Why Was Boston Strong? Lessons from the Boston Marathon Bombing

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WHY WAS BOSTON STRONG?

LESSONS FROM THE BOSTON MARATHON BOMBING

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This work is presented in memory and in honor of those who lost their lives or suffered grievous injuries in the Boston Marathon bombing.

It is dedicated to all of those who helped.

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April 2014

Executive Summary

On April 15, 2013, at 2:49 pm, an improvised explosive device (IED) 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 began about 100 hours of intense drama that riveted the attention of the nation. The response by emergency medical, emergency management, and law enforcement agencies and by the public at large has now become known colloquially as "Boston Strong."

This report, through analysis of selected aspects of the Marathon events, seeks lessons that can help response organizations in Boston and other locales improve preparation both for emergencies that may occur at "fixed" events like the Marathon and for "no notice" events like those that began with the murder of Officer Collier at MIT and concluded the next day with the apprehension of the alleged perpetrators in Watertown. The report is primarily based on a series of intensive interviews conducted in the summer and fall of 2013 with senior leaders of major law enforcement, emergency management, and emergency medical organizations who candidly shared their experiences in and insights about these events.

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, bringing together in both well-planned and spontaneous ways organizations with widely varying operating norms, procedures, cultures, sources of authority, perspectives, and interests.

The research 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 organizations have undertaken detailed and careful planning for the many fixed events like the Marathon that are staged annually in the Boston area. They have seen to the development of both institutional and personal relationships among response organizations and their senior commanders, ensured the adoption of formal coordination practices, regularly held intra- and cross-organization drills and exercises, and generated experience during actual events. Importantly, the senior commanders of these organizations seem to have internalized the "mindset" of strategic and operational coordination.

The research 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 organizations were deployed and managed. The response organizations – particularly at senior levels – demonstrated effective utilization of the spirit and core principles of the National Incident Management System (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-organizational collaboration in the Boston response are juxtaposed with some notable difficulties in what might be termed "micro-command," i.e., the leadership and coordination at the street level when individuals and

small teams from different organizations suddenly come together and need to operate in concert. The integration of NIMS into the practices and cultures of emergency response agencies is a work in progress – very promising but still incomplete, particularly at the tactical level of operations.

Recommendations

Strategic Command

- **Senior leaders should participate in a unified command at the strategic level and avoid being pulled back into making tactical decisions and directly overseeing basic operations.** While some engagement with rapidly evolving tactical matters is necessary, top commanders should concentrate on working with their peers in other organizations to establish an integrated, cross-agency, policy perspective that looks at the big picture context and a longer time frame.
- **Senior response officials (i.e., those directly under top commanders) should be carefully prepared *in advance* through training, exercises, and actual experience to assume responsibility for intra-organizational tactical management during crises.**
- **To help ensure leaders' strategic focus and opportunity for effective coordination with peers, contingency plans for fixed events like the Marathon should provide for well-equipped, secure facilities for top commanders to work together in the event of an emergency.** This command post should be close to but separate from the location of subordinates who manage tactical operations.
- **Organizations must develop sufficient depth of leadership so that they can rotate personnel regularly during extended events; otherwise, they will inevitably falter from fatigue.** By Friday evening, many of the people managing the overall event had been awake for 36 or more hours and, more generally, had been sleep deprived since Monday's bombing. Both they and their deputies had been more than fully deployed throughout the event, leaving no unused (rested) capacity in the system. Failure to provide for sufficient downtime for senior officials inevitably degrades their judgment, ability to comprehend information, and performance of even normal tasks. Allowing for regular rotation requires creating more personnel depth in these leadership positions.
- **Senior leaders should not be unduly exposed to the enormous flow of raw information, lest their attention be diverted from strategic issues and problems.** In an event with 24/7 news and social media saturation, there is an enormous amount of information circulating at any given time, much of which is misleading or wrong. This stream of data needs to be filtered and organized for top level leaders so they can concentrate on interpretation and strategic issues.

Tactical/Local Command

- **Response organizations must develop procedures and practices to better control "self-deployment" by individual personnel to the scene of emergency action.** Dangerous situations that threatened both responders and bystanders developed at the scene of the Thursday night shootout and Friday apprehension of the second suspect in Watertown, in part because of an overload of individual public safety officers operating as individuals rather than in disciplined units.

- **Public safety organizations should develop improved doctrine, better training, and practice through exercises to ensure effective "micro-command" in crises.** While officers typically look for command authority when operating at a scene with groups from their own agencies, they are less likely to do so when they have deployed as individuals and arrive at an emergency site on their own. Except for situations when near-instantaneous action is required to preserve life, doctrine should be developed and officers should be trained to look for authority at a scene of mass action, even if command is taken by someone from another organization.
- **Improved discipline and training is needed to control weapons fire when public safety officers from many organizations are present.** Control over fields of fire and authorization to fire is another critical micro-command issue in any rapidly-evolving, high-stress, emotion-laden event. It is dramatically more complicated when a "sudden team" of people from different agencies are thrown together under circumstances where there is no pre-determined command structure.
- **Improved protocols and control systems for parking emergency vehicles at an actual or potential emergency site must be developed and effectively communicated/emphasized to officers by dispatchers and on-scene commanders during an event to prevent obstruction of further movement that may be required.**
- **In complex, multi-agency events, teams of responders in the field should be structured to take advantage of both the local knowledge of conditions that the "home" organization possesses and the quantity and specialized resources that outside reinforcements can bring.**

Public Communication
- **Maintaining regular and open communication with the public – through traditional and social media – should be a high priority for senior officials, even when confidential investigations are ongoing.** When accurate, frequent, official communications were absent, news and social media filled the gap, sometimes with speculation and misinformation. Development of protocols for crisis communication, incorporating utilization of social media, should be part of the planning for fixed events. This should include improving practices for dispelling widely disseminated, inaccurate information or rumors.
- **Systems for coordinating and communicating information to families of individuals missing or injured in a crisis need to be improved**, perhaps including revision of HIPAA rules governing the release of personal information about patients receiving care during public safety emergencies.

Preparation for Future Crises
- **Robust development, practice, exercise, and application of incident management processes and skills (codified in the NIMS system) greatly enhance the ability of emergency responders to operate in complex, multi-organizational, cross-jurisdictional crises.** 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 under-estimated. They can literally be life savers for responders and others at a crisis scene.
- **"Fixed" or planned events can be effective platforms for practicing incident management skills even when no emergency occurs, and they are highly useful if emergency contingencies**

materialize at a fixed event as happened at and after the 2013 Boston Marathon. Skills honed at such events can also prepare responders and response organizations 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**, 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 organizations should report and await before undertaking field operations.
    - Establish protocols for the formation of "sudden" teams composed of individuals from different organizations 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 farther afield – may help to cultivate a culture of confidence and self- reliance.

Table of Contents

Acknowledgments

Preface

What this report is – and is not

In the following pages, we seek to understand the dynamics of the emergency response and law enforcement actions triggered by the bombings at the 2013 Boston Marathon. Specifically, we analyze how both prior preparation and action-in-the-moment contributed to the effectiveness of response, and we explore aspects of the response that were not as effective. We are not trying to tell the full story of the Boston Marathon bombings. Instead, through analysis of selected aspects of these events, we are seeking lessons that can help response organizations in Boston and other locales improve their preparation both for "fixed" events like the Marathon and for "no notice" events like those that began with the murder of Officer Sean Collier at MIT and concluded the next day with the apprehension of the alleged perpetrators. In doing so, we distinguish between elements of the events that are idiosyncratic (either to the events themselves or to unique features of the Boston setting) and those that are more general.

Our research suggests that major contributing factors to much of what went well – and to some of what went less well – were the *command* and *coordination* structures, relationships, and circumstances through which responding organizations were deployed and managed. This report therefore focuses extensively on the interactions between senior officials and their subordinates, on the one hand, and their peers in other organizations, on the other—and on how these interactions resulted in effective or less effective action as the events of the marathon bombing unfolded.

It is not our purpose to provide a complete narrative or chronology of the events or even to discuss all significant elements of this history. In order to examine the command and coordination processes that lie at the center of our inquiry, however, we need to describe the event sequence and context in which those acts took place. For some purposes, other factors that we omit here may be very important; in our view, however, they are less relevant to the examination of command and coordination that is our main focus.

We definitely do not intend our work as an investigation or after-action report. In describing these events, we generally do not name the individuals or specific agencies involved (except where their identity is obvious from context or already widely known). We are not trying to determine responsibility or assign credit (or blame) for things that went well (or not so well). There are several official investigations and after-action reports underway, and there are likely to be important things to learn from them. For example, theirs is the domain of determining the detailed circumstances of the event in which Officer Richard Donohue was severely injured. Our interest, by contrast, is limited to more general issues of strategic and tactical command during the rapidly unfolding events in the early morning hours of April 19 when Officer Donohue was shot. Overall, we are most interested in the organizational structures, doctrine, and practices governing the response. We thus frame and describe these events as examples of general operational processes, not as instances of individual performance.

Why issues related to command and coordination are a special focus of our research and findings

Our purpose in this report is 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 is *command* – the processes, procedures, and structures that facilitated decision-making and execution *within* the various agencies and organizations involved in the response. A second key factor is *coordination among* the wide array of agencies, organizations, and groups that mobilized in one or more aspects of response. Many of these entities worked together in teams, some small and some large. Viewed as a whole, the response spanned geographic boundaries, levels of government, professional disciplines, and sectors, bringing together in both well-planned and spontaneous ways organizations with widely varying operating norms, procedures, cultures, sources of authority, perspectives, and interests. 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 organizations to work together as effectively as they did? What are the obstacles that still need to be addressed to promote even better performance in the next events? In particular, what aspects of the way command and coordination of these organizations were established and practiced contributed to the substantial success – and to the less successful moments – in the Boston Marathon events?

This focus resonates with practices and trends in the broader world of emergency management in the United States. The Boston Marathon bombing occurred in the midst of a revolution in the way that command and coordination are organized among multiple agencies responding to a given event. In 2002, Congress mandated a "National Incident Management System" (NIMS) to be promulgated by the Federal Emergency Management Administration (FEMA). A key purpose of NIMS is to create a consistent system for managing emergency operations across agencies and jurisdictions, so that two or more organizations that encounter one another during an emergency event will be operating in the same way, facilitating coordination even if they had not previously worked together. Even a decade after this mandate, however, the integration of NIMS into the practices and cultures of emergency management agencies is a work in progress – very promising but still incomplete. Although this report does not systematically assess the application of NIMS in the Marathon situation, the issues of command and coordination to which we give our attention suggest that work remains in order to fully exploit the benefits that NIMS promises.

Genesis and basis of this research

This research is based principally on detailed personal interviews conducted by our research team with a wide array of command-level participants from the large number of organizations involved in these events, supplemented by intensive review of public source documents. In addition, we convened a private conference attended by many of our interviewees to review and make corrections to our early draft descriptions and conclusions. This was followed by a day-long "expert dialogue" among nearly 100 subject matter experts, including participants in these events as well as academics and experts in event security and incident management processes from around the US and other countries. The dialogue

focused on the development of lessons from and recommendations based on these experiences. (The appendix provides a more detailed description of our research process.)

In what follows, we seek to present an integrated picture of selected events during the aftermath of the marathon bombings. We do not generally identify individual sources for most of our descriptions, but most of the events we discuss were described to us by two or more (and often by many more) observers.

Why Was Boston Strong?

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Introduction

"We were not heroes, but we were in the company of heroes."

On April 15, 2013, a few thousand spectators were tightly-packed along Boylston Street near the finish line of the 117th Boston Marathon in one of the city's busiest shopping areas. They were cheering on non-elite runners who, nearly four hours after the starter's pistol shot, had conquered the challenging 26.2 mile course. At 2:49 pm, an improvised explosive device (IED) detonated without warning among the onlookers, followed 12 seconds later by another IED nearby. Both sprayed nails, ball bearings and metal

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[2] Professor Heymann worked principally on a separate part of our research dealing with the events prior to the marathon; that work is detailed in a companion paper.

shards through the nearby crowds. Three people died, and more than 260 others needed hospital care, many having lost limbs or suffering horrific wounds.

Those explosions began about 100 hours of intense drama that riveted the attention of the nation and left the local public shaken and yet proud. But it took decades to create the conditions for the response to the terrorist bombing of the Boston Marathon. That response has now become known colloquially as "Boston Strong."[3] As many have observed, important elements of much of what went well during the response was the product of purposeful work, not accidental action. It reflected effort literally over decades to create the capabilities and the coordination that were so visibly on display in the horrific immediate aftermath of the bombing and over the ensuing few days.

In the end, Boston was strong in the face of a horrific terrorist bombing of an iconic city event for a host of interrelated reasons. A few must simply be attributed, on an otherwise horrible day, to infusions of good luck that favored the response and reduced the consequences of the attack. Others were the result of careful planning and fully intentional action, but are nonetheless unique to the Boston setting and would be hard to replicate elsewhere. But many – indeed, we believe, *most* of the contributing factors to the (largely successful) response – were intentional and *are* replicable elsewhere. These provide the shareable lessons that are the central purpose of this report. We seek to understand both what worked best, why it worked, and what worked less effectively – all with the aim of assessing what can be done going forward in Boston and elsewhere to prepare even better for future events.

