

Emergency management undergoes a command revolution

What factors do almost all major emergencies have in common? Answer – they frequently overwhelm conventional command and control systems, imposing huge demands on commanders when efficient resource management, accurate information gathering and dissemination, and joined up decision making across multiple agencies are critical. VectorCommand's Command Support System has been developed to support emergency commanders and managers by addressing many of the specific command, communications, asset management, and information sharing lessons learned from recent major disasters, writes Stephen Prendergast, VectorCommnd Limited.



The scale and complexity of the 11 September 2001 bombings forced emergency services all around the world to reassess their emergency response plans. LFEPA responded by specifying the Command Support System (Photo: Getty Images)

For emergency services, the magnitude of the terrorist attacks of 11 September 2001 in New York changed everything. One message was very clear, emergency services would have to reassess every aspect of their planned responses to complex major incidents in the future. Post event analyses of other major catastrophic disasters and emergencies – Hurricane Katrina in New Orleans, the Buncefield fire, the 7 July 2005 bombings in London and recent flooding in the UK – have confirmed these findings.

When London's Fire and Emergency Planning Authority (LFEPA) conducted a review of how its existing command support structures supported incident commanders at incidents, and then began incorporating the resulting recommendations into the specifications for its fleet of new mobile command vehicles, it launched a process, the Command Support Project, leading to the development of one of the most advanced emergency command systems anywhere in the world. The resulting Command Support System is now generating interest throughout the international emergency response world.

Different threats

But terrorist attacks, whether involving hijacked aircraft, Improvised Explosive Devices (IEDs) or CBRN (Chemical, Biological, Radiological and Nuclear) devices, while significant and challenging are only

some of the many different types of threats for which police, fire and rescue, ambulance and emergency management organisations must prepare.

Whether an emergency is fire related, a natural disaster or a terrorist incident, many aspects of emer-

gency command management remain the same. Commanders need to know where incidents are occurring, where their assets are deployed (and how long their assets have been deployed), and they need to be able to communicate their command decisions clearly and quickly to all command levels, sometimes over large distances. With consideration of the requirements of the National Incident Command System in mind, they also need to leave an appropriate logging and audit trail.

Focus on London

This was the case for the LFEPA (the organisation responsible for the London Fire Brigade, the third largest in the world, with 7500 staff and 112 fire stations, training centres and offices). LFEPA considered the range of activities to be delivered by command vehicles and software as part of its internal Best Value Review of incident command. One of the principal outcomes of this work was to trigger the inclusion of command support at an earlier stage in an incident than historically, and the on board systems and software have been designed to support this requirement in full.

Senior managers took the opportunity presented by their need to replace ageing, mobile map room style mobile command vehicles with a fleet of new, high tech mobile command vehicles, to undertake a complete rethink of how the organisation could make London safer through improved command and control systems, while also ensuring that safe systems of work



Lessons learned from analysis of the multiple bombings in London on 7 July 2005 have been incorporated into the Command Support System (Photo: Getty Images)



Recent flooding in the UK tested emergency services over wide areas and for long durations. Efficient asset management and a clear, common operational picture shared between multi agencies and other emergency response organisations is possible using the Command Support System (Photo: Getty Images)

are supported at all incidents. Roy Bishop, Deputy Commissioner for the LFEPA, and his advisory team, were not content with making small incremental improvements in strategic and operational command. Instead the decision was made to test and rethink every aspect of the support provided to commanders at incidents.

Detailed analysis

Roy Bishop said, “We took this opportunity to take an in depth look at the command support structures at incidents and identified that a new approach would be required, one that combined sensible, practical procedures that supported a more collaborative style of command and control and that utilised all the best that modern information technology and communications systems would allow.”

Led by Group Manager Neil Orbell, Project Manager of the London Fire Brigade Command Support Project, the advisory team implemented a detailed analysis of all aspects of the brigade’s command and control systems, looking at such issues as speed of data update and start up times for mobile command units, access to brigade asset and risk database information, satellite and other emerging communications systems, spatial data, online streaming of imagery, deployment, management and monitoring of fire fighting assets (staff, appliances), and staff rostering.

According to Neil Orbell, “The fire service, when it turns out to an incident, either as an individual service or as part of a multi agency response, generates considerable communication activity, and robust technology is essential to support these communication requirements to allow London Fire Brigade to provide the right level of service to the public and emergency service colleagues and support for incident

commanders. Analysis for the Best Value Review included a full review of existing systems and practices, which identified areas of excellence (as demonstrated during 7 / 7, when the messaging system embedded within existing technology stood up to the strain).”

