



# Future-proofing UK fire and rescue service control rooms

The role of technology  
in sustaining high-quality  
command and control services

 **Capita**

# Contents

- 05 Introduction
  
- 06 How technology can help today
  - 06 From the first seconds of the call
  - 07 Real-time situation awareness before arriving on-scene
  - 09 Protecting officers and the public by mobilising the appropriate resources
  - 12 Using the Internet of Things for improved safety and attribute-based mobilising
  - 13 Improving the user experience by providing real-time information
  - 13 Using analytics for continuous service improvement
  
- 14 Using technology to harness the power of collaboration
  - 14 Successful collaboration of fire brigades
  - 15 Supporting multi-agency incidents and campaigns
  
- 16 The control room of the future
  - 16 Artificial intelligence – using machine learning to fine-tune responses
  - 16 Predict and prevent
  - 17 Future digital convergence
  - 17 Supporting cross-service collaboration with the cloud
  
- 18 Conclusion

# Foreword

**It's fair to say that today's fire and rescue services exist in challenging times. We find ourselves juggling often limited budgets and resources against a backdrop of significant regulatory requirements and increased public scrutiny.**

This paper, which looks at the role of technology in sustaining high-quality command and control services follows the publication of Her Majesty's Chief Inspector of Fire & Rescue Services' report to the Secretary of State The State of Fire and Rescue 2019, the first assessment of the efficiency and effectiveness of England's fire and rescue services in more than a decade. The State of Fire and Rescue 2019 report sets out its recommendations to create modern fire and rescue services fit for the future, including the need to capitalise on the opportunities provided by ever-improving technology.

The observations within this paper are, therefore, certainly timely, providing food for thought around how we can use the very latest technology to better protect both the public and our officers as we develop effective and efficient command and control rooms and lay the foundations for a sustainable future for fire and rescue services.



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# Introduction

**Recent years have seen UK fire and rescue services undergo huge periods of change as they respond to financial, regulatory and workforce challenges. Services across the country have been evolving to meet the often-conflicting pressures, adjusting their operational strategy to ensure they can meet demand and continue to protect the communities they serve.**

As the central force which drives every service's response to emergencies, fire and rescue control rooms are no exception to this need for transformation – as the National Fire Chiefs Council puts it 'Quite simply, incident command lies at the core of what fire and rescue services do'<sup>1</sup>.

This paper looks at the current challenges for control room teams in fire and rescue services and considers how technology can support operations, ensuring continued high-quality sustainable services, both now and in the future.

# How technology helps: where we are today

**There's no doubt that today's control rooms are under extraordinary pressure, with fire control operators and managers having to make quick decisions which take into account many and complex variants – most of the time under extremely challenging circumstances. Added to this is the ubiquitous nature of social media, where every incident (and therefore every decision made in the control room and more widely in the service) is scrutinised not only by Her Majesty's Inspectorate of Constabulary Fire and Rescue Service (HMICFRS) but also by the public.**

Without recourse to unlimited manpower, fire service control rooms are increasingly turning to technology to support them in making informed decisions whilst making the best use of resources.

Set out below is a summary of where today's technology can, and is, supporting command teams, from situational awareness to resource management and communication.

## I. From the first seconds of the call

Even before the caller speaks, technology can provide an understanding of the person on the other end of the telephone. For example, when a member of the public makes an emergency call, crucial facts relating to the number they're calling from can be made instantly available. This includes an automated search running on the calling line ID which references the records database and shows information previously recorded about calls from that number.

This is particularly useful in the case of a vulnerable person, flagging warning markers to help fire officers evaluate the urgency and resource requirement. Frequent known callers can be flagged as vulnerable persons, to prompt the operator to the most appropriate approach to the call.

Operators can use the calling number to get an exact address if it's a land line, or alternatively find the location of the phone if it's a mobile. The What3Words geocode system also supports in helping to confirm the location as quickly and efficiently as possible.



## Enhanced location awareness

Technology such as EISEC (Enhanced Information Service for Emergency Calls), caller line identification and AML geo-location tools enable control room operators to confirm the caller's location swiftly, with no input required by the caller. Capita's Vision solution also provides enhanced location awareness with multiple fully-integrated different location-based tools, such as 999eye and What3Words.