The events in Boston began as a rapidly-evolving, adversarial attack by terrorists. Undoubtedly, some of what can be learned from these events will thus be specific to such events. But we believe that many of the lessons about mastering highly uncertain and fluid events will apply to many other event scenarios just as well – natural disasters and industrial accidents, for example, in addition to terror-related events. In what follows, therefore, we make an effort to present the discussion in a way that facilitates wider applications.

Organization of this report

Following this introduction, in Section One we describe general features of events like the marathon bombing and explain why we see command structure and coordination methods as so important to the success or failure of response in swiftly evolving circumstances. In Section Two we provide an overview of the major events that took place in the four intense days after the bombs went off in Boston, focusing on the parts of the story that are key to understanding the nature and dynamics of command and coordination. Section Three describes what we see as the main strengths and weaknesses visible in the response. In a final section, we identify key areas where we believe further evolution of incident management doctrine, procedure, and practice is needed to prepare even better for whatever our next significant challenge may be.

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[3] A more accurate (but less catchy) phrasing might be "Greater Metropolitan Boston Strong" or "New England Strong" or an even more general characterization, since assistance came from throughout the region and well beyond – but we here join with others in treating "Boston" as an inclusive term.

Section One

**General features of rapidly-evolving events and
the reasons behind our special focus on issues of command structure and coordination**

The "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 characterized 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 this combination of situations, has not been routinely experienced and therefore no pre-prepared "script" of executable actions can address it. Instead, plans for coping will have to 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 both to the circumstances themselves 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 in an event where they confront:

- In an adversarial situation or criminal investigation, a profusion of leads, clues, valuable insights *and, simultaneously*, a great number of distractions, red herrings, and false leads. Valuable leads are confounding and difficult to distinguish from distractions.

- Poor understanding – The plethora of information and misinformation is disorganized and difficult to verify, assess, analyze, and grasp as a whole. This condition is commonly described as "low situational awareness."

- High risks for the community and therefore for the organizations and the individuals involved.

- Fear and anxiety for all concerned.

The poor situational awareness that exists in circumstances of this kind is often referred to colloquially as the "fog of war" (a reference to Clausewitz, *Vom Kriege* Book 1, Chapter 3). Situational awareness is intrinsically low in novel, rapidly-evolving events because, in Clausewitz's words, three quarters of what is important to know "is lying in a fog of uncertainty."

No individual, organization, or structure can perform with a high degree of precision and efficiency in such a task environment. Expectations of swift, smooth, sure, and effective interventions (based on experience in smaller, better-understood, less complex, and less chaotic events) are out of place, but may nonetheless unconsciously be applied. In the aftermath, it may be quite obvious what proved correct and useful information and what was not, as well as which decisions were well founded and which mistaken – so personal and institutional risks from the inevitable missteps are often very high.

That risk is magnified by the fact that large-scale emergencies attract national and international attention from a wide variety of communications media, from a mass public, and from local and external political leaders. Such events thus receive a high degree of scrutiny both during and after the event. The application of 20/20 hindsight makes this worse.

In addition, large-scale emergencies typically involve a very large number of stakeholders: individuals directly affected by the event, multiple professional disciplines that respond (police officers, firefighters, emergency medical personnel, emergency managers, public health officers, and more), multiple public agencies within each jurisdiction, many formal and informal community groups, multiple local political jurisdictions, multiple levels of government, and multiple non-governmental organizations from the private and nonprofit sectors.

While there may be wide agreement on the overall goals, there will also inevitably be conflicts concerning the identification and ordering of priorities during the event, given the multiplicity of stakeholders.

These baseline conditions and circumstances, which set the task environment for leaders, flow from the characteristics of the event. Outcomes will then depend on what other conditions and circumstances leaders have created for themselves in advance to handle events with these characteristics – that is, their institutional and personal *preparedness* -- and on what they do in the moment. Many of the preparations and actions relate in general terms to how command and coordination are organized and operated.

Command and *coordination* as central imperatives of response—and incident management as a paradigm

Given the intrinsic characteristics of this task environment and their immediate implications, events like these create significant challenges to developing effective *command* and *coordination* – both in effectively leading and directing individual organizations engaged in the response, and in establishing and maintaining cooperation among the substantial number of organizations involved.

In a novel, confusing, and/or geographically dispersed event, the resources that can be useful for response will be widely distributed, and the potential of those resources to be used productively depends critically on the ability to combine, coordinate, and efficiently deploy them. There is no simple way to do this. At least in the system of American federalism, the agencies involved are not part of a single hierarchy; they

are under the legal authority of and accountable to different political jurisdictions and levels of government, as well as the private and non-profit sectors. Even in a unitary system where governmental authority clearly spans levels of government, commanding and coordinating a host of response organizations is a challenging task – one that cannot be accomplished by authority exercised only in the moment of crisis.

Currently, the prescribed doctrine for structuring command and coordination among multiple responding organizations in the United States is the National Incident Management System (NIMS), mandated by Congress in the Homeland Security Act of 2002 and subsequently promulgated by the Federal Emergency Management Administration (FEMA). A key purpose of NIMS is to create a consistent system for managing emergency operations across agencies and jurisdictions, so that two or more organizations that encounter each other during an emergency event will be operating in the same way, facilitating coordination even if they had not previously worked together. The critical components of NIMS evolved in wildland firefighting in California in the 1970s and spread to many (but not all) types of emergency response organizations even before the Congressional mandate. The creation of NIMS was sparked in reaction to the events of 9/11, and accelerated by the experience of Hurricane Katrina in 2005.

NIMS provides a generic framework for leading a given incident, called "incident command," and specifies the structure that such a command should have – including a designated incident commander who oversees the event as a whole, together with one operational and three support functions. An operations chief directs the current operations. In support, the Plans, Logistics, and Administration/Finance groups undertake planning for the next operational cycle, organize the logistics necessary to support that plan, and keep track of the resources used and who is responsible for paying for them. It thus frames procedures, practices, and norms that will enable each participating agency to offer its best capabilities in contributing to an effective, integrated response when operating in circumstances like those of the Boston Marathon bombing – and in preparation for events where the risks are significant. It was indeed applied in multiple ways throughout the actions associated with the Boston Marathon – from planning through response – and in multiple episodes within the overall event.

The central device NIMS offers for multi-agency coordination is a "unified command." The idea is to assemble command-level representatives from the major organizations involved in an event or in a given part of an event and have them act, commonly under the facilitation of an overall "incident commander," as a committee pooling resources and coordinating action. Command-level interaction among the major agencies encourages the joint formulation of goals and priorities and plans for addressing the major challenges. Within this context, NIMS specifies that in extended-duration or geographically expansive events (lasting more than one or two operational cycles or spread out over more than one jurisdiction or a very substantial physical area), there will be incident command structures underlying the unified command, with incident commands overseeing individual events within the overall situation. Some of these incident commands may also involve multiple agencies, in which case they may form local unified commands as well.

Much of our work in this report, thus, is an examination of the way incident management, as the structure of coordinated command, operated in the context of the Boston Marathon bombing events. The high degree of effective coordination among response agencies and other organizations was in many ways the

hallmark of the successful elements of the response during these events. This contrasts sharply with some prior events – Hurricane Katrina is perhaps the most salient example – in which cooperation and coordination were dramatically weaker. A great deal has been learned in the intervening years – and was on display in Boston during the week of April 15.

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

Command in "fixed" and "no notice" events

The events of the week of April 15 provide 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 prepositioned in the run up to the day of the race. The marathon itself – as a huge collection of interrelated operational activities – was set up to be managed through an incident command structure. Great care had been given to consider possible emergencies arising from or during the event – including a range of scenarios involving large-scale medical emergencies (e.g., widespread heat exhaustion on a very hot day), and, quite importantly, the possibility of a terror attack. Thus, the response on Monday sprang from a platform of structure, process, and personnel designed to be able to cope with a significant emergency. In effect, an incident command structure set up to manage the event was in a position to transition to a "war" footing when the emergency arose. While there was no detailed plan to deal with the precise scenario that was unfolding, there was at least 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 could at least form the skeleton of the command structure that could and would be developed as the event progressed.

The events of the evening of Thursday, April 18, and carrying into Friday April 19 stand in sharp contrast as "no-notice" events. The two alleged bombers are further 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 shootout then triggered an intense 18-hour manhunt for the surviving perpetrator, concluding early Friday evening. As these cascading events unfolded, command had to be organically assembled while events were ongoing and continuing to evolve. 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 give us an important window in which we can watch the same organizations and people cope with two contrasting events and the resulting challenges of applying incident command in two quite different settings.

Section Two

A brief (and selective) overview of the events

"Moments like this, terrible as they are, don't show our weakness – they show our strength."

Phase I: The bombing
(Monday April 15 at 2:49 pm to Monday April 15 at 4:50 pm)

Two bombs exploded 12 seconds and about 200 yards apart in crowds near the Boston Marathon finish line at 2:49 pm on April 15, 2013. Three people – Krystle Campbell, 29, of Arlington, Massachusetts; Martin Richard, 8, of Dorchester, Massachusetts; and a Chinese national who was a graduate student at Boston University (whose family requested anonymity for her) died immediately of catastrophic trauma. Dozens of others received potentially fatal wounds; and hundreds more were injured, many of them severely. (See Exhibit 1 for a map indicating the location of key events that occurred April 15-19 in relation to the bombing and ensuing response.)

Three distinct but overlapping response tracks were simultaneously triggered by the explosions – (1) the medical response, (2) the law enforcement response, and (3) the community-caring response.

Medical

Almost instantly, survivors, bystanders, and on-scene first responders rushed to the aid of the injured. This included runners and spectators, uniformed and civilian -- including on-duty police, fire, and emergency medical personnel, as well as doctors, nurses, EMTs and other medically-capable people (for example, a number of recent Iraq and Afghanistan veterans) who happened to be in the vicinity.

The presence near the finish line of a large number of highly trained medical personnel is entirely by design -- not a matter of fortune or coincidence. The Boston Athletic Association (BAA), which hosts the marathon, is a major driver of all of the preparations for the event. Working with other agencies, the BAA recruits and stations a large number of medically-trained personnel in large tents just past the finish area, where runners routinely suffering from everything from heat exhaustion to dehydration to muscle strains can receive initial treatment. Many of these personnel had training that allowed them to respond to a much wider range of traumas, from wounds and burns to amputations. Nearly immediately, personnel from these tents rushed to the aid of injured survivors, while others in the tents quickly moved runners already in the tents with less-serious dehydration and other race-related conditions to clear space for arriving trauma victims. In addition, the BAA had made prior arrangements to station a large number of transport vehicles at the scene to facilitate evacuation of runners with severe dehydration or other afflictions. In the event of the bombing, this provided the bulk of the capacity for transport of victims to emergency departments. In the aftermath of the event, a number of officials drew attention to the

importance of the fact that the BAA approaches the marathon with a "public safety perspective" embracing runners and the public. [4]

A number of both uniformed personnel and civilians who responded at the scene had recent combat or medical experience in theaters of war, and had thus previously treated or been trained to address traumatic blast injuries. Experience from wartime medical treatment had made its way into changes in civilian treatment protocols – so, for example, recent changes in medical doctrine to encourage aggressive use of tourniquets were applied at the marathon finish line. Some responders were carrying tourniquets, while others were improvised at the scene. Many lives were reportedly saved by the aggressive and immediate application of tourniquets.

Police officials, coordinating with medical personnel, broadcast to the (many) arriving police officers that they should make sure not to leave their vehicles blocking the roadways and exits used by ambulances from the site. Generally, lanes did remain open, and ambulances and other vehicles were able to transport the injured.[5] Vehicles of any available type were used to move victims to definitive care.

One key implication of the fact that the event took place on Patriots' Day, a state holiday, was that the greatest impediment to rapid transport of victims to hospitals – the standard daytime Boston traffic and drivers – were, for the most part, absent from the scene.

The site was cleared of victims with serious injuries within 22 minutes.

Boston has eight Level I trauma centers – five for adults and three for children – within a few miles and accessible in a matter of minutes from the site of the marathon bombing.[6] On the day of the marathon (and on two other days each year – for the New Year's Eve "First Night" celebrations and for the annual July 4th fireworks extravaganza), Boston activates a coordination center that oversees the distribution of patients across its (many) hospitals. The trauma centers were notified that a mass casualty event had occurred and that they should expect to receive severely injured victims. Injured survivors were transported immediately, and began arriving in emergency departments within minutes of the blasts. Since the marathon takes place on a Massachusetts holiday, hospitals are open and fully-staffed but do not have elective surgery scheduled. Operating rooms were thus available as patients arrived. The bombing

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[4] It is instructive to contrast the degree of preparation for the Boston Marathon with other "fixed" events. The marathon, operating annually, has accumulated over time a variety of processes and procedures in preparation for potential medical need by a large number of people near the finish line. By contrast, other events – like one-off parades or assemblies – that might also involve a large number of people gathering at (or moving through) a given location have generally shown dramatically lower levels of preparation for the possibility of sudden large needs for medical services ("mass casualty" events).

[5] Four days later, however, the issue of arriving police vehicles blocking one another would prove a critical factor in the escape of the second assailant from the scene of the initial shootout in Watertown.

