a readily available source of technical and other documents to aid the functional considerations. In support of some of the wider discussions included within this document, the topics below are suggested to be worthy of further reading:

- User-centred design
- Systems thinking
- Human behaviour during emergencies (especially social science studies)
- Customer experience

6 I RECOMMENDATIONS

Incident image transmission technology constitutes a significant contribution to the work of the PSAP. The use of video has the potential to bring numerous benefits to the experience of both the caller and the call handler. We have nevertheless shown that there are a number of considerations to that must be taken into account. We therefore recommend the following:

Recommendation 1 – be clear about the real benefit of introducing video (or any other change). Its primary purpose should always be to facilitate a proportional improvement to the experience and/or outcomes for citizens. This may require that a visual imagery strategy is developed to provide an organisation framework, enhance consistency and consider how images captured in one place may be useful elsewhere.

Recommendation 2 - In doing the above, the specification of video technology should ensure it benefits staff through improvements to the ease of operation and by removing tasks which can be readily automated. It should be the aspiration that any new technology is easily integrated and reduce the overall burden on staff.

Recommendation 3 – adopt user-centred design principles to ensure that the technology meets the requirements of all users and potential users. This includes fully understanding the public experience and needs through research or other forms of engagement.

Recommendation 4 – ensure all services share an ambitious vision and commitment to meeting the needs of their citizens. Ideally this should be captured in a common strategy, that recognises practical and mental wellbeing outcomes.

Recommendation 5 - technology and citizen expectations are changing rapidly. Emergency services need to ensure they can quickly adapt and constantly strive to meet or surpass these. Increasingly, techniques and agile methodologies reduce the cost and increase the speed of adopting technology.

Recommendation 6 - create a culture in which staff welcome and eagerly adopt technology that allows them to enhance the experience and outcomes of citizens. Where, inevitably, this impacts on their current role, they should be supported to develop the new skills required and for any wellbeing issues encountered.

Recommendation 7 – create a customer experience strategy that includes the emergency call handling function.

7 I CONCLUSIONS

Should the video call be initiated by the caller or emergency services

Video calls introduce additional benefits and factors for both the caller and call handler. On a human level, it is foreseeable that there would be circumstances under which either party may wish to have the ability to determine which is the most appropriate or comfortable medium for them. The potential operational benefits of video calls may be diminished if callers or call handlers felt that they would be personally compromised by being unable to decide when to use either. As such, in general, it is likely that the aim should be to provide both parties with the ability to control whether to use audio or video at any stage of the call.

Prior to implementation, it may be beneficial to approach other sectors or organisations that have introduced video call technology. They are likely to provide valuable insight of their experience and may even be able to provide examples of call protocols.

Even with the best preparation, some adaptation should be expected during the implementation phase based on user experience. As such, an iterative approach should be incorporated with structured feedback programme collating the experience of both callers and call handlers.

Benefits of the use of video

Whilst it is a new application, many emergency call centres will already have experience of accessing and using live footage, for example from CCTV. In this respect, video calls from citizens simply provide another source from which imagery can be received. Where it differs is that CCTV is usually at a fixed location, and citizens can be asked to change their vantage point.

From a human perspective, video calls for most incidents will only enhance the effectiveness of the communication between both parties. This is likely to reduce the stress created from the limitations of relying on discussions limited to verbal descriptions only. It is likely to have professional benefits to the call handlers including: enhancing their ability to liaise between the caller and responding crews; building a better understanding of incidents; and assisting their ability to help the caller accomplish their own priorities e.g. ensuring the welfare of pets or saving valued possessions.

For the caller, video calls should provide a more human experience by being able to see a person rather than just hear their voice. This may be particularly helpful for incidents where the caller is distressed or there is a need to create a rapport quickly. It is likely to reduce the burden on the caller, by enhancing the ability to create a shared situational awareness particularly for dynamic incidents. This should help the caller both at the time and post-event as they will have a greater sense of any actions being a shared responsibility with the call handler. The impact of post-event trauma amongst citizens is perhaps still largely underappreciated. Video calls will also provide a positive enhancement in developing the options for those with disabilities to make calls for their own, and others, welfare.

Challenges for the citizen, safety etc.

The main challenges for the citizen are likely to be in relation to use of the technology and in terms of ensuring its use does not cause harm.

Adoption and frequent use of video technology has been greatly enhanced during the pandemic and is now a medium that many will be comfortable with. However, there will be a significant number of citizens that are not comfortable or experienced in its use and, for these, retaining the audio only option will be important.

For most events, using their phone to share video of the incident is unlikely to create any additional risks. Most services are already likely to ensure that the caller is in place of safety when making an audio call. It may even be the case that audio callers are asked to verify additional information necessitating them changing location. Video may increase the frequency of this option being used. In doing so, the relationship between caller and call handler may change slightly from one of primarily a reporting function to one in which they take on a more active assessment role. Ongoing evaluation and learning should be used to monitor and respond to any issues identified due to this.

Either way, the call handler (and service) clearly has a responsibility to ensure that any additional information sought does not place the caller at risk, either through a direct or implied request. Incidents on live roadways provide an obvious example. The caller must be advised that the call handler can only see what the camera is directed towards, and the caller must maintain a view of all around them and be responsible for their own safety.

Challenges for the emergency services: psychological impact etc.

There will of course be some incidents that pose new risks or challenges to the wellbeing of the call handler through exposure to images or because of their actions in guiding the caller. In most cases, video will reduce the potential for an adverse outcome form advice given when compared to reliance on audio and verbal only communication.

Inevitably, call handlers will be exposed to some visual imagery that has the potential to be personally disturbing or upsetting. This is an extension of the existing risk of being distressed by what they hear on a call. As such, most services already have appropriate measures to prevent, monitor or address any adverse effects. Again, as part of the implementation plan, appropriate safeguards should be incorporated to identify any new or unexpected issues.