Lessons learned

The group took a long, hard look at lessons learned from practical experience over a wide variety of incident types. Neil and his team concluded that existing command and control systems, both fixed and mobile, while ‘cutting edge’ when installed, now reflected an earlier IT age, the era when command and control systems were custom built and not interoperable. In this era decisions tended to be made at a senior level and communicated on a top down basis.

The technology of this time, before open standards such as XML and GML had been widely adopted, and new communications and display technologies (such as electronic whiteboards and tablet PCs), had been developed and made affordable, was seen as a major brake on the adoption of new, more collaborative forms of emergency management, communications and decision making. Managers needed to be allowed to manage, using the most reliable and up to date information available.

Up until the recent past whiteboards and marker pens, clipboards, maps and paper were commonly used for managing incident information. Data and decisions could not be recorded electronically or communicated and distributed easily and efficiently to achieve a common operational picture across an incident ground (or between different levels of a command structure). The benefits of modern technology were not being fully exploited.

Resilience a key concern

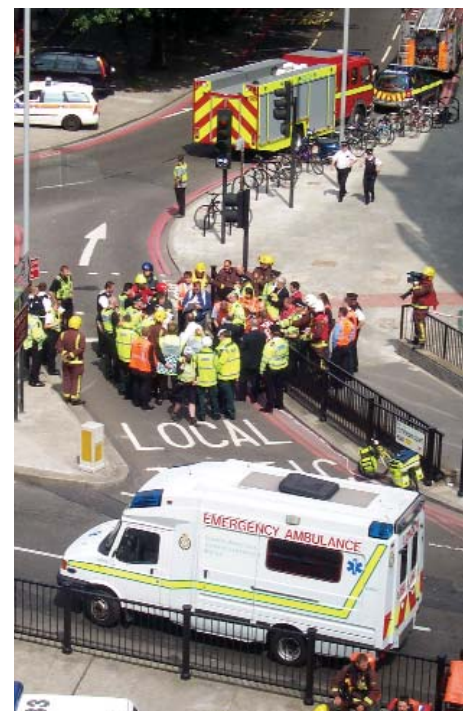
System and communications resilience was another key concern. With Hurricane Katrina and other major incidents in mind, any future systems would have to be capable of withstanding major catastrophic threats (with multiple redundancy built in) to ensure emergency communications continued to operate when mainstream communications systems had failed.

The project name chosen for the proposed system reflected the new approach being adopted – command support, rather than command and control. Instead of adopting a top down approach to command, dictated in the past by the technology being employed, the new system would aim to provide key information, clearly displayed, to commanders throughout the fire ground (achieving a common operational picture), drawing on GIS mapping, the service’s databases, live news and other imagery feeds.

Another key feature of the system would be the integration of the fire brigade’s Decision Making Model (DMM) into all aspects of the Command Support System user interface. The graphical sequencing of actions shown within the DMM, from gathering information to setting objectives and plans and then communicating and controlling plans and assessing outcomes, drives the user interface of the Command Support System. Command thinking and actions within the CSS have the DMM embedded into them, thereby supporting adherence to established procedures under pressure.

The proposed solution

London Fire Brigade’s proposed solution for the fleet of eight new vehicles combined sophisticated information technology with advanced vehicle design. Working with designers at AssetCo, the managed services company supplying and maintaining LFEPA’s fleet of fire appliances and other specialist vehicles,



Command Support System is designed to improve the speed and efficiency of multi agency information sharing and coordination during major incidents such as the attempted bombings in London on 21 July 2005 (Photo: Getty Images)

Neill Orbell and his team prototyped and tested a number of different mobile command vehicle internal and external layouts before arriving at the agreed design specification.

After a highly competitive international open tender, UK based emergency training and technology company VectorCommand was selected in late 2006 as the supplier of the Command Support System. In winning the bid the company could draw on its extensive international experience and successful track record in the emergency command sector.

A whole new level

The Command Support System takes emergency command and control to a whole new level. Now commanders will be able to draw on a comprehensive range of information sources – database information (such as risks, standard operating procedures, parking and hydrants) streamed video imagery from helicopters, traffic cameras or incident cameras, templated or ad hoc organisational asset information, GIS mapping and electronic whiteboard sketch maps (known as ‘mudmaps’) – to create a clear, accurate picture of an incident showing threats, resources and proposed actions. Commanders can then share that information as a common operational picture across an incident ground (on tablet PCs), throughout the incident command structure as well as back to headquarters and to other interested multi agency organisations on scene or at their own headquarters.