[6] American College of Surgeons Trauma Centers website, http://www.facs.org/trauma/verified.html, accessed January 23, 2014. For adults, these include Beth Israel Deaconess Medical Center, Boston Medical Center, Brigham and Women's Hospital, Massachusetts General Hospital, and Tufts Medical Center; for children, they include Children's Hospital Boston, Floating Hospital for Children at Tufts Medical Center, and Massachusetts General Hospital for Children.

victims arrived near the time of a shift change at the hospitals, which meant that staff from both the arriving and departing shifts were available to provide additional people and skills as needed. Additional hospital employees, hearing about the bombing, reported to the hospitals in case they might be needed. No center reported having had a shortage of personnel to handle the traumatic injury cases it received.

There were, of course, unusual challenges faced by the hospitals in the midst of this crisis that were not initially or naturally well-handled. Since the casualties resulted from a bombing event, concerns at the hospitals included the possibility of additional attacks, so ambulances and people entering hospitals needed to be examined (searched) before they were allowed to enter emergency departments. Hospitals did not generally have protocols or procedures – or the requisite skills or people – to carry out these tasks, and as a result had to improvise. They also encountered significant problems in coordinating with victims' families and providing accurate information. Because of the (natural) confusion at the site of the bombings, in many cases survivors were not immediately identifiable (and in some case were misidentified as a result of personal effects like purses and wallets erroneously connected to them at the scene). Medical privacy laws ("HIPAA" regulations under the Health Insurance Portability and Accountability Act of 1996), which preclude release of medical information about a patient to anyone (other than a caregiver) who has not been authorized by the patient also hindered the exchange of information about the location and nature of injuries of some of the victims. This was particularly problematic in the case of patients who were, by virtue of their medical condition, not able to provide permission about disclosure – and also in the cases where multiple victims from the same family or group were taken to different hospitals. Eventually, caregivers – including senior hospital officials – made connections with colleagues in other hospitals to facilitate the exchange of vital information to families about the location of their loved ones.

In spite of the hundreds of patients arriving in a relatively short time at the various trauma centers, emergency departments report having been able to treat each arriving patient as soon as s/he arrived and was ready to be treated. The availability of medical personnel with the requisite skills (trauma surgeons, vascular surgeons, trauma nurses, and so on) and the availability of equipment ranging from operating rooms to surgical instruments meant that there was in essentially all instances no reason to triage patients – that is, to force one to wait until another's treatment had been completed. One trauma center director described his job as creating "micro-sites" – small areas in the emergency department where a team of doctors and nurses could focus together on a single patient, insulated from the other patients being treated nearby. "I wanted to make them feel 'I am in a space I understand.'" In effect, he took it as his job to make their environment as routine and recognizable as he could. By creating separate micro-sites, the director was trying to make it irrelevant to each team that they were working in the midst of a mass-casualty event and that they were surrounded by other teams working on other victims of the same event. All each individual team had to do was to concentrate on its single patient, in a setting that was constructed to resemble as closely as possible the conditions of their work on an ordinary day.[7]

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[7] The ability to create such "micro-sites" with conditions familiar to the caregivers is perhaps greater within medicine because the unit of work is always a single human being, and that remains true for individual caregivers in a mass-casualty event. (This might change if the medical system were to become overloaded so that there are not enough caregivers to attend to all of the patients.) Even though creating "micro-sites" may therefore be easier in

Every injured person who reached a hospital alive survived.

Law Enforcement

In the immediate aftermath of the bomb blasts, the urgent life safety rescue issues were apparent to all on the scene, and many law enforcement officials joined others in providing emergency medical aid to injured victims. Having had two bombs go off, law enforcement personnel were also immediately aware that there might be further explosions, and began working on securing and clearing the area of uninjured and lightly injured runners and spectators.

Senior commanders for a number of the agencies involved in providing security for the event were already at the scene; others, some of them nearby for coincidental reasons, heard quickly from dispatchers about the bombing and headed to the scene. Several describe mentally preparing themselves for what they would see and what they needed to do when they arrived – a luxury not afforded to those who were present and thus directly felt the shock when the blasts went off. Very quickly, a number of senior officials in several different agencies felt a need to find one another, coalesce, and form a joint command post to direct key elements of the response operation. One senior police official (who was on the scene at the time of the blast) describes the intense pull of the tactical: "I wanted to go hands-on." He was literally pulled away by the gunbelt from responding to an individual victim by a senior official from another agency (who, perhaps importantly, had *not* been present when the bombs went off, but arrived minutes later), who told him he was needed to establish a joint command.

Command formed first as pairs of senior officials from different agencies sought and found each other. These pairs then grew by absorbing other pairs or small groups or individuals as they encountered them, self-organizing into a multi-agency structure. Various participants described a felt need to find their colleagues and create a command structure that included and integrated key partner agencies.

Tactical command at the bombing scene was thus first a group of senior officers and associated assistants and staff gathered on the street. They searched briefly for a better location in the immediate vicinity, but because of an apparent "hit" on explosive ordnance by one of the canines at the site they had selected, they decided to move farther away. Eventually they joined the unified command structure that was forming at the Westin Copley Place Hotel as agency heads connected with one another as they were arriving at the scene. They chose the hotel as the best location in which to gather because it was very close to the scene and would have covered, securable space and could provide the services that would be needed for an extended effort (such as tables, chairs, easels, telephone lines, food, coffee, and restrooms). Command thus formed both through self-organization from below (on the street) and on a more centralized basis from above – and was complete when these two emergent structures connected at the Westin Copley Place.

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medicine than in other disciplines, the general principle – creating routine conditions for responders within an otherwise non-routine event – seems potentially to have wider applicability.

Even while it was still in the process of forming, the command group began to organize task force groups to work on some of the operational imperatives. They organized evacuation of people in surrounding buildings, including bars, restaurants, residences, hotels, and shops along the running route; they also established a sub-command to conduct explosive ordnance searches and clearance of the area. After the blast, many in the near vicinity had fled, leaving behind a great profusion of packs and bags and duffels on the street. Explosive ordnance disposal (EOD) teams, already on the scene because they were periodically sweeping the area for explosives, immediately went to work clearing the bags that had been left behind, as each constituted a potential additional threat. This effort, which had already begun as a result of initiative by the EOD teams present, was further organized and made more systematic. At the same time that medical needs were attended to, patients transported from the scene, and bystanders cleared from the area, law enforcement began to treat the entire neighborhood surrounding the blasts as one of Boston's largest-ever crime scenes. Law enforcement effort shifted from direct engagement in and support of the rescue mission to opening the investigation and evidence collection process. Because securing the entire 13-block area and then systematically searching for evidence required a large number of people, law enforcement agencies sought the help of the National Guard to provide soldiers to collaborate in setting up a perimeter to keep people from re-entering the crime scene. Officials also began collecting security camera videotapes in the hope that pictures revealing suspicious behavior prior to the blasts would help identify the perpetrator(s). In addition, evidence teams began the painstaking search for signs that would shed light on the crime or the perpetrators. An honor guard of police officers was stationed with the body of young Martin Richard, who died at the scene.

In the aftermath of the blasts, outside the immediate blast zone, over five thousand runners were still on their way toward the finish line. They were halted about a mile short of the line by a small group of police officers, supplemented by a group of National Guard soldiers who were walking the marathon route as a training hike. Starting long before the runners and walking in uniform with rucksacks, this group was approaching the finish line at the time the bombs exploded and was thus in a position to reinforce other uniformed personnel. Given their military command structure, they were immediately deployed to help manage and assist the group of runners who needed to be stopped outside the impact zone.[8]

The command structure coalesced rapidly at the Westin Copley Place Hotel in a commandeered ballroom. It took some time, however, to establish conditions under which managing the emergency response effectively was possible. As in other crisis situations, in the Metropolitan Boston area and certainly at the finish line, cell communications were overloaded and unreliable. Text worked better, but the difficulty with communications in the short term did create an operational impediment. A request was made of the hotel to provide landlines – which turned out to be more difficult and to take longer than might have been anticipated.[9] While senior commanders from different agencies were in close proximity

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[8] While this group proved immensely valuable in the Boston marathon event, some have observed that the inclusion along the running route of a large group of men and women in combat fatigues carrying rucksacks could itself create a security issue, suggesting that some form of credentialing system to confirm affiliations may be an important component of enhancing security in the future.

[9] What proved to be the region's overall strength was the BAPERN (Boston Area Police Emergency Radio Network), which has been in place for nearly forty years. It was first conceived after the Harvard Square anti-Vietnam riots in the 1970's and has steadily grown over the last four decades. The radio network is sustained by over 176

to one another, there were a great many people pressing into the ballroom. Security had been set up to protect the command structure, but more or less anyone with a gun and a badge and enough rank (and some others as well) could and did get through to the command post. The area rapidly became overcrowded, and the senior command group sought progressively smaller rooms, establishing sub-commands in the ballroom to coordinate specific elements of the response.

Critical operational questions had to be faced immediately, and on some questions there were sharply conflicting views. Some wanted to close down the public transportation system, which includes both bus and rail transit, some of it below ground, on the theory that it was vulnerable to further attack. Others believed it was crucial to keep the trains and busses running normally to facilitate the flow of people away from the blast area. (The determination was made to add security personnel on the transit system and in stations, but to keep the system running.) There was an NHL hockey game scheduled at the Boston Garden that evening – should it be cancelled or should it go on? Given the potential vulnerability of such a gathering, and in light of the additional strain it would place on security resources that were already heavily stretched to meet the demands of the ongoing response, the game and an NBA basketball game scheduled for the next night were both cancelled.

Members of the unified command group continued to receive a flood of tactical information and requests for guidance about tactical matters from their subordinates. Even so, some felt the need to identify broader strategic issues that might need attention but that might have been missed in the focus on the original bombing attack, and several attempted to find time and space to focus their attention and coordinate their thinking on these issues. Among other broad issues, one senior official asked, "What are we missing, people? Where are they going to hit us next?" Aware of the possibility – and warned in part by the fact that two bombs had already exploded – that the marathon bombing might be part of a larger, coordinated series of attacks, they were vigilant in asking about what was happening elsewhere. They identified the trauma centers to which patients had been transported as potential sites for secondary attacks, and coordinated across several agencies to deploy tactical teams to provide security at these locations.

Within the flow of information from social media, news media, cell phone texts and calls, there were inevitably many pieces of *mis*information that added to confusion. Several reports of additional explosives found on the street near the finish line were carried in network media bulletins and echoed (and widely re-echoed) in social media; these turned out to be erroneous interpretations of reports about ongoing EOD clearance operations, and no additional explosives were found, but the reports caused additional concern and confusion. Reports of an explosion at the John F. Kennedy Library – five miles from the scene, in a relatively remote corner of the city – caused alarm that it might indicate that the attack was broader and ongoing. This "explosion" was eventually determined to have been a fire that

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communities in the Boston metropolitan area and has served as the main communications hub during every large-scale event involving multiple regional police agencies. It proved to be an invaluable resource during the aftermath of the explosions at the Boston Marathon finish line – but also a source of information overload, which in part contributed to the massive confusion and resulting firefight on Dexter and Laurel Streets in Watertown three days later.

resulted from an ordinary and minor electrical fault – but not before it had been described in the first press conference and labeled as "being treated as related," adding to the burdens and concerns of the leadership group and adding uncertainty to their understanding of the events they were managing. It also led to the evacuation of the Kennedy School of Government at Harvard (on the theory that perhaps "Kennedy-related" sites were being targeted).

From a tactical perspective, the command group was overseeing a large and rapidly burgeoning array of operational tasks and activities, including, among others:

- Ensuring ongoing EOD clearance of the finish line area;
- Deploying of personnel to secure the crime scene area;
- Investigating and collecting evidence;
- Securing sites regarded as potential secondary targets;
- Clearing and securing the tens of thousands of gym bags runners had sent to the finish line;
- Organizing transportation for tens of thousands of marathon spectators, departing Fenway Park baseball fans, and ten thousand or more runners still on the course or near the finish line who now needed to leave the impact area; and
- Assessing intelligence about ongoing events in Boston and elsewhere to determine if they might be connected or required further investigation or action.

Essentially all of these tasks involved cooperation from and coordination among multiple agencies. Among the many organizations represented in the command post were the Boston Police Department, the Massachusetts Bay Transportation Authority Police Department, the Massachusetts State Police, the National Guard, the Massachusetts Emergency Management Agency, the Massachusetts Department of Transportation, the Federal Bureau of Investigation (FBI), the United States Secret Service, the Bureau of Alcohol, Tobacco, and Firearms (ATF), and the police departments of various colleges and universities in the area. Massachusetts Governor Deval Patrick and, somewhat later, Boston Mayor Thomas Menino (who was recuperating in a local hospital from recent surgery) also joined the command structure.[10]

For members of the unified command, most of whom were also the senior people in their respective agencies, the tasks enumerated above came linked to subordinates who had information to share, questions to ask, and requests for decisions or guidance. At this stage, the event was (quite naturally and predictably) creating a flow of transactions – most of which focused the attention of senior leaders on *tactical* matters.

Less obvious, and therefore more difficult to define and focus attention on, were a broader set of *strategic* issues. As the afternoon wore on, the clock was continuing to run; no public agency, let alone any group of agencies, had yet issued a general statement to the press or public (though there had been a stream of information released through social media by several participating agencies). How were the state and the

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[10] The role of political leaders proved to be very important during the week. This is not sufficiently addressed in NIMS doctrine and needs to be more fully explored and defined and codified into both general understanding and procedures.

city to present themselves in the aftermath of – or, as it might be, in the *midst* of an *ongoing* – attack? How was the event to be characterized? (Was it a horrific crime? An act of terror? An attack on Boston? On the nation?) How was the response, and its organization, to be described? (For example, who would be described and presented as leading the response and/or the investigation?) And there were substantive issues as well: was the command and coordination structure that was in the process of self-organizing the best way to grapple with the event as a whole? These issues were more strategic but had to compete for attention with the tactical questions from subordinates that were naturally flowing into the command room.

