Staying strong:
marathon security in Boston and London

Securing sport

Making Boston stronger

In the wake of the Boston Marathon bombing in 2013, a team from Harvard University carried out extensive interviews with participants to identify strengths and weaknesses in the incident response to the terror attack. This abridged version of their final report focuses on the lessons learnt

On 15 April 2013 at 2.49pm, two improvised explosive devices (IEDs) detonated near the finish line of the Boston Marathon. Three people died and more than 260 others needed hospital care, many having lost limbs or suffered horrific wounds. Those explosions set off about 100 hours of intense activity that drew worldwide public attention. The response by emergency medical, emergency management and law enforcement agencies and by the public at large has now become known as 'Boston Strong'.

Viewed as a whole, the events following the marathon bombing posed enormous challenges. The response spanned geographic boundaries, levels of government (local, state and federal), professional disciplines and the public and private sectors. It brought together in both well-planned and spontaneous ways organisations with widely varying operating norms, procedures, cultures, sources of authority, perspectives and interests.

Our aim in researching this response, through interviews with a wide range of participants, was to examine the conditions that contributed to making Boston Strong – as well as those that made the response less effective than it might have been. One key factor was command – the processes, procedures, and structures that facilitated decision-making and execution within the various agencies and organisations involved in the response. A second key factor was coordination among the wide array of agencies, organisations and groups that mobilised in one or more aspects of response. Many of these entities worked together in teams, both small and large. The fact that they could work together as effectively as they did is a credit to those involved, but it is also an object lesson to those who will face the next unpredictable, swiftly evolving disaster or attack. What was it – in prior preparation and in the moment – that enabled these very different groups and organisations to work together as effectively as they did? What are the obstacles that still need to be addressed to ensure an even better performance

in future events? In particular, what aspects of the way command and coordination of these organisations were established and practised contributed to the substantial success – and to the less successful moments – in the aftermath of the Boston Marathon attack?

'Task environment' in rapidly evolving events

It is useful to begin by taking a step back from the specific circumstances of the marathon bombing to understand more generally the nature of similar events from the perspective of those trying to lead and manage them. Crisis events can be characterised as:

■ High-consequence: lives, property, community and economy are at grave risk;

■ Complex: many things are happening that may or may not be connected;

■ Novel: this situation, or combination of situations, has not been routinely experienced so there is no pre-prepared 'script' of actions to address it. Instead, plans for coping must be developed, in real time, as the event evolves;

■ Volatile/rapidly evolving: additional novel elements continue to be generated as the event evolves;

■ Chaotic: the environment is 'noisy' due to the circumstances and to the reactions of survivors, bystanders, citizens, responders and leaders.

From the perspective of the observer or leader, events of this kind create a task environment that is highly uncertain, ambiguous, confusing and unstructured. In turn, this implies intrinsically that leaders are trying to lead during an event where they confront:

■ In an adversarial situation or criminal investigation, there is a profusion of leads, clues, valuable insights and, simultaneously, a great number of distractions, red herrings and false leads. Valuable information is confounded with, and difficult to distinguish from, irrelevant or inaccurate reports;

Justin Greer/Alamy

The finish line of the Boston Marathon, which in 2013 was the scene of a terror attack that killed three people and injured more than 200

- Poor understanding: the plethora of information and misinformation is disorganised and difficult to verify, assess, analyse and grasp as a whole. This condition is commonly described as 'low situational awareness';
- High risks for the community and, therefore, for the organisations and the individuals involved;
- Fear and anxiety for all concerned.

No individual, organisation or structure can perform with a high degree of precision and efficiency in such a task environment. Much of our work in the report, therefore, was an examination of the way incident management, as the structure of coordinated command, operated in the context of the Boston bombing events. The high degree of effective coordination among response agencies and other organisations was, in many ways, the hallmark of the successful elements of the response.

This contrasts sharply with some prior events – Hurricane Katrina is perhaps the most salient example – during which cooperation and coordination were dramatically weaker. Much has been learnt in the intervening years – and was on display in Boston during the week of 15 April 2013.

There were, however, significant weaknesses as well. The stresses of the events in Boston showed some fault lines in the doctrine – and in the depth of implementation of the doctrine – and these provide an opportunity to progress in Boston and elsewhere before another crisis.