## II. Real-time situation awareness before arriving on-scene

It's widely recognised that good situational awareness is fundamental to incident command as it provides the basis on which all decisions are made<sup>2</sup> whilst also reducing uncertainty in order to make it easier to make decisions.

Even more valuable to fire control room operators is when members of the public can provide live footage of a fire or incident, offering instant 'on-scene eyes' for an enhanced level of situational awareness. This helps teams assess the scenario much more easily and accurately to mobilise the appropriate resources to dispatch to the incident. This also supports control rooms in providing more qualified information to partner agencies to help manage the incident more effectively.

Provided the caller has a smartphone, they can stream live footage direct from their phone camera to the service control room, providing vital live footage together with the caller's location, enabled by GPS coordinates. In these situations where speed is of the utmost importance, it's crucial that the technology will work, no matter what version of

phone, and that the caller doesn't need to spend time downloading an app: this next-generation remote technology not only works on any smart device and operating system, but is immediately accessible through a secure, one-time-use link sent by SMS or email.

Having this initial situational awareness before the first pump's arrival is extremely helpful. An example is where, say, a bin fire has been reported – this could either be quite minor (needing just one pump) or escalating rapidly, or perhaps be situated close to a petrol station or chemical plant, needing more significant resources.

This intelligence also supports flexi-duty officers in making better-informed decisions to assess whether they should attend an incident as they can receive a live feed from the incident to their smart phone. As well as health and safety benefits, there are clear resource and environmental benefits in terms of alleviating unnecessary attendance at non-critical incidents, particularly pertinent for fire investigation officers and hazardous materials (HazMat) officers to protect the utilisation of specialist teams.

## 999eye – ‘on-scene eyes’ for enhanced situation awareness

Developed as a collaboration between West Midlands Fire Service and Capita, 999eye is the world’s first emergency live streaming solution, allowing 999 callers to securely send live-streamed footage of incidents to control rooms.

### *The impact*

In use in the West Midlands since May 2017, the live images offer instant ‘on-scene eyes’ to help operators better assess the scenario and select the appropriate resources to dispatch. This is improving incident outcomes, ensuring first responders are aware of the risks before attendance to begin planning and tactical strategy.

As West Midland Fire Control’s Graham McCann explains:

**“ It’s very much increasing the efficiency of our response in terms of being able to augment or reduce attendances as and when we get the fuller picture.”**





### III. Protecting firefighters and the public by mobilising the appropriate resources

To be able to protect lives – both those of firefighters and members of the public, it's crucial to mobilise the right teams, the right skills and the right equipment to the incident in the shortest possible time. Attribute-based fast time mobilising contributes to ensuring the most efficient and effective response and cover to minimise risk and protect life.

There are software systems which can automate a search through the lists of stations, crews and pumps, automatically calculating where the nearest, most appropriate resources are. Automatic vehicle location enhances this facility, so that any appliances located at that point in time in the vicinity can be deployed.



#### Cutting incident response times with effective mobilisation

London Fire Brigade's 'Fire Facts' report evidences how much faster they're reaching incidents since they introduced new control room technology – Capita's VISION system: the average attendance time for both the first and the second appliance to reach an incident in 2018 was 19 seconds faster than in 2015.

The system uses a routing algorithm which analyses current resource utilisation and the nature of the incident, taking into account vehicle location (AVLS) and journey times. Automation technology guides operators to mobilise appliances according to their proximity to incidents, recommending the most appropriate resources to despatch to an incident.

Assistant Commissioner for Brigade Control and Mobilising, Jonathan Smith, explains how this helps:

**“ Being able to mobilise the closest resource, which takes into account intelligence such as individual road speeds, enables us to cover a particular incident – say, in the east of London – whilst ensuring that we're still able to provide cover for the rest of London. It provides our officers with the information they need to make informed mobilisation decisions, enabling us to move our resources around more quickly and efficiently.**

An even more effective way of ensuring the right blend of skillsets at an incident is when the control room system is linked with firefighter training records and can automatically recommend particular personnel. This is invaluable when specialist skills and experience are needed for a particular incident, such as a hazardous chemical spillage, rescue from a high building, a road traffic accident and so on - searches can run in just a couple of seconds to locate the right expertise.