Governor Patrick soon recognized the need for focus on the broader strategic issues. He and his aides also saw that the command group was being continually drawn into the ongoing discussions about the tactical activities. Consequently, he asked all to put down their cell phones and focus on defining what issues needed to be taken up next. The immediate imperative was to provide a joint message to the public. But what form of public statement would be made, what should it say, who would say it, and how would it be structured? The first press conference was then organized, and began at 4:50 pm – two hours and one minute after the bombs went off.

Community Caring

"Everyone in Boston owns the Boston Marathon."

In addition to the response by medical and law enforcement personnel, members of the general community responded both at the scene of the bombing and in other locales where needs flowing from the bombing arose. The day began with an army of volunteers deployed along the course, and thousands of other citizens lining the course providing water and oranges and support – an outpouring of community involvement that is a consistent feature across the years of Boston Marathons. Then, when the bombs went off, many bystanders in the vicinity of the blasts, especially those with medical training, assisted in the treatment of injured victims. One senior responder present in the immediate aftermath remembers the "sea of yellow jackets" – the Boston Athletic Association's army of volunteers near the finish line – plunging in and providing help at every hand. A large number of community members contributed information through social media and in other forms in the immediate aftermath and in the following days, and very large numbers contributed their photos and videos to investigators to assist in identifying the perpetrator(s). Others assisted with the process of evacuating people from the area, or cooperated in the process of being evacuated themselves. Yet others offered help – lodging, blankets, food, phone calls, and other assistance – to the stranded runners who couldn't complete the race and who needed to locate family members or friends who were waiting for them to finish. Over the ensuing days, the community offered caring in other ways – offering solace to friends and families at memorials and services for the victims who had died in the blasts, in helping the injured survivors and their loved ones cope with the challenges they were suddenly facing, in providing funds through the rapidly-formed One

Fund (a unified charitable trust set up to help the victims of the bombing),[11] and in a host of other ways large and small. [12]

Phase II: Managing communications and the investigation
(Monday April 15 at 4:50 pm to Thursday April 18 at 10:30 pm)

As the first afternoon wore on, many of the most immediate operational challenges related to the bombings had been met. The crime scene had been secured and was being swept for explosives. Evidence teams were at work and being organized for work on the following day. Spectators and runners had, one way or another, found their way away from the blast area and to safety and support. Certainly, much remained to be done: How would runners reconnect with their property left behind at the finish line? How would security be enhanced at key locations – the transit system, hospitals, and other locations perceived as vulnerable – to provide both greater safety and reassurance? How would logistics be arranged to support the literally thousands of law enforcement and National Guard personnel now assigned to various aspects of the ongoing response? For the most part, though, these operational tasks were being identified, organized, and attended to.

What increasingly loomed in front of the senior leadership group were three broader and less operational matters: (1) the management of and flow of communication about the event through the media to the public; (2) the organization and management of the criminal investigation; and (3) the continuation of daily police operations in the city, beyond the critical 13-block area.

The first press conference began at the Westin Copley Place Hotel at 4:50 pm on Monday afternoon, almost precisely two hours after the bombs went off. The result of a concerted effort, particularly by the governor and members of his staff, to develop and present an organized and unified message, it consisted of a dozen senior officials on a small stage. Only the governor and the Boston Police Commissioner spoke; both gave short statements and answered questions. It lasted about eight minutes.

After arriving at the command center in the Westin Copley Place Hotel, Mayor Thomas Menino held a press conference, joined by the governor and the Boston Police Commissioner, flanked by several other senior officials, beginning at 5:54 pm and lasting about 7 minutes. In it the mayor expressed his

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[11] The One Fund effort is an interesting case in point of the community unifying. In many previous disaster events, a variety of different funds have formed to help survivors, each with a somewhat different emphasis or approach. The (often well-intentioned) proliferation of different efforts seems to confuse both donors and beneficiaries. Here, a conspicuous effort was made to simplify and coordinate efforts. Inevitably, this leads to internal debates (for example, how to determine relative amounts of compensation or assistance for different injuries that defy simple comparison). Nonetheless, this unified approach, developed in the immediate aftermath of the bombing, seems to have much to recommend it.

[12] Community caring began in the instant and has continued in the interim. Here are a few examples: A "Boston Bites Back" food festival to which restaurants from around the city donated services was organized by a group of chefs in mid-May to raise funds for One Fund; a benefit concert with dozens of musicians and comedians from Boston and beyond was held in late May, also to support One Fund. Contractors have volunteered services to victims to provide needed home modifications. As we were finishing this paper, a flash mob was organized in downtown Boston by two victims of the bombing to celebrate movement, thank caregivers, and support victims.

condolences to the victims and their families and expressed confidence in Boston's ability to respond to and recover from the events. The governor and police commissioner also spoke briefly.

As the bombing was nearly immediately widely perceived as a terrorist act, it was anticipated that the FBI would assert federal jurisdiction and become the lead agency; this was announced at the opening of the third press conference, which began at 8:50 pm on Monday evening. This press briefing, originally announced for 7:00 pm, was delayed by discussions about the message to be conveyed and who would speak. A larger group of officials crowded onto the stage (including some politicians who would have no obvious role in the event). The governor opened with a carefully structured statement in which he briefly described what was known and articulated a series of steps that had been taken, including the securing of the crime scene, the FBI taking the lead role in the investigation, and the establishment of a support center for runners in the nearby Boston Park Plaza Castle (where runners were being bussed from along the route and families and friends could gather to meet them). He announced that on the following day Boston would be "open for business, but it will not be business as usual," observing that among other things that there would be little or no access to the crime scene area for residents or businesses, that there would be a heightened security presence in various areas of Boston, and that there might be random searches of backpacks on the transit system. He called for vigilance on the part of everyone. He commended and thanked residents and spectators along the marathon route for extraordinary acts of kindness to the runners. Four other officials spoke during the session, which lasted a little over 15 minutes. The FBI Special Agent in Charge confirmed that the FBI was taking the lead in the investigation and would conduct it through Boston's existing Joint Terrorism Task Force, which included agencies represented by the other law enforcement officials on the podium. The US Attorney, the Boston Police Commissioner, and the Suffolk County District Attorney also spoke. Requests for the public to provide information – and, especially, photographs or video captured near the scene just before, during, and just after the event – were made during the briefing.

Meanwhile, local, national and international news media converged on Boston, fueling a continuous hunt for new leads, reports, and other material. Social media, too, continued to carry a high volume of comments, observations, and speculation. Over the next few days, the intense focus by media and the need for new material would generate both accurate and inaccurate reports about the investigation, suspects, leads, and arrests (of which there were in fact – until Friday – none).

One significant focus of the investigation was on scrutinizing the photographic evidence from the scene of the blast, and investigators requested spectators and others who had photos or videos that might contain useful intelligence to forward copies to the FBI. The community response was overwhelming. The area of the blast probably had the greatest saturation of photographic coverage of any place in the country at the time the bombs went off, so the likelihood of finding useful photographic evidence seemed quite high. On the other hand, the massive volume of material that flowed in created logistical problems of finding enough trained photographic analysts to search for the useful frames among the multitude of images received. The investigation received an astonishing flood of information and leads that had to be digested, decided about, and in some cases acted upon. Eventually, this generated crucial progress in the investigation – but it also generated a torrent of *mis*information and bad leads. Thus, a major challenge in events of this kind – inevitably fraught with imperfection – is separating the modest amount of useful,

accurate, actionable information from the flood of confusing, erroneous, and irrelevant observations in which the valuable leads are embedded.

While the FBI had been established as the lead agency for the investigations, other agencies had their own independent interests in investigating, for both federal and state crimes had been committed. The Boston Police Department investigates homicides within its city limits; the Suffolk County District Attorney (who oversees prosecution of state crimes in Boston) and the US Attorney (who is responsible for federal prosecutions in Massachusetts) each had an intense interest in how the investigation was conducted, how evidence was being collected and secured, and in who had access to what information, evidence, and intelligence about the matters being investigated. The joint task force for the investigation was rapidly convened, with the FBI as the investigation's lead agency and with the US Attorney's office ultimately in charge of the prosecution. Leaders of the organizations directly involved in the investigation agreed to cooperate fully with one another in all aspects of the investigation, and in many areas of investigative activity, the cooperation at the senior level projected reliably down to the tactical level. For example, perhaps in part because it was a massive task requiring a very large number of trained people, evidence collection at the crime scene was conducted by teams drawing on personnel from multiple agencies, and cooperation and coordination among these groups seems to have been strong.

In other areas of the investigation – particularly in the sharing of intelligence and findings from the reviews of security tapes and the massive amount of other video provided by media and spectators – it proved less easy to overcome the institutional barriers to sharing information and working together. When friction rose to a sufficiently high level, senior leaders quickly addressed it, directing their subordinates to collaborate, but there were many bruises along the way.

As suspects were identified from video and photographic evidence and better photographs of them were obtained, discussions began about whether to release the photographs to the public. Initially, there were conflicts of view within the investigation about how much to reveal. This is a common problem in investigations of potentially ongoing terrorist events – releasing more information may allow the public to help identify the perpetrators, possibly reducing the probability of another attack, but it also forewarns the suspects that authorities may be closing in and may give them a chance to flee, possibly reducing the likelihood of a successful apprehension and prosecution. Both sides of this debate have strong arguments in their favor, so making this decision is complicated and difficult. There were strong advocates for both views within the marathon bombing investigation, and thus ensued what one official involved in the discussions characterized as a "healthy and constructive debate."

As this debate developed, a consensus gradually formed in favor of releasing the photos. Part of what shifted the balance was that it came to be seen as risky *not* to release the photos. If the investigation had photos in hand that it regarded as accurate depictions of the suspects – as indeed it did, by Wednesday morning – and had not released them, what would happen if the perpetrators were then able to carry out another attack before investigators were able to track them down? Many (perhaps justifiably) might feel that the second attack might have been prevented if the public had been shown the pictures and been asked to help identify the suspects. If this were to happen, it would put all of the agencies involved into a nearly impossible "hindsight" situation.

One result of the (necessary) secrecy imposed concerning the investigation was that there were intense efforts by media to get reports about progress, and this led to a number of leaks (some accurate and many not), further contributing to the uncertainty surrounding the event. There was also substantial echo of media reports in diverse social media channels, together with a flow of direct observations, commentary and opinion, and completely unfounded speculation.

As the week wore on, coordinated official communication became more sporadic. There was no general news conference held on Wednesday, as many who would have been involved were working intensively on the question of whether the photos should be released. A great deal of information – and a great deal of *mis*information – about the investigation and related activities and events was carried in the press and through a variety of social media channels. As one example, on Wednesday afternoon John King announced live on CNN that he had confirmed with two federal sources, one in Washington and one in Boston, that a suspect was in custody. News helicopters followed a motorcade headed to the federal courthouse in Boston, speculating that the suspect was being taken to be arraigned. Everything about this report, which was widely repeated, was incorrect.

Thursday morning saw another massive logistical challenge, as the President and First Lady travelled to Boston to attend a multi-denominational service in Boston's South End and to visit injured survivors in Boston hospitals. As one initially exasperated senior law enforcement official observed, "The city may have needed this event, but law enforcement didn't." As the President's visit unfolded, though, almost everyone came to see it as positive and important for the survivors and their families, for the city, and for the nation. Nonetheless, the visit created substantial additional demands for already taxed and fatigued security services. In addition to continuing their work on the ongoing investigation and in chasing leads that were continuing to flood in, especially to the FBI and the Boston Police Department, they now had to provide for everything ranging from crowd control at the multi-denominational prayer service (and for hours ahead of time as people queued for very limited seating) to traffic control along the President's motorcade route to yet more EOD dogs to sweep sites where the President would be visiting.

Cooperation in getting resources was sometimes creative and improvisational. Illustratively, when more EOD dogs were needed, it was determined that the Air Force had dogs it could provide, but had no mechanism to lend them to the City of Boston.[13] A request to the Air Force for the dogs was made by the Secret Service – which, once they were in hand, could lend them to the City as part of the coordinated security apparatus for the President's visit. But cooperation was not always the order of the day. In one illustrative (though certainly not typical) event on Thursday, a group of law enforcement officials in a car with out of state plates were staking out a location thought to be connected to the assailants. A uniformed on-duty local police officer from that jurisdiction, suspecting that they were engaged in a stake-out and knowing that he had not been informed of any activity of this kind that should be taking place in his precinct, approached them and asked who they were and what they were doing – and the group refused to identify themselves.

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[13]The discovery of available dog teams arose from a prior relationship between an Air Force officer and a Boston Police Department official, who had been in a training course together. The Air Force officer called to offer any assistance that might be needed … and the BPD official asked, "Can you get us any EOD dog teams?"