Command in 'fixed' and 'no-notice' events

The week of 15 April provided examples of two very different settings of incident command. The response to the bombing at the finish line was in the context of a 'fixed event' – a highly planned and structured event in which assets necessary to operate the marathon, as well as assets that might be needed to deal with contingencies arising in the context of the marathon, were carefully identified, provided and pre-positioned before the race. The marathon itself – as a huge collection of interrelated operational activities – was set up to be managed through an incident command structure. Possible emergencies arising from or during the event had been considered – including scenarios involving large-scale medical emergencies (such as widespread heat exhaustion on a very hot day) and the possibility of a terror attack. Thus, the immediate response on the Monday sprang from a platform of structure, process and personnel designed to be able to cope with a significant emergency.

While there was no detailed plan to deal with the precise scenario that unfolded, there was a general structure, already activated, that brought together many of the agencies that would naturally be involved in responding to an event of this type; and this structure formed the skeleton of the command structure that would be developed as the event progressed. In effect, the incident command structure set up to manage the event could transition to a 'war' footing when the emergency arose.

The events of Thursday 18 April to Friday 19 April stand in sharp contrast as 'no-notice' events. The two alleged bombers are believed to have shot and killed an MIT police officer, carjacked a vehicle and engaged in a gun battle with police in Watertown that resulted in the death of one of them. The conclusion of this shoot-out then triggered an intense 18-hour manhunt for the surviving perpetrator, which ended early on the Friday evening. As these events unfolded, command had to be organically assembled while events were ongoing. By contrast with Monday's events, the rapidly assembling responders in Watertown had only the doctrine of incident management and their experience and personal relationships with one another to build upon.

The marathon bombing events thus enable us to see the same organisations and people cope with two contrasting events and the resulting challenges of applying incident command in two quite different settings.
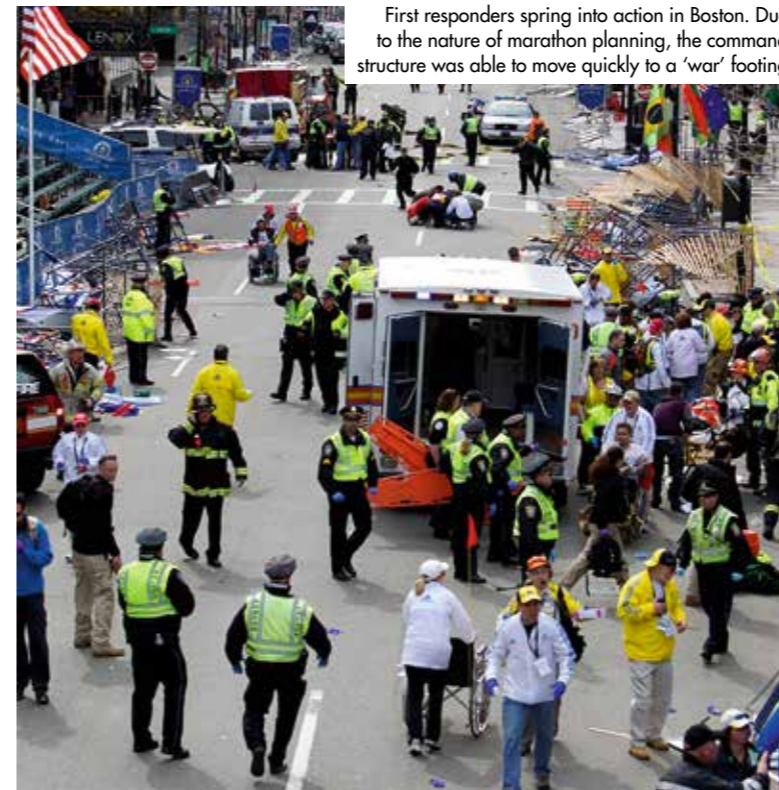
Strengths of the response

Given the characteristics and implications of the environment flowing from the bombing, the strengths shown by the response in Boston were quite dramatic, and are listed below under categories of medical, law enforcement and community response.