## Attribute-based fast time mobilising

### *Ensuring the right resources on the ground*

Rather than simply matching vehicle types to the type of incident, attribute-based mobilising enables brigades can match appliances, equipment, crew, expertise and so on, in a split second of the operator confirming the type of incident. The best mobilising systems are customisable, enabling each brigade to build automated rules to suit what applies to incidents arising in that area. For example rules can be built regarding the response to an incident in a high-rise building, a bomb threat and so on.

With sophisticated new equipment and appliances being introduced all the time, attribute-based mobilising has become even more important. For instance, for lower grade incidents it can be more efficient – and quicker - to send mini pumps which have two crew members rather than a full-size pump and crew.

Another useful feature enabled by attribute based mobilising functionality is the ability to define rules geographically to support collaboration work. For example, where two brigades are mobilised from the same control room, different sets of response rules for each fire service can be defined and implemented depending on where the incident has arisen. This allows for other resource allocation factors, such as one area perhaps relying on a number of retained or on-call fire fighters at the weekends/in the evenings. This also enables fire services to put in place different rules for different areas and times of day, for instance where one fire service has a policy of sending one pump for a certain type of fire, but where their partnering fire service might usually send two pumps.



Ensuring the right  
resources on the ground





#### **IV. Using the Internet of Things for improved safety and attribute-based mobilising**

The dedication of officers to protecting communities often puts them in highly pressured, dangerous situations where their entire focus is on saving lives and minimising the impact of the incident. This means that time passes quickly and they may not be aware that they've been under particular conditions for a length of time.

To support teams in not going over specified maximum time limits, technology can track their location and alert the officer in charge that, for example, it's time to rotate the fire fighters on the ground for a much-needed rest and/or change their breathing apparatus. Wearable devices, either worn separately or built into uniforms can collect data to be transmitted and monitored, providing useful information to enhance firefighter safety, whether to convey the temperature or contamination levels that the firefighters are subject to, or to monitor heart rhythms following and during particular incidents.

Sensors within equipment are also useful for providing inventory information, including how many breathing apparatus units are available at any one time. Those sensors can trigger alerts when it's time for the device to be serviced or where there are maintenance issues, making sure that all fire service equipment and attributes are safe, available and maintained correctly – crucial for protecting the lives of officers.

Another welcome innovation is that new vehicles today feature a system, eCall, which automatically contacts the emergency services if that vehicle is involved in an accident. Dialling is activated automatically as soon as in-vehicle sensors and/or processors (such as an airbag) detect a serious crash, providing data such as the exact location of the crashed vehicle, time of the crash and the direction of travel. This feature can also be triggered manually by witnesses by pushing a button in the car. Where this integrates with the control room system, this can be even more valuable: that information is conveyed within seconds, potentially saving lives, particularly where a pump is needed urgently in the case of a vehicle fire.



## V. Improving the user experience by providing real-time information

Mobile solutions for officers ensure they can see exactly what's happening and don't have to contact the control room for status updates whilst also being useful for providing decision makers in the control room with up to date information. Key information is delivered to the frontline, and captured from the frontline in the most effective way.

The Thames Valley Fire Control Service, which handles 999 calls and mobilisation across Berkshire, Buckinghamshire and Oxfordshire, uses BOSS Mobile, a web-based application designed for mobile devices as an operational situational awareness tool for officers.

Once alerted and mobilised to an incident officers can immediately access information such as incident location and type, mapping, the incident log and the status of responding resources, as well as being able to access information on other incidents in the area, including 'information only' incidents such as road closures. The Incident log can be updated on-scene and shared across responding officers, providing an efficient handover tool for incidents that span multiple shifts.

## VI. Using analytics for continuous service improvement

As part of day-to-day monitoring, services have to record activity and outcomes taking place on the ground. Technology has a role to play in ensuring that this information is easy to capture, and is captured in a useful way. Being easy to implement and to integrate successfully with other systems is critical – the bare minimum required of control room software is that it can provide a full audit of activity associated with an incident and, in the event of an inquiry, can provide information immediately.

In addition, senior officers need to ensure quality and efficiency of responses – a useful facility which a good control room system can offer is a 'replay facility' where activity can be replayed in real time or slow time, enabling the actions and steps taken to be analysed and to see if any improvements can be made or whether there are gaps in training. This is an important factor both in service improvement and in staff personal development, both important factors contributing to an efficient and effective brigade.