The investigation continued apace during and after the President's Thursday visit. As the consensus grew that the photos should be released, the FBI, as the lead investigative agency, worked with the office of the US Attorney in Boston and with the Department of Justice in Washington, DC, since they would be responsible for carrying out any subsequent prosecution in the case – and releasing photographs of individuals identified in an investigation can complicate matters during trial. This coordination took some time, but at 5:20 pm on Thursday, April 18, the FBI held a press conference in Boston in which Special Agent in Charge Rick Deslauriers, reading a carefully-worded statement, released photographs of two people identified as "suspects," saying they were considered to be "armed and dangerous." One widely reported description of the final stage of the decision to release the photos is that the photographs had been leaked to the press by someone inside the investigation, and the FBI released them officially after being told that a major media outlet would shortly release them if the FBI did not. According to this account, the FBI asked for – and received – an agreement from the media outlet to hold off on releasing the photos until the FBI could make arrangements for an official release.

Release of the photographs, predictably, immediately resulted in a new flood of information – some of it useful and much of it not – pouring into FBI headquarters in Boston. [14]

Phase III: The endgame
(Thursday April 18 at 10:30 pm   to   Friday April 19 at 9:30 pm)

On the evening of Thursday, April 18, an armed robbery took place at a 7/11 convenience store at 750 Massachusetts in Central Square in Cambridge. MIT police officer Sean Collier, on patrol that evening a few blocks away and hearing reports over his radio about the robbery, had positioned his vehicle near the intersection of Vassar Street and Main Street facing out toward a street that suspects fleeing from the robbery might traverse and from a vantage point where he could monitor an illegal left turn that people commonly made into the campus. Surveillance video from a nearby building shows that at about 10:25 that evening, two men approached Collier's vehicle on the driver's side from behind and shot Officer Collier five times. They moved away from the vehicle, and then returned, apparently attempting to steal Officer Collier's weapon, but were unable to get it to release from his "retention" holster (designed to make it difficult for anyone other than the owner to remove it). They then left the scene.

MIT police, responding to reports of noise in the area, were unable to reach Officer Collier on his radio, and other responding units found Officer Collier in his vehicle at 10:33; they immediately summoned medical assistance. As this was a likely homicide, the Middlesex County District Attorney, using the investigative service of the State Police, would investigate the shooting. With reports of a police officer shot, however, numerous other agencies sent personnel to the scene.

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[14] As events unfolded, both sides of the debate about whether to release the photos could find affirmation of their views. Release of the photographs did, indeed, result in receipt of a great deal of additional valuable information from the public. It also seems, however, to have precipitated the attempted flight of the suspects from Boston.

While the homicide of a campus police officer, especially on a university campus, is extremely rare, it was not immediately obvious that this event was connected to the marathon bombing. Some observers on the scene thought it might be connected to the armed robbery at the 7/11 that immediately preceded it, while others thought instantly that it was so unusual that it might be related to the marathon bombing. These differing assumptions then influenced the interpretation by different observers of the other events that then unfolded.[15]

Around 11 pm, a Boston-educated Chinese immigrant driving a new black Mercedes SUV was carjacked when he pulled his car over on Brighton Avenue in Allston to answer a text message. He would later describe the carjacker as a "Middle Eastern" male who got into his car, showed a handgun, and told him that he wanted money, that he had shot a Cambridge police officer, and that he had carried out the marathon bombing. After a meandering drive through Allston and Watertown, they stopped and picked up a second man who had been following in an older car. The car owner would later describe him as looking like one of the men in the FBI photos released earlier in the day. He and the carjacker loaded a series of heavy objects into the SUV and then headed back to Cambridge with the carjack victim still in the car. During the drive the carjackers indicated that they intended to travel to New York. When they stopped to buy gas in Cambridge around 12:15 am, with one of the carjackers in the gas station convenience store and the other having put down his handgun to fiddle with a GPS device, the car owner seized a chance to escape and jumped from the car, fleeing to a second gas station nearby, from which he told the attendant to call 911. The two carjackers quickly drove off in the SUV in the direction of Watertown.

The car owner was (understandably) upset, and his English was imperfect, so while he gave a description of the carjackers, it took a long time before he indicated that the carjackers had said that they were responsible for the marathon bombing. Officers who interviewed him reported the description of the two carjackers as Middle Eastern males who were headed toward New York. Shortly thereafter, area police officers were told to stand by for a "be on the lookout" advisory "from Cambridge." The Cambridge dispatcher broadcasting the description and license plate number of the SUV described the carjackers as two Middle Eastern males, possibly headed to New York, adding that they were "wanted for a carjacking in Cambridge, possibly related to the Cambridge incident" (presumably, a reference to the homicide of Officer Collier). In neighboring Watertown, officers on patrol were specifically notified by the Watertown dispatcher to look for the stolen SUV. Throughout the evening, and certainly while looking for the vehicle, public safety agencies in the region were monitoring radio networks and using the BAPERN channel.

About 40 minutes later, with the assistance of GPS technology in the car-jacked SUV, the Watertown Police dispatcher was provided with a location of the vehicle, which by this time was back in Watertown. A Watertown police officer on patrol in that area radioed dispatch in Watertown to ask for the license plate of the SUV to be repeated, and said he had the vehicle in sight and was following it. He was advised not to approach or stop the vehicle until backup had arrived, and he continued to follow the vehicle

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[15] As events would eventually turn out, the armed robbery at the 7/11 was apparently independent both of the marathon bombing and of the shooting of Officer Collier – though this could not be definitively known at the time.

without lights. The SUV stopped on its own, however; and the driver got out of the vehicle, approached the Watertown police vehicle 15 to 30 yards behind the SUV, and began firing at the officer and cruiser. The Watertown police officer put his car in reverse, backing away from the assailant, and radioed that shots had been fired. A second Watertown unit arrived on the scene about this time and also engaged the assailant. A gunfight ensued in which shots were fired and explosives were thrown at police, which was reported to Watertown dispatch; the dispatcher then requested assistance from other units, giving the location as the intersection of Dexter and Laurel Streets. A large number of law enforcement officers from a number of different departments were dispatched or on their own initiative began to move toward Watertown. The gathering point, both sides of the intersection at Dexter and Laurel, is a densely settled maze of suburban streets, slightly removed from more trafficked roads and usually quiet in the middle of the night.

In the ensuing minutes, there was an intense and confusing gun battle in the general vicinity of Dexter and Laurel Streets. The assailants threw multiple explosive devices, some of which detonated while others did not. One of the assailants fired multiple rounds from the lone handgun that they had between them (which apparently was reloaded at least once during the event). The Watertown police officers who had first engaged with the two assailants coordinated with one another; while two engaged the assailants directly, two other responding Watertown officers engaged in a flanking maneuver.

Coordination with other arriving officers was much more difficult. During the course of the battle, many police officers from other agencies arrived in the general vicinity of Dexter and Laurel streets. Many rounds were fired, some penetrating nearby homes and vehicles. Whether dispatched or self-deployed, most of these officers seem to have arrived individually; once on scene, they do not appear initially to have self-organized into working units, but instead tended to act individually – at least until somewhat later, when very senior commanders from various agencies began to arrive on scene and made conspicuous efforts to produce a more structured response.

The gun battle with the assailants ended when one of them approached a Watertown police officer in a driveway off Laurel Street, firing at him at close range. The officer returned fire, and is thought to have hit the assailant multiple times. The assailant's weapon then either ran out of ammunition or jammed; he then threw it at the officer, striking him in the arm, and then ran back toward the street. The officer pursued him, tackling him in the street. While he and two fellow Watertown officers were taking the assailant into custody, the second assailant drove the SUV toward them on Laurel Street. Police officers dove out of the way. The SUV apparently ran over the first assailant, dragging him along Laurel Street for what was reported to be about 30 feet; the SUV then escaped the immediate scene in what some observers described as a hail of gunfire (apparently involving hundreds of rounds fired).

At some point during the exchange of fire, MBTA Officer Richard Donohue was struck in the groin by a bullet. He was attended to by officers from several departments who summoned Watertown Rescue emergency medical assistance and tried to stop his severe bleeding, but he lost consciousness at the scene. He was loaded into an arriving rescue ambulance, along with a State Police officer who was a paramedic (who made a habit of carrying his medical equipment in his police cruiser) and the two EMTs from the

rescue vehicle – which left no one to drive the vehicle. They yelled for someone who knew the streets to drive, and one of the Watertown police officers jumped into the vehicle. After having to drive several blocks out of his way to avoid streets blocked by a tangle of police cars that had been left by police officers from many different agencies as they arrived near Dexter and Laurel Streets, he drove the few minutes to Mount Auburn Hospital's emergency department. A surgeon from a Level I trauma center was doing a rotation at Mount Auburn that night; together with a dedicated and committed team of emergency department physicians, and in spite of his severe blood loss, the medical team was able to save Officer Donohue's life.

Medical assistance for the assailant who had been taken into custody was also summoned, and he was separately transported to a Boston trauma center.

The second assailant drove several blocks west on Spruce Street and then abandoned the SUV, proceeding into the surrounding neighborhood on foot. Police were initially hindered in their pursuit by the snarl of police vehicles parked at the scene when other officers arrived to provide support or engage in the gun battle. Some eyewitnesses reported that police followed with a lag of perhaps 45 seconds.

A series of interrelated incidents then followed in which police officers on the scene attempted to apprehend the assailant who had fled in the SUV. Erroneous radio reports that a State Police SUV had been stolen by the fleeing assailant led to a substantial number of rounds being fired, apparently by one or more police officers, at a State Police SUV departing the scene. By this time, reports had been broadcast that the carjacked SUV owner indicated that the carjacking suspects had said they were the marathon bombers; in addition, their use of explosives during the gun battle led some to conclude that they were the bombing suspects. At a minimum, this had put all officers in the area on notice that the fleeing suspect might have further explosives, including the possibility that he might be wearing a suicide explosive vest or other device. Each of these "distractions" interrupted the efforts to locate the second suspect.

In the darkness and confusion, several vehicles as well as pedestrians in the immediate area were treated as potential suspects. A pedestrian passing through the area not long after the gun battle was stopped by police. This scene was joined by a number of arriving police officers, and the pedestrian was surrounded by officers from multiple agencies, most with weapons drawn – which meant that officers were in effect also pointing their weapons at one another. This was resolved by the arrival on scene of a very senior police officer. He took tactical command of the situation, organized the police response to move officers out of each other's line of fire, and gave instructions to the pedestrian to demonstrate that he was not wearing a suicide vest.

An arriving senior officer from another agency came upon this scene, coordinated with his senior colleague already in charge at that location (whom he knew personally from earlier joint training and jointly-managed fixed events), and moved on to the next incident – a similar set of circumstances in which a driver had been detained in his vehicle. Here, again, there were many officers from many different agencies surrounding the vehicle with weapons drawn, creating a potential crossfire hazard. It took the arrival of a very senior officer to take tactical command and organize the effort by ordering the

second and third rows of officers to holster their weapons and then telling the driver to get out of his car and take his clothes off so that they could see that he was not wearing explosives.

As these sub-events were resolved (or brought under control), senior commanders gathered with one another, feeling a need to form a joint command post and organize the larger search and apprehension mission. Originally, they convened near the intersection of Dexter and Laurel, but found this unsuitable because it was a crime scene, with unexploded ordnance still in the street and brass from literally hundreds of rounds fired that would eventually have to be collected as evidence. Having more people come to and walk through this area would expose them to greater hazards and would further disrupt the evidence. So the decision was made to form a general command post a few blocks away at the Arsenal Mall. By this time, command level officials from many agencies had responded to Watertown, and were directed to the Arsenal Mall location. An early decision in the command group was to establish a wide perimeter, containing about 20 blocks, around the area in which the escaped assailant's car was found.[16] One important advantage conferred by the large number of dispatched and self-deploying officers arriving in Watertown was that there was adequate staffing to set and supervise a large perimeter. Starting from early in the initial response to the gunfight, officers on the scene as well as some newly arriving were deployed to maintain a perimeter watch. Meanwhile, groups of police officers from several agencies coordinated in the field searching within the perimeter for the assailant, who was still at large.

As the situation in Watertown stabilized overnight with no further sign of the assailant, the determination was made at the command post to organize a systematic search within the cordoned-off area starting at dawn the following morning. The senior command group gathered in a large State Police command vehicle at the Mall; a tactical command post to organize and operate the search process was organized nearby.

The command group now faced considerable uncertainty about the nature of the ongoing event. One concern was that the event might now be evolving, with additional people involved. Why had the suspects come to Watertown? Was there a safe house, or a cell living there that had now been activated? Apprehensive that the event might now be spreading, the command group began to consider whether a wider area should be "locked down."

They discussed how wide an area they should request be closed, aware that public transit would soon be starting its early morning service, making it possible for the missing suspect and/or accomplices to leave the area and disappear into the city by blending into ordinary daily commuter traffic. The group learned that a taxicab had picked up a man in the vicinity of the Watertown events and dropped him at South Station (the regional Amtrak hub where trains depart for cities along the east coast). This, together with a recognition that flight from the area on foot was a practical reality, heightened the sense of a need to control a wider area.

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[16] In the confusion of the aftermath of the intense gunfight and in the darkness of the night and with many officers present from other localities and agencies who were not familiar with streets of Watertown, the established perimeter actually centered more on the initial gunfight at Dexter and Laurel Streets than on the location of the abandoned SUV.