Emergency medical response
- Rapid, effective response by survivors, bystanders and many types of professional responders to help the blast survivors;
- Rapid, effective mobilisation of trained personnel from the marathon's medical tents;
- Effective on-scene triage and identification of which victims needed transport most urgently;
- Rapid, effective mobilisation of transport to convey injured survivors to emergency departments (EDs), including summoning of additional ambulances, maintaining open roadways, and use of police vehicles;
- Coordinated apportionment of seriously wounded patients among local trauma centres;
- Preparing for the unpredictable, all bombing victims were searched by hospital staff outside the ED in case one was a suspect carrying weapons or explosives;
- Effective work in EDs handling the surge of grievously wounded survivors;
- Creation of ED 'micro-sites' in which individual teams of medical personnel could concentrate without distraction on a single victim.

Law enforcement response
- Rapid response to help survivors of the blasts;
- Great initiative and improvisation shown at the blast scene (eg use of police cars to transport blast survivors once available ambulances had been fully utilised);
- Rapid securing of the blast area – including stopping 5,000 runners a mile short of the finish

First responders spring into action in Boston. Due to the nature of marathon planning, the command structure was able to move quickly to a 'war' footing

Kelvin Ma/Bloomberg/Getty Images

line and evacuating thousands of bystanders on the street and in establishments in the 13-block crime scene;
- Rapid ground-up and top-down establishment of central coordination/command;
- Delegation from central command to subordinate structures for tactical operations;
- Rapid mobilisation of a sweep of the area for additional explosive devices by Explosive Ordnance Disposal (EOD) teams;
- Rapid mobilisation of investigative work;
- Securing the crime scene;
- Obtaining public and private surveillance video;
- Searching for evidence to identify methods and the perpetrator(s);
- Requesting information (especially photos and video) from the public to aid the investigation;
- Mobilisation of a massive investigative review of video, pictures and other evidence;
- Pursuit of suspects: while leaving room for improvement, definite strengths were also exhibited in:
  • Confrontation with suspects in Watertown;
  • Massive manhunt for the second suspect after he escaped from the initial contact area;
  • Successful apprehension of the second suspect.

Community care
- Community response to help stranded runners and spectators;
- Community provision of video, photographs and other information;

- Community acceptance of and cooperation with the request to 'shelter in place' (stay at home during the police manhunt for the perpetrators).

In addition to the years of training, joint exercises and comprehensive planning, what made these strengths possible? Effectiveness at the finish line (emergency medical and law enforcement), in the trauma-centre EDs, in the criminal investigation, in the apprehension of the perpetrators, was a result of extensive prior planning and a product of both centralised and decentralised action in the moment of the crisis.

Decentralised actions
Survivors, bystanders, and responders of all types near the blast zone determined independently what needed to be done and could and did take action at their own initiative with little or no direction. Medical responders from the medical tents self-deployed and acted without needing centralised direction. People in the trauma centres receiving patients had the requisite skills, equipment and facilities, so that they could and did act swiftly without needing much direction or additional organisation. Individual subordinate leaders across many disciplines (eg police, fire, emergency medical response [EMS]) demonstrated effective personal leadership in organising and directing small-scale operations with little need for direction by central commanders.

Members of the public submitted video and photographic evidence. Professionalism and courtesy were displayed by tactical units and other law-enforcement officers to neighbourhood residents in Watertown during the shelter-in-place request on Friday 19 April. Cooperation with the request by the public was high.

Training, practice, experience and, in the moment, near-selfless behaviour and ingenuity figured prominently. Medical personnel (at the scene and in EDs) had years of training, drills and practice at handling mass-casualty events and they were willing to work despite the threat of possible additional explosions. Many survivors, bystanders and non-medical responders (police, National Guard, spectators, runners etc) also had some knowledge of first aid (eg use and availability of tourniquets) and were willing to stay and help (at great risk from possible further blasts). Business owners and managers displayed ingenuity and cooperation. For example, buildings were evacuated through rear doors; some buildings directly in the cordoned-off crime-scene area voluntarily emptied.

The general public also contributed to these efforts in the following days. Many people generously gave their time to help – for example, Lenox Hotel staff volunteered for days. The public also responded very positively to requests for photographic and video images of the marathon scene and with surprising degrees of compliance to the shelter-in-place request on the climactic Friday.