# Using technology to harness the power of collaboration



**The guidance document published by the Emergency Services Collaboration Working Group considers both the duty to collaborate (as required by the Policing and Crime Act 2017) and the benefits of a successful, cohesive approach to enable emergency services to deliver the highest quality service. It recognises that greater collaboration provides greater opportunity to respond innovatively to today's demands whilst strengthening future resilience, effectiveness and efficiency.**

## I. Successful collaboration of fire services

In addition to collaboration between different blue light services, there are also, of course, the benefits of collaboration between brigades themselves. This offers similar benefits to multi-service collaboration, with the added benefit of economies of scale, where three fire brigades utilise the same system.

For example, the Networked Fire Services Partnership (NFSP), a consortium of Fire Services comprising Hampshire Fire and Rescue Service, Dorset & Wiltshire Fire and Rescue Service, and Devon & Somerset Fire and Rescue Service share their command and control solution. They use a fully integrated solution, distributed across three control rooms, which not only supports the individual services but also meets the operational requirement for interoperability and resilience across the partnership.

This successful collaboration has positive benefits in terms of back-up resource and resilience as John Aldridge, Chair of the NFCSP Strategic Board explains:

“Because all three fire and rescue services have the same technology in their control centres we will have far greater resilience. If one service is under pressure the others will be able to provide full support.”

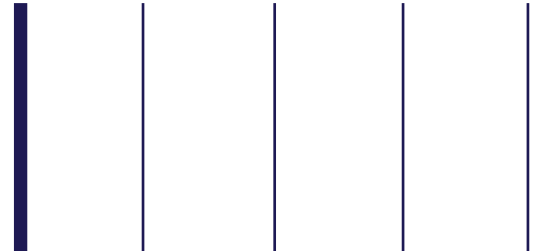
## II. Supporting multi-agency incidents and campaigns

The Multi Agency Incident Transfer (MAIT) system has been developed to support incidents which require a blend of emergency services and other agencies, such as HM Coastguard, the Highways and the Department of Transport, because of their severity or complexity. Designed to achieve secure interoperability between IT systems, MAIT is an integrated IT solutions which removes the need for operators to make telephone calls to other services and agencies whilst under high pressure situations. As well as streamlining the process by reducing the call transfer time between services from four minutes to a few seconds<sup>3</sup> through automation, the use of standardised information and communication ensures that all those who need to be involved are regularly updated with the full picture.

Pilots of MAIT are currently underway across the UK and it's evident that, to be truly future-proof, any command and control technology implemented by fire brigades must be able to easily integrate with MAIT. As a result, software suppliers must be able to evidence now that their systems are fit for purpose for the near future of multi-agency response.



# The control room of the future



**What is clear is that, to support sustainable fire services in a climate of high demand and limited resources, control rooms will need to be highly collaborative, making use of technology and shared data to achieve true cohesion between functions.**

The effective sharing of data will revolutionise how emergency services develop to ensure they're fit for the needs for the future. Even if services aren't physically sharing a single control room, the three blue light services should, ideally, be able to share data quickly using the latest technology.

In addition to sharing of information, there are other technologies which present opportunities to support the work of command and control in fire brigades. A few examples are:

## **I. Artificial intelligence – using machine learning to fine-tune responses**

Looking into the future, there's a great opportunity to use artificial intelligence (AI) and improve some of that efficiency, for example a very small amount of information about an incident – perhaps a domestic fire in a particular type of dwelling - could be provided.

Using machine learning, technology could determine the level of resource required and facilitate the dispatch of this from the control room. There's no doubt that human judgement will always be the overriding factor for decision-making, but AI could make those judgements that much easier by presenting various likely outcomes in a split second of the time it would take a human being to consider each variant and consequence.

## **II. Predict and prevent**

A further established area of technology is that of predictive analytics which can be used to understand where, when and why a particular type of incident is most likely to occur based on the analysis of historical data. In this way patterns can





be picked up, perhaps around particular types of building, geographical location and so on, helping to identify where fire brigades need to concentrate their resources, either as preventative work or, in worst case scenarios, to help them manage an incident with particular characteristics.