In an early morning conference call with Massachusetts Governor Patrick and Boston Mayor Menino, the command staff made its recommendation that a large section of the western metropolitan area be asked to "shelter in place." That is, residents of Watertown and surrounding communities, including Cambridge, Waltham, Newton, Belmont, Brookline, and substantial parts of Boston, would be asked to close their businesses voluntarily and not leave their homes during the day on Friday, April 19. The governor and mayor approved the recommendation, issued the "shelter in place" request, and suspended public transit until further notice. Some other communities not included in the governor's official request – including Somerville, which lies immediately to the north of Cambridge (and, it later turned out, very close to the family apartment where the suspects lived) – also suggested to residents that they stay indoors with doors locked and minimize any outside travel. The affected communities, which awoke to vivid reports of the overnight gun battle in Watertown, cooperated to a very considerable extent with this request.

Early Friday morning, the assailant who had been fatally injured at the scene of the Watertown gunfight was identified through fingerprint matching as Tamerlan Tsarnaev, an immigrant of Chechen descent with US permanent resident status and a pending citizenship application.

Police sought the taxicab in which the unidentified person had been transported from Watertown to South Station; it was located and detained near Kenmore Square in Boston. When it was stopped, there was a passenger in the front seat (an unauthorized and unusual circumstance) who, like the Tsarnaev brothers, was determined to be a Chechen. The driver's name was checked and found to be on the national terrorist watch list. An explosive ordnance team was summoned to search the vehicle, and an EOD dog hit on an object near the vehicle. All of this added significantly to the sense that the event might be enlarging, with a sleeper cell now possibly activated and on the move. It turned out, however, that the driver's name had been misspelled, and that he was not in fact on the watch list, that there was nothing suspicious about the Chechen in the front seat, and that the EOD hit was false and the object was harmless – but in the initial process of this sub-event, anxieties about the possibility of wider involvement had again been accentuated.

In organizing the Watertown search, the command group determined that tactical teams should be used to conduct the planned house-to-house search for the suspect, and accordingly the tactical command post divided the area into a grid with five areas, with a tactical team assigned to each. These teams were supplied by multiple agencies, but each acted within its own command structure as a unit within its grid area. Police had no authority (except in a case where they had probable cause to suspect that a household was under duress) to search homes without permission; accordingly, they proceeded by contacting residents and asking if they would like to have their homes searched. Although the neighborhood in which this took place is highly diverse demographically, there was abundant cooperation by residents. Tactical teams were courteous and highly professional throughout the day. The work, conducted in full tactical gear and in many teams with few breaks and little food, was grueling.

As they searched through their grid areas, there was no simple way for the tactical teams to hold the ground that they had already searched; it might therefore have been possible for the suspect, even if he

were in the area of the search, to move from an unsearched to an already-searched area. In addition, there were distractions that arose at various times during the day, as reports from residents in the search areas drew attention to an open door here or an open window there. On occasion, this resulted in teams, or parts of teams, moving from the area they were in the process of searching to another area within their grid area, resolving the issue, and then returning to where they had been to resume their search, so there was both systematic and some less systematic movement within the search areas.

Over the course of the 18 hours following identification of Tamerlan Tsarnaev as one of the suspects, the development of increasingly detailed knowledge about him led to activity in Cambridge, New Bedford, and Dartmouth; information was uncovered about the whereabouts of the two suspects since the time of the bombing and about their associates. This was monitored, but mostly not directed, by the command group at the Arsenal Mall – though resources were sometimes dispatched from Watertown to follow these leads (in part because a very large fraction of all available police resources in eastern Massachusetts [and in some cases from even further afield] had gathered in Watertown).

Other matters also arose during the day that required attention from or release of resources controlled by the command group assembled in Watertown. Following leads developed from new intelligence flowing from the identification of the suspects, tactical teams were deployed to New Bedford, Massachusetts and to Dartmouth, Massachusetts to pursue evidence or associates that might be connected to the bombings.

In several cases, this involved the release of tactical teams that had been assembled in Watertown. The *command-level* cooperation in the deployment of these operations appears to have been smooth and effective. For example, tactical teams that had assembled in Watertown were redeployed, using Blackhawk helicopters provided by National Guard, to both New Bedford and Dartmouth. *Tactical* coordination, however, was not always so strong. At one point during the day, when the possibility that Tsarnaev had gone to his college campus at the University of Massachusetts, Dartmouth, two tactical teams were to be deployed to Dartmouth, from *different* agencies, using National Guard helicopters. In the execution, two tactical teams from the *same* agency got to the two Blackhawk helicopters first, and left the team from the other agency on the ground in Watertown. This was eventually resolved through procurement of another Blackhawk from the National Guard -- but not without some hard feelings on the part of the agency left temporarily grounded -- and resulted in more tactical teams than were probably needed in Dartmouth.

As the sites of law enforcement activity came to be scattered over a wide area, which, at times on Friday, constituted a large area of eastern Massachusetts, senior-level cooperation among the agencies remained generally strong. But this did not always translate into smooth tactical coordination at these operational sites among people from different agencies. While there were many instances of cooperation, there were also many instances in which it seems that cooperation could have been better. As an example, there was no systematic plan for sustaining the operation and supplying relief. Many of the tactical teams at this point had been involved in the searching for upwards of 15 hours.

As Friday afternoon wore on with no sign of the missing suspect, the command group realized that Watertown, Cambridge, Waltham, Newton, Belmont, and Boston could not be kept in lockdown indefinitely, and that at some point the "shelter in place" request would have to be lifted even if the suspect had not been located.[17] Accordingly, a press conference was assembled at about 5:30 pm on Friday evening, in which the governor announced that the "sheltering in place" had been useful, allowing the best possible chance of locating the suspect, but in spite of excellent efforts on the part of all concerned, the search had not resulted in capture of the second assailant. The "shelter in place" request, he went on, was now lifted; people and businesses could return to their normal activities. One tactical team was still finishing the search of its assigned area of the grid, but for the most part groups and teams assembled in Watertown began to demobilize and organize for departure.

Within minutes of the lifting of the shelter in place request, a resident on Franklin Street in Watertown, released from his home and entering his backyard to "get some air," went to fix the loose cover on the boat he had behind his house. During his day of confinement, he had noticed it had been disturbed (he thought, by recent high winds). On his first visit to the boat, he investigated, and set things right without detecting the presence of a person in the boat. It was when he returned to the boat a second time, a few minutes later, and lifted the cover, that he saw a person (or body) inside. He then called 911 and reported to the Watertown dispatcher what he had seen.

Almost immediately, a senior police officer was on the scene, establishing incident command and requesting "a tactical team" for support. He got much more than he asked for. Calls about this new circumstance went out over a broadly-monitored radio channel, and a very large number of police officers moved toward the dispatched address, resulting in a confused scene in which some officers appear to have been in the line of fire of others. Since many of the officers present were not familiar with the layout of streets in that area of Watertown, many were unaware of the dangers that were being created. The arriving tactical team was deployed by the incident commander, and a perimeter around the area was formed from other responding officers, but tactical command over the situation was incomplete, with many different organizations represented and less than universal recognition of the authority of the incident commander. Implicitly, some officers seemed ready to accept orders only from someone else in their own hierarchy. This might have worked if the commanders in their group had recognized and subordinated themselves to the incident commander, but those commanders were not always immediately available or present. While there was a good deal of cooperation and coordination among some officers, there was also at least one incident in which direct orders from a senior officer in one agency who was part of the incident command structure were ignored by a group of officers from another agency.

With multiple agencies – and multiple tactical teams – at the scene, some collisions over which group or agency was supposed to be holding which positions were perhaps inevitable. As an example, one regional SWAT team member, arriving on a rooftop to which he had been deployed, found a member of another SWAT team already in position there, and was told that "this is a [agency name] operation," and that he

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[17] As one indication of the intense interest in the use of "shelter in place" as a device, on Friday afternoon Governor Patrick received a phone call from President Obama inquiring about how long the lockdown would continue.

was not needed. "I'm a Watertown police officer," said the more recent arrival, "and I'm not leaving." (Both stayed.)

In addition to police officers, a large number of media representatives converged on the Franklin Street location, which had been revealed over police channels. In the aftermath of the lifting of the "siege," there were no apparent regulations in place about where media could now go – and so, indeed, they went. Eventually, many police officers drawn to the scene turned out to be managing the many reporters and camera people who also arrived on scene.

When the suspect tried to lift the boat cover, apparently using a fishing gaff he found in the boat which, from outside the boat, resembled a rifle, a tactical team member who had been stationed on a rooftop overlooking the boat fired upon him. This resulted in the outbreak of a substantial volume of contagious fire from other police officers on the scene. In tapes of this incident, the voice of the incident commander shouting orders to cease fire is prominent, but the firing went on for over 10 seconds, and involved what appears to have been hundreds of rounds fired. There is at the time of this writing no indication that the suspect in the boat had a weapon or fired upon police.

Eventually – indeed, fairly quickly – the response around the boat became better organized. Under the direction of the incident commander, the perimeter was secured, and officers were moved out of one another's line of fire. The FBI's Hostage Rescue Team (HRT), a highly trained group combining tactical elements and skilled negotiators, was deployed to the scene; and the head of the HRT coordinated effectively and cooperatively with the incident commander about next steps. Responders were conscious of the fact that the suspect might be armed with either firearms or explosives or both, and might be wearing a suicide vest. Infra-red cameras from an overhead State Police helicopter provided useful intelligence about the location and degree of movement of the person in the boat underneath the boat cover, but also created noise that made it difficult to coordinate at the scene.

A robot was used to remove the tarp covering the boat to provide a better view of the person inside. Eventually, the HRT decided to use concussive explosive devices ("flash-bangs") to stun the suspect in the hope that he would then surrender and could be safely apprehended. This effort was successful. The suspect emerged, obviously weak and unresisting, and was taken into custody about 8.45 pm. While the FBI's HRT was in charge of the negotiations and process of extraction of the suspect, various other agencies were present at the scene, and people from a number of different agencies appear to have taken part in the final rush forward to take the suspect into custody.[18] The suspect was transported to a Boston trauma center for medical treatment.

A press conference was held in Watertown, beginning at 9:32 pm, to announce that the second suspect was in custody.

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[18] *Tactical* squads present at this event appear to have included teams from the Boston Police Department, Massachusetts State Police, the FBI's Hostage Rescue Team, the regional Northeast Massachusetts Law Enforcement Council, the Massachusetts Bay Transportation Authority, and the Bureau of Alcohol, Tobacco, and Firearms. This represented both a great deal of tactical firepower – and a significant coordination challenge.

Section Three

What were the strengths (and weaknesses) of the response
– and what were the antecedents and conditions that caused them?

"If it doesn't go bad, we don't correct it."

Taken together, the elements of the response to these events – by law enforcement, emergency medical services, fire fighters, military personnel, officials and employees in other agencies, hospital managers and medical staff, volunteers, bystanders, and members of the community at large – were much of what people meant when they referred to "Boston Strong." Much during the response worked very well, and a great deal of that was the result of extensive and careful planning, years of investments and training, structure, skill- and relationship- and trust-building (together with some good fortune). Indeed, the strength actually went well beyond Boston, with a great deal of help drawn from the greater Boston metropolitan area, and a considerable amount from outside the region.

Strengths in the Response to the Marathon Bombing

Given the characteristics and implications of the environment flowing from the bombing, the strengths shown by the response in Boston were quite dramatic.

Emergency Medical Response

- Rapid, effective response by survivors, bystanders, and many types of professional responders to help the blast survivors
- Rapid, effective mobilization of trained personnel from the marathon's medical tents
- Effective on-scene triage and identification of which victims needed transport most urgently
- Rapid, effective mobilization 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 centers
- 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 each 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 (e.g., use of police cars to transport blast survivors once available ambulances had been fully utilized)
- Rapid securing of the blast area – including stopping 5,000 runners and evacuating thousands of bystanders on the street and in establishments in the 13-block area

- Rapid ground-up and top-down establishment of central coordination/command
- Delegation from central command to subordinate structures for tactical operations
- Rapid mobilization of a sweep of the area for additional explosive devices by Explosive Ordnance Disposal (EOD) teams
- Rapid mobilization of investigative work
    - Securing the crime scene
    - Obtaining public and private surveillance video
    - Searching for evidence to identify methods and perpetrator(s)
    - Requesting information (especially photos and video) from the public to aid the investigation
    - Mobilization 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 request to shelter in place

Antecedents to success in emergency response, the criminal investigation, and pursuit of the perpetrators

In addition to the years of training, joint exercises, and comprehensive planning, what made possible the strengths that were evident in the response?

Effectiveness at the finish line (emergency medical and law enforcement), in the trauma center EDs, in the criminal investigation, and in the apprehension of the perpetrators was a result of extensive prior planning and a product of both **centralized** and **decentralized** action in the moment of the crisis.

Decentralized 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 centralized direction.
- People in the trauma centers receiving patients had the requisite skills, equipment, and facilities, so that they could and did act swiftly without needing much direction or additional organization.

- Individual subordinate leaders across many disciplines (e.g., police, fire, EMS) demonstrated effective personal leadership in organizing and directing small-scale operations with little need for direction by central commanders.
- Submission of video and photographic evidence by members of the public.
- Professionalism and courtesy displayed by tactical units and other law enforcement officers to neighborhood residents in Watertown during the "shelter in place" request on Friday, April 19
- Cooperation by the public in the "shelter in place" request on Friday, April 19.