Tactical leaders at the scene when the blasts occurred or who arrived shortly thereafter showed self-conscious, disciplined self-management – supported by their years of training and experience, as well as by mental access to

Dan Lampariello/Corbis

An explosion erupts near the finish line. As part of the law-enforcement response around 5,000 runners abandoned the marathon

New Year's Eve, 4 July concerts on Boston's esplanade along the Charles River) and major episodic events (eg home games when Boston was in the World Series, the Super Bowl, and celebrations following championships). Hosting the Democratic presidential nominating convention in 2004 – the first post-9/11 political convention in the nation – led to new levels of sophistication in subsequent event planning and cooperation across agencies and levels of government.

As the National Incident Management System (NIMS) took hold in the past decade, it too contributed to more effective collaboration in both simulated and real events. Public safety agencies planned and conducted inter-agency and cross-jurisdictional exercises and drills for mass-casualty events – with scenarios for transportation disasters, terrorist attacks and natural disasters. Post-9/11, increased federal funding for training and exercises, as well as the requirement that most occur at regional scale, contributed to the development of closer institutional relationships. Response to regular winter storms and less frequent hurricanes or severe wind storms also shaped a culture of collaboration at the command level. Overall, these leaders established professional relationships and got to know each other personally through meetings and other interactions. As a result, they developed

examining options, and issuing instructions. In a highly confusing event, there is a tendency for everyone to be pulled into tactical matters despite knowing that it is important to establish a cross-agency, integrated, senior strategic and policy-making level of engagement that looks to the big picture and a longer timeframe. Recognising that they needed to form such a command and to have a location for it, senior officials gathered at the Westin Copley Place Hotel, commandeering a ballroom. Repeated attempts were made to convene the group and to get it focused on work at the strategic level; it finally took the governor, saying, in effect, "I want everyone to put down their phones and gather so that we can figure out what we have and what we are going to do." The tactical pull from subordinate staff – represented by the cell phones that the senior leaders had in their hands – can be overwhelmingly powerful.

There are many forces that combine to pull in this direction, including: (a) the tactical issues are important; (b) subordinates actively seek, and do seem to need, guidance; (c) the tactical issues have a clarity and sense of urgency that the more abstract and yet-to-be-defined strategic issues may not; (d) senior commanders often were promoted from subordinate ranks, and are comfortable in and feel competent and confident in tactical/operational command roles; (e) senior commanders may not have full confidence that their subordinates can handle issues with the suddenly elevated importance of those now on the table. With the importance of the issues having suddenly been elevated, everyone needs to step up a level (away from tactics toward strategy), but the tendency is to be pulled down a level instead.

The setting and situation of dealing with the flow of casualties from the bombing sites was very different from usual

trust, respect for the competence of their peers and their agencies, and understanding of complementary capabilities across their respective professional disciplines (eg law enforcement, fire service, emergency medical, public health and hospital-based emergency medicine); they also developed an understanding of how best to coordinate and collaborate across agencies and built mutual understanding of the cultures and imperatives of their respective organisations.

Weaknesses in the response
Inevitably, weaknesses also appeared in the handling of the response. Our research focused on structural and procedural elements of the response apparatus that resulted in persistent and remediable weaknesses so as to suggest ways in which these weaknesses could be ameliorated:

Strategic command issues
Establishing and maintaining strategic oversight or 'command': Early in the event, senior officials in every response agency were immediately notified (if they were not already on the scene) and became engaged with subordinates in defining the situation, developing and

Making this step upward toward strategy is not a natural act, particularly under the stress of a breaking, highly uncertain event – and, while many participants seemed intellectually to recognise the necessity to do so, it was still difficult to maintain the more strategic focus consistently.