### III. Future digital convergence

It's also crucial that any control room system is functionally rich enough to be future-proof in terms of supporting the forthcoming Emergency Services Network (ESN), the communications initiative for police, fire and ambulance services control rooms in England, Scotland and Wales. Although not likely to be live for several years, the aims of this are to make it possible for communications to share an existing commercial network (5G) and allow better use of mobile data.

### IV. Supporting cross-service collaboration with the cloud

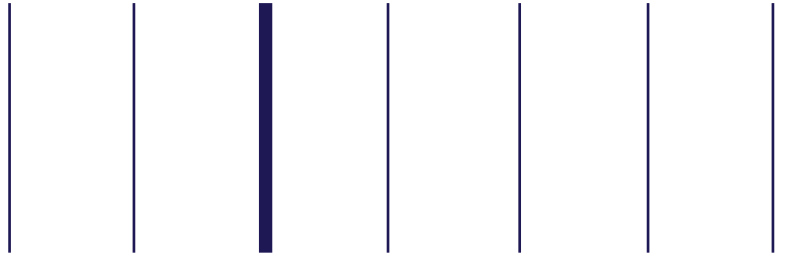
Considering a move to the cloud with control room technology offers a number of advantages, not least being the opportunity to cut IT costs, particularly where it might suit several fire brigades to share those cloud services. Security and resilience are the key factors but there are platforms available which certainly provide this reassurance, such as Microsoft Azure.

There's no doubt that being in the cloud makes it much easier to upgrade and implement new technology, and there is support available to help brigades make the move.

Cloud is starting to be considered as a feasible option by fire services, and they're watching closely to see how other emergency services adopt this approach both in the UK and overseas. In particular, when a powerful control room solution is used in the cloud, it supports where services have chosen to work together in collaborative partnerships where, say, one control room is providing the control room operations for several brigades.

It's key that any solutions used by fire brigades are able to link into the latest technology, including the new Emergency Services Hub to support the sharing of information, best practice and cooperation. The best technology can facilitate systems 'to talk to each other', for example, enabling police forces to see the locations of fire engines and ambulances, sharing information about casualties, firearms presence etc. It's important to ensure that the technology is able to protect sensitive and restricted information so that only relevant information for each service is shared.

# Conclusion



**New technologies are already transforming how control rooms and supervisors can operate as effectively as possible, ensuring informed decision-making throughout the process, from the moment a call comes in to major incident management.**

The enhancements to situation- and location awareness provided by real-time remote video technology, combined with automated data searches running in the background as soon as a control-room operator picks up an emergency call, mean that responding officers can be as prepared as possible for any incident. This pre-arrival intelligence provides powerful benefits: the most obvious being the ability to provide an appropriate, timely response to deal with the incident itself, therefore better protecting public safety. Other key benefits include being able to better protect officers themselves and ensure resources are focused exactly where they're needed, preventing the unnecessary allocation of officers or specialist skills to non-critical incidents.

Automation technology is enabling more effective mobilisation of resources with routing algorithms which ensure teams and appliances reach the incident in the quickest possible time. Attribute-based mobilising is further strengthened when utilised with Internet of Things (IoT) technology to factor in on-duty times for resource rotation and provide alerts when equipment needs maintenance.

The latest mobile solutions ensure decision-makers always have the information they need, with real-time updates to and from the frontline. Technology also makes it easier for fire services to work together collaboratively, from enabling several brigades to use the same system for economies of scale to supporting multi-agency incidents and campaigns by streamlining call transfers and making it easier to share standardised information to keep all parties up to date.

From automation to artificial intelligence, to analytics and the cloud, it's evident that the technologies needed for the collaborative control room of the future are already available to those fire and rescue services looking to lead the way in service transformation and sustainability.



*Sources*

<sup>1</sup><https://www.nationalfirechiefs.org.uk/Ops-Future-of-incident-command>

<sup>2</sup>[https://www.nationalfirechiefs.org.uk/write/MediaUploads/NFCC%20Guidance%20publications/Operations/CFOA\\_Incident\\_Command\\_future.pdf](https://www.nationalfirechiefs.org.uk/write/MediaUploads/NFCC%20Guidance%20publications/Operations/CFOA_Incident_Command_future.pdf)

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