It is the facility to combine intuitive, hand drawn ‘mudmaps’ (illustrating key features of a fireground or outlining how a fire will be attacked or a rescue performed) with drag and drop organisational asset charts and icons, that is proving to be one of the most appealing features of the new system. Plume overlays, flood plan overlays, electronic management of BA main control function and automatic supply of related standard operating procedures are some of the additional types of functionality that will also be included in the system.



A CBRN terrorist incident would test communications and coordination across all bluelight and other agencies. Efficient management of all these resources lies at the heart of the Command Support System approach (Photo: Getty Images)

Even while a mobile command vehicle is travelling to its destination the mobile data terminal (MDT) on board is receiving data relevant to the incident address sent from the command headquarters. Risk information (drawn from the risk database), asset data (showing what fire assets a commander will have available for deployment), hydrant locations and standard operating procedures aligned to incident type can all be included in these data packets.

Mobile command vehicle

Once the mobile command vehicle has arrived at the incident location, the MDT will immediately export that data to the four on board networked PCs and have it ready for use. A specially developed symbology vocabulary and standard desktop interface will

allow operators to access and set up the system with great speed. The Command Support System solution addresses another major issue, speed of set up and handover, identified in LFEPA's analysis of incident command.

The vehicle standard equipment includes: large format touchscreens, both inside and outside the vehicle; networked, ruggedised tablet PCs, linked wirelessly to the main system for use throughout the fire ground; and high bandwidth wireless communications and systems capable of receiving streamed imagery.

Versatility

The Command Support System technology is being developed for use in sophisticated mobile command vehicles but is equally useful and deployable throughout fixed command headquarters and other locations for all types of emergency service across a wide variety of incidents, such as flooding and terrorism, a critical point when emergency responses to incidents are being monitored by centralised, multi agency political and command organisations.

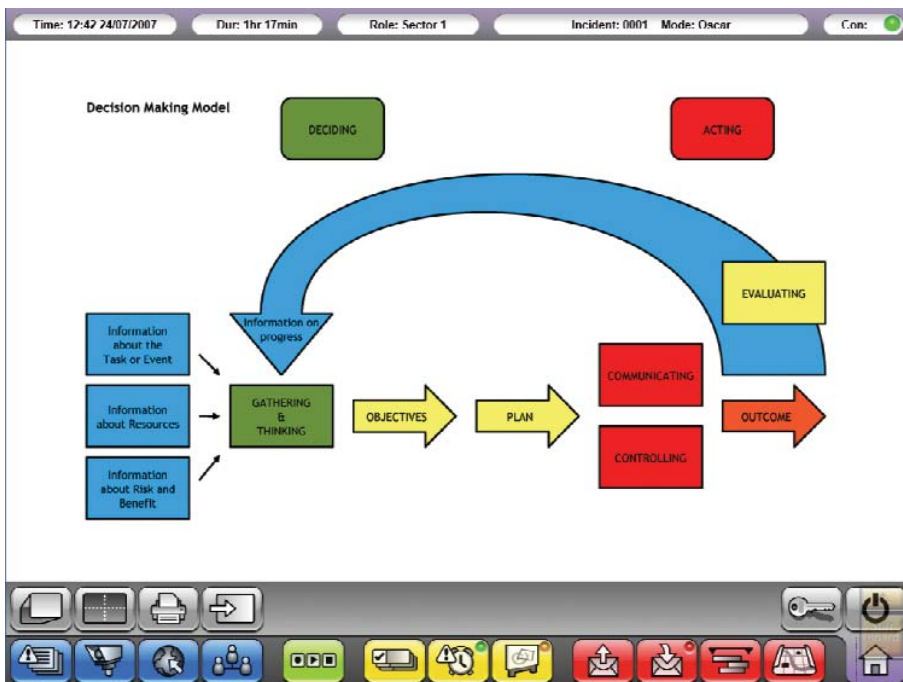
Neil Orbell comments, “It will be available to everybody at their desktops. Some users will just be observers; they will not be interacting, but will be able to see what is going on. This will dramatically improve the way that we remotely monitor incidents.”

According to Dr Mike Griffin, Technical Director of VectorCommand, “With the development of the Command Support System, the company is taking emergency command and control to a whole new level. We are doing this by exploiting to the full the huge potential of the latest command, control, communications and display technologies.

“Once installed, Command Support System can then be integrated with our company’s range of Emergency Command System products and services for operational and tactical training and exercising. In our view, this is the future for emergency command, communications and control.”

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For more information visit the website: www.emergencycommandsystem.com



The graphical sequencing of actions shown within the Decision Making Model – from gathering information to setting objectives and plans and then communicating and controlling plans and assessing outcomes – drives the user interface and all buttons / icons and actions within the Command Support System