Secure, dedicated facilities for command and coordination: In an event of the size, complexity and duration of the marathon bombing, there is a need for a substantial command facility near the locus of the event. The space needs to be secured, covered, lit and equipped with chairs, tables and the tools useful for coordination and collaboration – everything from easels and pens to copiers and printers. Services – bathrooms, coffee, food – need to be readily available. Some process needs to be developed to secure the area (since it would be a natural target in the case of a multi-stage attack) and to screen entrants (since an overwhelming number of people from multiple agencies will present themselves at the boundary, each with a story that he or she regards as compelling about why he or she should be inside). For operational security, the work area must have a well-defined perimeter,

models of effective leadership in moments of great stress. Illustratively, as senior law enforcement leaders told us: "I was tempted to go hands-on, but I knew I was needed to organise and direct", and "I thought about historical leaders and what they had done, and I realised that the people around me needed me to remain calm and that would help them be able to do what they needed to do".

In hospital emergency departments, senior leaders emphasised maintaining 'micro-sites' within the ED environment in which small teams of medical personnel operated in conditions as similar as possible to their normal operating situations. The setting and situation of dealing with the flow of casualties from the bombing sites was very different from usual for the policy-level leaders overseeing the situation, but they took it as their task to make the tactical conditions and situations of the individual medical teams – working on one patient at a time – as familiar as possible.

Centralised actions in the moment
While tactical leaders displayed considerable initiative at the scene and in hospitals, top leaders of many organisations and jurisdictions were creating a structure for command and coordination at the strategic/policy level. This worked both from the bottom up (individual leaders seeking each other out on the street in the minutes after the bomb blasts) and from the top down, once the command post was established at the Westin Copley Place Hotel. Within a short time period, senior leadership of the Boston Police Department, the FBI, ATF (Alcohol, Tobacco and Firearms), Massachusetts State Police, Massachusetts Bay Transportation Authority police, Massachusetts Emergency Management Agency,

the Massachusetts National Guard and others were gathered at the hotel, with Governor Deval Patrick soon arriving, followed later by Boston Mayor Thomas Menino (who was released from a hospital where he was recuperating from surgery). This structure generally worked effectively to manage the need for strategic thinking and policy setting, while balancing the pressures that each leader felt to be involved in tactical decisions and information flows within their own organisations.

Another form of centralised control operated as injured victims of the bombing were triaged and allocated to different hospital facilities through the Massachusetts Public Health Coordination Center, which had been pre-activated for the marathon.

High-level coordination among multiple agencies in the response was also effectively achieved in the criminal investigation – both for evidence processing at the crime scene by multi-agency teams led by FBI evidence technicians and in the processing of surveillance, media- and citizen-provided video and photographic evidence. Similarly, communication with the public about the status of the investigation and requests to the public were regularly handled effectively on a centralised basis.

Centralised actions in advance
This capacity for coordinated action at the command level was the result of many years of collaborative effort, driven by planning and carrying out public safety support for numerous fixed events organised in the Boston area each year. These included 'routine' events (eg regular season games of the city's professional teams) as well as annual events that attracted large crowds (eg the Boston Marathon, First Night celebrations on

but there is no simple way to describe which people from which agencies should be admitted and who should be turned back. (Exercising judgement at the boundary is delicate, and a recipe for negative 'my agency doesn't take instructions from your agency' interactions.)

The Westin Copley Place Hotel was a reasonable choice in the circumstances on the afternoon of the bombing, as it provided many of the kinds of spaces (large rooms for press conferences and for organising task groups, smaller rooms for command staff to meet in) and could provide needed facilities and services. Even so, no space that is suddenly taken over will be perfectly configured. At the Westin, the command group had to evolve through several different iterations to finally reach space in which it could work effectively, as successive chosen locations each became overcrowded and noisy. (Some key meetings among a very small group of senior officials, for example, took place in a suite high up in the hotel, and removed from the ballroom area where most of the group was assembled and most of the work was being done.)

One area in which further work might be useful would be to specify some of the general characteristics that would be desirable for a forward 'command space', so that those in the area early could take control of configuring the space to provide some of the 'zones' within it that will, predictably, be necessary.

Focus and filtering of distractions: In an event with 24/7 news and social media saturation, and minute-by-minute 'news' breaking on social media, there is an enormous amount of information circulating at any

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given time, and much of it is wrong. It is important for senior-level decision-makers not to be unduly exposed to the flow of raw information, lest their attention be diverted away from the central real events. Better systems need to be developed for monitoring and vetting the external flow of information and filtering it for presentation to policy-level commanders – while ensuring to the greatest extent possible that significant information is not filtered out.