What made this possible? Training, practice, experience and, in the moment, near-selfless behavior 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 in spite of 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 (e.g., use and availability of tourniquets) and willingness to stay and help (at considerable 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 showed enormous generosity in donating their time to help – for example, Lenox Hotel staff volunteered for days. The public also responded with great cooperation 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 demonstrated self-conscious, disciplined self-management -- supported by their years of training and experience, as well as by mental access to 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 organize and direct," and, "I thought about historical leaders and what they had done, and I realized 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 emphasized 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.

Centralized actions in the moment

While tactical leaders displayed considerable initiative at the scene and in hospitals, top leaders of many organizations and jurisdictions were creating a structure for command and coordination at the strategic/policy level. As described earlier, 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, 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 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 organizations.

Another form of centralized 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 investigation was also effectively achieved in the criminal investigation – both for evidence processing at 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 centralized basis.

Centralized 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 organized in the Boston area each year. These included "routine" events (e.g., regular season games of the city's professional teams), as well as annual events that attracted large crowds (e.g., the Boston Marathon, First Night celebrations on New Year's eve, July 4th concerts on Boston's esplanade along the Charles River), and major episodic events (e.g., 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 trust, respect for the competence of their peers and their agencies, and understanding of complementary capabilities across their respective

professional disciplines (e.g., law enforcement, fire service, emergency medical, public health, and hospital-based emergency medicine); they also developed understanding of how best to coordinate and collaborate across agencies.

Summary: Enabling "Boston Strong"

Boston Strong was not a chance result. It was, instead, the product of years of investment of time and hard work by people across multiple jurisdictions, levels of government, agencies, and organizations to allow command-level coordination and effective cooperation among agencies. Great effort had been expended in professional training, experience, discipline, and leadership development within the individual organizations and disciplines involved in the event. More specifically, over a considerable period of time the area had invested in training of and mass-casualty practice drills for trauma doctors, nurses, EMTs, firefighters, and others. The area also had rich resources for such an emergency – not least the extraordinary availability of Level 1 trauma capacity at eight centers (including three specifically for children). In the moment of crisis, moreover, Boston received willing and generous cooperation from the larger public.

In addition, Boston Strong was the product of some good fortune within an otherwise terrible set of circumstances:

- The bomb blasts occurred very near medical tents staffed by hundreds of medical personnel, but not close enough to damage the medical capacity itself.
- They had relatively low-energy explosive material and less-lethal (round) shrapnel.
- The bombs produced mainly lower-extremity injuries.
- A shift change was underway at area hospitals, generating extra capacity in EDs as patients arrived.
- Marathon day is a state holiday in Massachusetts (Patriots Day, commemorating the battles of Lexington and Concord in the American Revolution), so traffic is generally light and elective surgeries are not scheduled, leaving empty operating rooms at area hospitals.
- In spite of the fact that the terrorists murdered an MIT police officer in an apparent attempt to secure his service weapon, they were apparently unable to obtain additional firearms and, between the two of them, appear to have been armed with only one 9mm semi-automatic handgun.
- The person the terrorists car-jacked in an apparent attempt to secure an escape vehicle had the presence of mind and the determination to escape and notify police, allowing them to locate and track the vehicle.

Areas for Improvement in the Response to the Bombing

Inevitably, in a complex, chaotic, highly uncertain event, weaknesses appeared in the handling of the response. The purpose of the discussion here is to focus on structural and procedural elements of the

response apparatus that resulted in persistent and remediable weaknesses -- and to suggest ways in which these weaknesses could be ameliorated.

Strategic command issues

Establishing and maintaining strategic oversight or "command" (i.e., defining and staying in the strategic lane, and avoiding being pulled back into the tactical lane): 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 examining options, and issuing instructions. In a highly confusing event, there is a tendency for everyone to be pulled into the immediate, demanding, crucially important, rapidly evolving tactical matters – in spite of the fact that he or she knows that it is even more 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. Recognizing 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 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 we are confronting 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.

In a major disaster or terrorist event, the response apparatus consists of people and agencies that exist to handle an ordinary flow of daily work (and, hopefully, to be ready to handle sudden important additional work, like the bombing event). Agencies that have well-designed processes and structures and people within them to handle this ordinary flow of work – much of it, appropriately, tactical in nature – are suddenly confronted by a large, novel piece of work with a greater mix of strategically important issues than the ordinary daily flow encompasses. The workload has suddenly gotten heavier at the strategic end of the distribution – but, to a first approximation, the same people have to handle this new work as the group that was (presumably optimized to be) dealing with the former, more tactical mix. This implies that, in effect, everyone in the organization needs to step up one notch in the strategic direction. A senior commander who is used to dealing with some strategy issues but also to resolving tactical issues is now needed

to focus more completely on the strategic issues, leaving the tactical issues principally to subordinates. His or her subordinates, who are used to handling the ordinary tactical issues but seeking guidance for the more important tactical issues and for the strategic issues that arise in their work, suddenly need to cope with more of the tactical issues, and probably some of the strategic issues, on their own.

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 recognize 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 with the size and complexity and duration of the marathon bombing, there will inevitably be a need for a substantial command facility near the locus of the event. Discussions will involve many people and many agencies and will go on for multiple hours and perhaps for days; sometimes, small groups will need to convene, while at other times a large group may need to be gathered. Some groups may form and work together for an extended period, but other groups may need to convene for a time and then dissolve as that work is finished and other work draws the participants in other directions. The command group will need to have space in which it can meet and not be in the midst of the larger crowd of people working on different aspects of the response. 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 also to screen entrants. For operational security, the work area must have a well-defined perimeter, but there is no simple way to describe which people from which agencies who say that they need to go inside should be admitted and who should be turned back. (Exercising judgment at the boundary is delicate, and a recipe for negative "my agency doesn't take instructions from your agency" interactions.)

Not infrequently, hotels seem natural places to establish the kinds of interactive spaces command structures need, and 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 organizing task groups, smaller rooms for command staff to meet in) and needed facilities and services. Even so, no space that is suddenly taken over for these purposes will be perfectly configured for the work that needs to be done and to accommodate the structure that is organized to undertake that work. 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.)

Some of what would be needed (for example, a fairly small room to which access could be controlled and in which the rapidly forming unified command structure could assemble and work, telephones, white boards, easel pads, power cords for phone charging) was easily predictable at the outset. One area in which further work might be useful would be to specify some of the general characteristics that would be desirable for a "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 given time, and much of it is wrong. (The military adage for this is that "the first report is always wrong.") The implication is that 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 organizations 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. For example, in a terrorist event, how do different organizations view the importance of (1) capture and subsequent successful prosecution of the perpetrators versus (2) improving safety of the community through successful interdiction and prevention of future events (even where this might reduce the opportunity for successful prosecution)? In most instances, these two goals will be aligned, and differential dedication to one or the other by different agencies will not cause conflict. But they may, at times, conflict. (For example, releasing the photographs of the terrorist suspects may lead them to flee or go to ground or be more wary, reducing the probability of capture and successful prosecution, but may also make it less likely that they will try to or be able to conduct another attack.) Conflicts among these values within a collection of organizations 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. And such conflicts may be part of the essence of true crisis events. 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.[19] 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. (Adding pain to anguish, for example, apparently because of an understandable mix-up of identification at the blast scene, the family of Krystle Campbell, who died almost immediately as a result of the blast, was initially informed that she was alive and would recover; reportedly, this error was only discovered hours later, when a member of her family was admitted to "her" hospital room to visit her, and instead found a stranger.) 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. This might require, among other things, a legislative change to the HIPAA regulations regarding release of information about the health status of patients injured in an attack – for example, a presumption that people who are unable to give consent would prefer that their families be informed of their location and condition. In addition, it may be useful to implement a central call in center for information that also serves investigation needs (similar to arrangements in the UK and Israel).

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 honor 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 continued rapidly to evolve during Tuesday, Wednesday, and Thursday, and with much of the official activity during that period naturally concentrating on the developing investigation (which necessarily and

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[19] No official we know would consider reporting for duty in events like these having had two stiff drinks in advance – but significant sleep deprivation has much the same debilitating effects. Arriving drunk would be seen as unconscionable; being sleep-deprived, by contrast, is often viewed as an honorable symbol of dedication and importance, a marker of having been heavily involved in the earlier events. Sleep is viewed as an unaffordable luxury. The cultural norm that sleep-deprivation is inevitable – and making this a badge of honor – is not a way to produce the best possible performance.

appropriately involves less transparency), combined official communication with the public (joint press conferences and press releases) decreased. While maintaining regular coordinated briefings and information release would have required significant additional effort by public officials, news and social media tended to fill the vacuum thus created in the absence of a continuing unified official presentation of information – and, while this generated some genuine information, it also resulted in a good deal of confusion and misinformation. 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/local 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 (e.g., when tactical teams were requested to deploy to Watertown in the early hours of Friday morning). Indeed, it seems likely that, with a few exceptions, nearly all who moved a significant distance from their duty stations for any considerable period of time did so with some degree of authorization from a dispatcher (as in "I'm responding to the 'officer down' report at …"). In their turn, agencies and dispatchers generally wanted to be supportive when help seemed to be needed, and also probably felt a (perhaps unstated) desire for their agency to be involved in what promised to be some of the most important law enforcement events in the region in recent years.

Whether or not they were nominally sanctioned by a dispatcher, however, in a number of episodes within the marathon events 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 centers 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 18th; 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 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. In some cases – as when police officers treated blast victims at the finish line – self-deployment and out-of-policy initiative were undoubtedly to good effect; in other cases, it created dangerous situations that had to be defused. (One later characterization of the Watertown boat episode was that when the call came over the radio that there was a man in a boat on Franklin Street, "every law enforcement official in North America started heading toward that boat.") 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.

Allegiance to mission: While we assume the intentions of all responders were first and foremost to be helpful, it appears that in the heat of the moment of responding, the desire to be more involved in an important event may have affected the behavior of some responders, particularly during the most dramatic moments in Watertown. It is essential that those engaged in responding to highly emotional and visible events primarily demonstrate fealty to getting the mission accomplished, even if that involves only an indirect, supporting role – whatever their desire to be personally involved in the event.

Micro-command: Self-deployment, together with a great desire to be present and involved in the events, created problems of establishing effective command in several episodes of this event. 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 recognize 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. When numerous people from different agencies arrive in darkness with adrenaline flowing at a confusing and rapidly-evolving situation, unaccompanied by their own supervisors or others from their agency, not knowing the other officers present (or even knowing which other organizations are represented at the scene), and anxious to be helpful and involved, the result can be chaos and endangerment.

The difficulty of establishing micro-command at various episodes within the marathon response looms as one of the most persistent and troubling weaknesses revealed by these events. In contrast to the formation of unified command at the strategic level – which was, after an initial period in which tactical issues tended to pull senior leaders down into the tactical fray, generally smooth and effective (but which had also been practiced multiple times before the event) – the establishment of definitive command in fluid situations among ground-level responders from multiple agencies was repeatedly problematic (for example, at the MIT shooting scene, at Laurel and Dexter streets; 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 business in the process of developing and successfully cascading the doctrine of unified command down to the lowest levels of tactical operation. What is well-demonstrated is the development and successful deployment of "macro-command" at the strategic level; what is also well-demonstrated is the *failure* of successful development and successful deployment of the corresponding "micro-command" process at the tactical small group level.

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. (The study team witnessed an example of this during our field work long after the event when groups from two jurisdictions happened to meet at one of the crime scenes at a time when we also were there.) Often, organizational rivalries (implicit or explicit) get in the way of mission performance; people sometimes behave as if establishing what they regard as the appropriate hierarchy among organizations is an important component of solving the problem, and seem to want to establish that "my badge means more than your badge." Better protocols – a ritualized process recognized by and participated in by both parties – for self-identification and introduction need to be developed and practiced.

Discipline, fire control, and training: Control over fields of fire and authorization to fire is another critical micro-command issue in any rapidly-evolving, high-stress event, and it is dramatically more complicated in a sudden team of people from multiple agencies where there is no shared history and where, as a consequence, command is likely to be more tenuous. "Contagion" can be a serious matter. In an urban setting in a US city fire discipline is essential to the safety of officers and bystanders.

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 authorization 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 practice "directed fire" in which the range supervisor calls out individual authorization to fire (so that officers become practiced in listening in some circumstances for authorization 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 nighttime 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 none 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 labor among the responders is important. We need structures in which the best of what each has to offer can be creatively and effectively integrated into the solution. There were some brilliant examples where this happened during this event but also some instances in which this process was less successful. Generally, external help is needed because a given jurisdiction does not have adequate capacity. The local jurisdiction does, however, generally possess the best "local knowledge" of the situation. For example, Watertown police officers responding to the Franklin Street boat scene had the local street map in their heads, and could readily assess the fields of fire from different locations and determine what the crossfire situations might be at a time that responders from no other agency would have been able to make that determination. Better processes for integrating, in the field, 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 organizations 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 practiced, and in which their actions fit and are supported by the legal and policy framework in which they are embedded. On most days, the procedures they have evolved are functional and effective. On extraordinarily bad days, however – days involving novel situations – these procedures may obstruct effective performance against the unusual conditions the organizations and their people face. Generally speaking, this suggests that greater discretion and judgment should be offered to officials operating in unusual circumstances.