Mission conflicts: Inevitably, when many organisations come together to work on a common challenge they do not all see it the same way, or see the importance of different goals and priorities within it in exactly the same rank order. Conflicts among these values within a collection of organisations in which there is no intrinsic hierarchy – no one overarching agency that has authority over all and that can resolve the issue definitively – are

particularly difficult to sort out. Such conflicts may be part of the essence of true crisis events – that is, part of what makes them crises is that not all of the values are aligned, and the conflicts among them have not been anticipated and sorted out in advance, and so instead have to be confronted and dealt with in real time under the pressure of the event. Better mechanisms for identifying and resolving these conflicts are needed. This is appropriately a role for political leaders, but also involves operational officials in defining the issues and questions for practical resolution.

Rotation, depth and fatigue: By the end of the law-enforcement pursuit and apprehension of the second suspect on Friday evening, many of the people managing the overall event generally, and the Watertown event specifically, had been awake for 36 or more hours and had more generally been sleep-deprived since Monday's bombing. Part of the reason for this is that few had true deputies on whom they could trustingly rely and with whom they were reasonably interchangeable – or, to put it another way, both they and their deputies had been fully deployed throughout the event, leaving no unused (rested) capacity in the system. This inevitably degrades performance. No one knows in an ongoing event just how long it will go on, so methods for ensuring rotation and rest are essential to sustained performance.

Systems for coordinating and communicating information: One particularly compelling need for better coordinated information concerned the information families needed about the location of their loved ones who might have been injured during the event. Were they among the injured? If so, where were they now? In the swirl of the event, there will inevitably be some mistakes and misinformation. While there is no way to eliminate all such errors, there could be a much better system for capturing and disseminating reliable information about patient status and location.

Legal changes to allow more information to be conveyed: In ordinary circumstances, there are severe restrictions (for example, those embodied in privacy clauses of the Health Insurance Portability and Accountability Act of 1996 [HIPAA] and in policies adopted by health institutions to maintain compliance with it) on the release of information about the health status of patients. These may well be wise and appropriate in circumstances where patients can provide guidance about what information they want released and to whom. In mass casualty situations, however, it may make sense to provide exceptions to these restrictions by creating a presumption that the patient would prefer to have information released to friends or relatives if in the good-faith judgment of health professionals this would be helpful in providing better care or reducing the likelihood of errors of identification or treatment.

Mayor Thomas Menino, Governor Deval Patrick and Boston Police Commissioner Ed Davis address the media. Effective communication is vital in such events

Bill Greene/Getty Images

Attending to the emotional needs of survivors and family members: What people need most in the moment of crisis is for feelings of safety and security to be restored. They may also have needs that are idiosyncratic, as individuals all respond differently. The need to protect the young and preserve the dignity of the dead is a near universal sentiment. The honour guard that stayed with the body of Martin Richard not only afforded him the dignity and respect he deserved, but also allowed his father, with a severely injured wife and young daughter, to leave the scene. These kinds of actions are easy to take and very important for victims and family members. Developing plans for community care should be a high priority.

Maintaining regular general communication with the public: As events rapidly evolved, combined official communication with the public (joint press conferences and press releases) decreased. The effort that would be required to coordinate on a more continuous basis may well be worth it – and by developing standard protocols to simplify that coordination in durable ongoing events we might be able to reduce the costs of this necessary function further.

Maintaining accuracy of public information in a media- and social media-saturated event: Other definitive, official information about the event also needs to be coordinated and communicated, directly (through press conferences and social media) and through the press. While that was

done effectively in most cases during this event, better means of monitoring and responding to the flow of public information emanating from numerous media and social media sources are still needed.

Tactical command issues

'Self-deployment': To a great extent, people deployed to assigned tasks in many episodes of this event as a result of official requests and in the context of units of which they were a part (eg when tactical teams were requested to deploy to Watertown in the early hours of Friday morning). However, in a number of episodes there were many self-deployments or self-reassignments in the sense that the movement was initiated by the individual rather than as the result of a mutual assistance request transmitted between agencies and then affirmatively or systematically from a dispatcher to a unit.

Examples of self-deployment in this sense are medical staff reporting to the trauma centres on Monday (though this was managed well and presents positive lessons that should be applied more generally); some of the officers responding to the shooting of Officer Sean Collier at MIT on Thursday evening (18 April); many officers responding to radio traffic concerning the encounter with terror suspects at Dexter and Laurel streets in Watertown; tactical teams chasing reports within their assigned search sector during the search; people moving toward the boat on Franklin Street in Watertown on Friday evening (where news media video shows a large and unstructured flow of police officers in many different uniforms moving toward the reported location). This created confusion, command challenges, crossfire situations, and other conflicts in a number of instances. Better mechanisms for determining the appropriate limits to improvisation and self-deployment are needed, including rapidly identifying a staging area for all responders and not permitting any breach of the established perimeter.

Micro-command: Self-deployment, together with a great desire to be present and involved in the events, created problems of establishing effective command. At the macro-level, the process of leadership and management tends to be collaborative and to focus on cooperation and coordination, but in tactical situations definitive and authoritative command is an essential resource. Someone needs to be 'in charge' – and those present need to recognise who that is and to accept it – or grave and unnecessary danger can be created for responders present at the scene, civilians nearby and suspects. The difficulty of establishing micro-command at various episodes within the marathon response looms as one of the most persistent and troubling weaknesses. In contrast to the formation of unified command at the strategic level, the establishment of definitive command in fluid situations among ground-level responders from multiple agencies was repeatedly problematic (eg at the MIT shooting scene; at the 'naked man' event in Watertown, where the driver of a vehicle was directed to strip naked; and at the Franklin Street boat episode). This implies unfinished

Recommended preparations for future crises

Robust development, practice, exercise, and application of incident management processes and skills (codified in the National Management System) greatly enhance the ability of emergency responders to operate in complex, multi-organisational, cross-jurisdictional crisis situations.

The great value of common systems and the understanding that these produce among responders who have never previously met or worked together should not be underestimated. They can literally be lifesavers for responders and others at a crisis scene.

'Fixed' or planned events can be effective platforms for practising incident management skills even when no emergency occurs, and they are highly useful if emergency contingencies materialise at a fixed event as happened at and after the 2013 Boston Marathon. Skills honed at such events can also prepare responders and response organisations to perform more effectively even in 'no-notice' emergencies that may occur at other times.

Because coordinating multiple agencies and disciplines will be particularly difficult in 'no-notice' events,

during such events, senior commanders should themselves form a unified command structure to make decisions and implement them, identify a separate staging area to which deploying individuals and organisations should report and await instructions before undertaking field operations, and in advance of such events should establish protocols for the formation of 'sudden' teams composed of individuals from different organisations that may not have previously worked together.

Community resilience should be systematically developed and celebrated.

In the face of the bombing, Boston showed strength, resilience, even defiance – and these were key drivers of the overall outcomes … that is, of 'Boston Strong'. These qualities are latent in many communities in the United States and elsewhere. Celebrating examples of community resilience – both local examples and from further afield – may help to cultivate a culture of confidence and self-reliance.

Police beneath a 'Boston Strong' sign near the site of one of the bomb blasts on the first anniversary of the attack

In a confusing night-time gunfight, police jumped from their cars to join the fray

business in the process of developing and successfully cascading the doctrine of unified command down to the lowest levels of tactical operation.

Micro-coordination, trust and respect: Related to the problem of establishing micro-command is the issue of generating appropriate coordination and collaboration at the field level in encounters among officials from different agencies.

In several instances during this event, officials from one agency, when asked to identify themselves to officers of the jurisdiction in which they were operating, refused to do so or refused to show identification. Better protocols – a ritualised process recognised by and participated in by both parties – for self-identification and introduction need to be developed and practised.

Discipline, fire control and training: Control over fields of fire and authorisation to fire is another critical micro-command issue, and it is more complicated in a sudden team of people from multiple agencies. The risks of contagious or otherwise undisciplined fire in a US city are substantial. This may call for further emphasis in training on fire control; waiting for authorisation to fire; care in identification of targets; and slow, aimed fire. It may also call for changes in procedures used in training. For example, a common practice is to have all people on a firing line fire at the same time – it might be useful on occasion to practise 'directed fire' in which the range supervisor calls out individual authorisation to fire (so that officers become practised in listening in some circumstances for authorisation and firing after hearing it).

Protocols and technology: When the bombs exploded on Monday afternoon, arriving police and other vehicles in the area were warned through dispatch and other radio traffic not to block egress routes for emergency medical vehicles, and to a great extent roadways remained passable for ambulances and other emergency vehicles. In Watertown, by contrast, a large number of police officers from different jurisdictions arriving individually in separate vehicles in the middle of a confusing night-time gunfight jumped from their cars to join the fray and left a tangle of abandoned vehicles with flashing lights that would later impede both the exodus of an ambulance transporting a gravely wounded police officer to hospital and the pursuit of a fleeing suspect because no one could quickly figure out who had the keys and ability to operate which vehicle. This may call for different training and protocols for officers arriving at an unfolding trouble event, and it may require additional procedures for dispatchers to remind arriving vehicles not to block local streets (unless there is a tactical reason to do so). It might also call for the development of a shared 'universal key' that could be used by any police officer to operate vehicles from any jurisdiction in emergency circumstances.

Structuring field teams to take advantage of local knowledge and external resources: A key feature of events where multiple jurisdictions are involved is that no one entity has all of the resources, capabilities and knowledge needed to address the event most effectively – and that is precisely why so many are called upon to be involved. This means that the division of labour among the responders is important. Often, a singularly important asset in situations of this kind is the local knowledge of those from the immediate vicinity of the event – that is, the knowledge held by the local team. Better processes

for integrating, in the field and in real-time, the useful local knowledge of the 'home-town team' with the capabilities of the external groups that are contributing capacities are much needed.

Extraordinary powers and procedures in emergency situations: Police and other organisations generally operate in 'routine' situations – circumstances that are familiar to them, for which they have evolved standard operating procedures, for which they have trained and practised, and in which their actions fit and are supported by the legal and policy framework in which they are embedded. For example, procedures generally specify that when a police officer has fired his weapon in an 'officer-involved shooting' incident, an investigation should be instituted and he or she should more or less immediately surrender his or her weapon to a supervisor. Most officer-involved shootings are of short duration, and are over before supervisory officials are on the scene, so this protocol generally makes a good deal of sense. But in Watertown in the early hours of Friday 19 April, there was substantial ambiguity about whether the 'event' was over. Some officers who had fired their weapons tried to surrender them to supervisors, and some supervisors sought and obtained weapons from officers involved in the shooting at Dexter and Laurel streets. Others, however, said that officers should retain their weapons and stay in the effort until the event was over. It may be useful to clarify guidelines and provide greater discretion in the event of longer-duration events than current guidelines seem to be predicated upon.

Conclusion: focus on macro and micro-command
Overall, the research carried out during the project points strongly to the fact that the emergency response following the bombing in Boston and the events in Cambridge and Watertown at the end of the week were shaped to a

substantial degree by the multi-dimensional preparedness of the region. Response organisations have undertaken detailed and careful planning for the many fixed events, such as the marathon, that are staged annually in the Boston area. They have seen to the development of both institutional and personal relationships among response organisations and their senior commanders, ensured the adoption of formal coordination practices, regularly held intra- and cross-organisation drills and exercises, and generated experience during actual events. Importantly, the senior commanders of these organisations seem to have internalised the 'mindset' of strategic and operational coordination.

It also suggests that the major contributing factors to much of what went well – and to some of what went less well – were command and coordination structures, relationships, and processes through which responding organisations were deployed and managed. The response organisations – particularly at senior levels – demonstrated effective utilisation of the spirit and core principles of the NIMS, mandated by Congress in 2002 but still a work in progress in many areas of the country. But the many highly positive dimensions of inter-organisational collaboration in the Boston response are juxtaposed with some notable difficulties in what might be termed 'micro-command', for example the leadership and coordination at the street level when individuals and small teams from different organisations suddenly come together and need to operate in concert. Improving these aspects of crisis response will, we hope, help make Boston, and other cities round the world, even stronger. ∎