For example, procedures generally specify that when a police officer who 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 April 19, 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. When it would make sense to pull officers off the line to preserve evidence about their involvement in the earlier chapters of the event is not immediately obvious – and 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.

Section Four

Priority Recommendations for Improving Future Responses

"We have time – but we don't know how <u>much</u> more time."

The preceding section discusses the sources of the strengths and weaknesses of the Boston Marathon response. It implicitly and explicitly outlines an array of recommendations about how those strengths can be further built and capitalized upon, in Boston and elsewhere. It also explores how the weaknesses can be avoided or mitigated. In this section, we provide what we regard as the top priority recommendations that flow from the events of the Boston Marathon bombing during the week of April 15, 2013.

We divide these recommendations into two parts, because we identified two wellsprings of strength in the Boston Marathon bombing events: first, in the responder community, and second, in the wider citizenry. The first set of recommendations therefore concerns the further enhancement of established procedures and doctrines to help *responders* to do their work even more effectively going forward. The second set concerns the further building of the culture and psychology of community strength and resilience to help the *community* play the most positive, effective, and powerful role that it can in future events.

Robust development, practice, exercise, and application of incident management: If there is one element in the response to the Boston Marathon bombings that in our view acted as a force multiplier for all of the others, it was the prior development of and in-the-moment application of incident management throughout the event. Any community that has not yet achieved a substantial development of its cross-agency, cross-jurisdictional incident command capabilities has not yet done its best work to prepare for future crisis events. Any community that has already developed such capabilities needs to continue to practice, exercise, and maintain high levels of preparedness. From this general recommendation flows a whole set of related priority activities and actions:

Use of "planned" or "fixed" events as a platform for practicing IMS and to handle emerging "no-notice" events

(1) Identify and use every significant fixed event (such as parades, conventions, sporting events, and Fourth of July celebrations) as an opportunity to conduct joint planning and coordinated action involving all relevant agencies and disciplines. Engagement in these recurrent processes are a way to build mutual respect across agencies and disciplines by giving them the opportunity to see their colleagues' professionalism and complementary skills and capabilities.

(2) Make sure that senior officials (and their top deputies) across agencies and disciplines have met one another and worked together – and take every reasonable opportunity for them to form personal relationships, while interacting in a positive and mutually-supportive setting.

(3) Use the incident management structure as an operational scheme to plan, manage, and operate any major fixed event – thus guaranteeing that the basic structure of IMS will already be present and in place in case a significant no-notice event arises in the context of the fixed event.

(4) Anticipate – in planning, in arranging the level of standby capacity available, and in observing the planned event as it unfolds – the possibility that there will arise a need to transition to a "war" footing to handle an emerging no-notice circumstance. To the extent possible, contemplate in advance what facilities in the general vicinity of the planned events might provide appropriate space in case an on-site command post needs to be established to manage an emerging event.

(5) Build – among political officials, senior operational commanders, and more junior operational leaders – recognition of the distinctions between (a) *strategic/political* issues (which need to be brought to the attention of and resolved by political leaders; (b) *tactical/operational* execution, planning, and logistical issues (which need to be managed through a unified command structure to provide coordination and enhance collaboration across agencies and disciplines, especially in long-duration events. This is especially challenging for senior operational commanders, who stand at the intersection, on the one hand, of requests from political officials for strategic guidance and, on the other, of requests from their operational subordinates for tactical decisions and guidance.

Handling emerging "no-notice" events with multiple agencies and disciplines represented

When a no-notice event emerges in the midst of a fixed event or arises outside the context of a planned and structured circumstance, the challenges of coordinating multiple agencies and disciplines will be particularly difficult. In such events, the following elements seem especially important:

(6) As quickly as feasible, specify a location at which senior commanders from responding agencies can gather and form a unified command.

(7) *Separately* specify a staging area at which responders should gather (and then await further instructions from command staff).

(8) At the tactical level, responding individuals should use protocols for forming "sudden teams" across agencies (The need for such teams arises when people from different agencies who do not know one another find themselves responding to the same event without an obvious or effective command structure in place.) Individuals who find themselves in such circumstances should cooperatively form a command structure and to the extent feasible and legally permitted should voluntarily subordinate themselves to the tactical command thus created.[20]

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[20] This final, tactical recommendation requires a further explanation. If recommendations 1, 2, and 3 have been assiduously followed in a given community, then the senior commanders of relevant agencies and disciplines will be familiar with one another, and likely experience a felt need to find one another and coalesce as a unified command.

Conscious and ongoing development of community resilience: In the face of the bombings, Boston showed strength, resilience, even defiance – and these were key drivers of the overall outcomes that is, of Boston Strong. We believe these strengths are latent in communities across the nation (and, indeed, the world). As was the case in Boston during the week of April 15, 2013, many people are at their very best during times of crisis and intense stress. This is the opposite of what is often predicted – a common expectation seems to be that people will be helpless when under duress and will stand passively by waiting for rescue. Intentionally building a public narrative of strength and resilience may help to nurture this underlying substrate of community toughness. Celebrating examples of community resilience – both local examples and from farther afield – may help to cultivate a culture of confidence and self-reliance.

For this, Boston Strong is a good starting point.

Line-level responders from different agencies do not necessarily experience a similar felt need to become part of a "commanded" group – rather, having arrived individually and without the benefit of the presence of their own command structure, they often feel authorized to act on individual initiative and sometimes resist attempts by those not in their command hierarchy to assert authority. Addressing this may require a significant evolution of doctrine concerning the formation of cross-organizational command at the tactical level – and will then require considerable training and practice to make it a reality. Nonetheless – if the early morning hours of April 19, 2013 in Watertown are any guide, development and implementation of such a doctrine should be a high priority.

Afterword

What is "Boston Strong?"

"This is our *#@!%$# city."[21]

"Boston Strong" is much more than a phrase or passing sentiment. It captures many different elements of what happened during and after the sad events of the week of April 15.

A part of Boston Strong is *pride* in the inspired work of those involved in responding to the event – the bystanders, the other runners, the Boston Athletic Association volunteers, the first responders, the medical staff at the finish line, the doctors and nurses and support staff in the hospitals, police from all responding agencies, fire, National Guard; in short, everyone who helped. From their dedicated, selfless work springs inspiration.

Another part of Boston Strong is an expression of *resilience* – that people, including those directly and indirectly injured, those involved in the response, and the community as a whole will come back, stronger than ever, going on with their lives and hopes and dreams.

And a part of Boston Strong is an expression of *unwillingness to be intimidated.* This is a forward-looking form of resilience – the community refuses to cower, to be deterred or diverted from its ongoing work and life and hopes and dreams.

Boston Strong is, thus, both about *response* and about *recovery*.

From our discussion with people involved in these events and with subject matter experts in the management of large scale responses and recoveries, there emerged two simple pictures that we found helpful in capturing some of what Boston Strong means.

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[21] David Ortiz ("Big Papi"), designated hitter for the Boston Red Sox, who is known for his exuberant and larger-than-life personality, made this comment at a ceremony held prior to the April 20, 2013 Red Sox/Royals baseball game at Fenway Park (which occurred less than 24 hours after the apprehension of Dzhokhar Tsarnaev in Watertown). Taking place at one of the country's iconic sports venues, the event paid tribute to the week's terrible tragedies – but also heavily emphasized the leadership and heroism exhibited by the region's public safety officials, first responders, medical personnel, political leaders, Marathon volunteers, and survivors of the bombings, all of whom were represented on the field. Following the ceremonial first pitch, Ortiz took the microphone and declared, "This jersey that we wear today – it doesn't say Red Sox. It says Boston. We want to thank you, Mayor Menino, Governor Patrick, [and] the whole police department, for the great job they did this past week. **This is our $#%$# city.** And nobody's going to dictate our freedom. Stay strong. Thank you!" Ortiz's words, which brought the ceremony to a powerful end, were widely rebroadcast, serving as a symbol of – and catalyst for – the resiliency of Greater Boston in the weeks and months following the bombings. Jon Paul Morosi, "Big Papi Speech Fitting for Moment," April 20, 2013, available at http://msn.foxsports.com/mlb/story/boston-red-sox-return-fenway-park-david-ortiz-big-papi-speech-marathon-tragedy-042013 [accessed March 24, 2014].
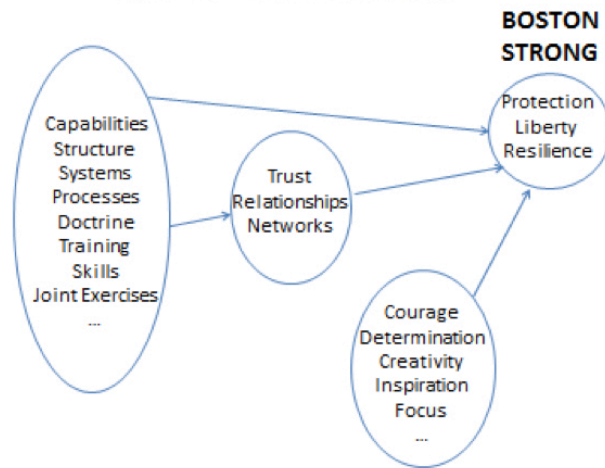
Figure A-1 shows one way of depicting relationships among some of the elements we have identified that contributed to Boston Strong. The formal response required carefully-developed antecedents: the capabilities, together with the structures, systems, and processes and the associated practice, training, and development of skills. These permitted the effective concentration and application of capabilities ranging from the medical system, to the law enforcement system, to the transportation system, and more general elements of the public safety system. These antecedents contributed directly to the outcome. They also contributed indirectly, through the development of the "infrastructure" – the trust, relationships and networks through which the different elements of the response were combined, coordinated, and turned into force multipliers of one another. Finally, the performance of individuals – based on their own courage, determination, focus, creativity, and inspiration – powered the response.

Figure A-1 concentrates principally on the conditions, forces, and relationships that were the antecedents to high performance by first responders. Throughout our research, however, all participants emphasized the importance of wider circles of people who contributed to making the response more effective and the outcome successful.

Figure A-2 therefore shows the work of first responders as embedded in a series of concentric circles of communities of response. At the center were the trained professionals whose vocation it is to help the wider community in moments of need. Literally surrounding them (at the finish line and elsewhere) were thousands of trained volunteers who brought their own skills and determination to the fight. These were backed in turn by bystanders who defied fear and plunged in to do what they could. And the community as a whole, over the next few days and the following months of recovery, showed itself a great reservoir of strength and resilience.

Boston Strong is one part preparation, one part response, one part resilience, one part defiance – and, together, it is far more than the sum of its individual parts.

Figure A-1: Elements of "Boston Strong"

BOSTON STRONG

Capabilities
Structure
Systems
Processes
Doctrine
Training
Skills
Joint Exercises
...

Trust
Relationships
Networks

Protection
Liberty
Resilience

Courage
Determination
Creativity
Inspiration
Focus
...

Note: As indicated by the ellipses in the circles above, this figure is suggestive and is by no means intended to offer an exhaustive or all-encompassing representation of the many factors that make Boston Strong.

Figure A-2: Boston Strong: Communities of Resilience

First Responders

Trained Volunteers

Bystanders

Community as a Whole

Appendix

Genesis and Basis of this Research

This research is principally based on detailed personal interviews with a wide range of command-level participants from the many organizations involved in the marathon bombing events. These include the incident commanders and a number of other participants in unified commands in most of the sub-events at which command posts were established. We are deeply grateful for the candor of the people whom we interviewed about their experiences. All were enormously generous with their time, and we learned a great deal.

These interviews were recorded but conducted on a not-for-attribution basis – that is, on terms that allowed us to use quotations and information without direct attribution but with general characterizations of the interviewee (for example, "a senior law enforcement official from a local agency").

In addition to the interviews that provided our primary data, we drew extensively on media reports (mainly to understand the state of media and public understanding and reaction to the events, rather than for data about the actual events themselves). We also drew on our experience with many other emergency events to inform our understanding, particularly of how command processes work.

After conducting our interviews and writing the first draft of this report, we convened a private conference, attended by most of those we had interviewed, for the purpose of reviewing our factual descriptions, our interpretations, our then-tentative conclusions, and our early proposed recommendations. This discussion provided a number of corrections and significantly enhanced confidence in the accuracy of our presentation and the salience of our interpretations and conclusions.

Subsequent to our private conference, we produced a corrected and enhance draft, and we then asked two senior officials each of whom was intimately involved in the events of the week to do a careful, line-by-line reading of the draft paper. This produced a small number of additional corrections and amendments.

Finally, we convened an intensive day-long "expert dialogue" at the John F. Kennedy School of Government at Harvard University in March 2014. The dialogue was attended by about 100 people. These included many of those we had interviewed and others directly involved in the marathon bombing events, about 20 others from around the US, and about 20 more from other countries -- all of whom have expertise in the design and management of security for major events of various kinds. We also hosted scholars of emergency management from the US and abroad. Over the course of a long day of focused discussions, we collectively re-examined the main events of the week of April 15, 2013, concentrating on the development of recommendations for further improvement here and elsewhere in future events.

All of these stages of development and review assisted us greatly in our research. We emerged from this process more confident in the accuracy of our descriptions and with the benefit of a wide range of experience and expert advice informing our interpretations and conclusions. We are deeply grateful for

the extensive help we have had from so many in carrying out this work. Any errors that remain were always and still are our own.

Exhibit 1

Map Indicating Locations of Events of April 18-19, 2013
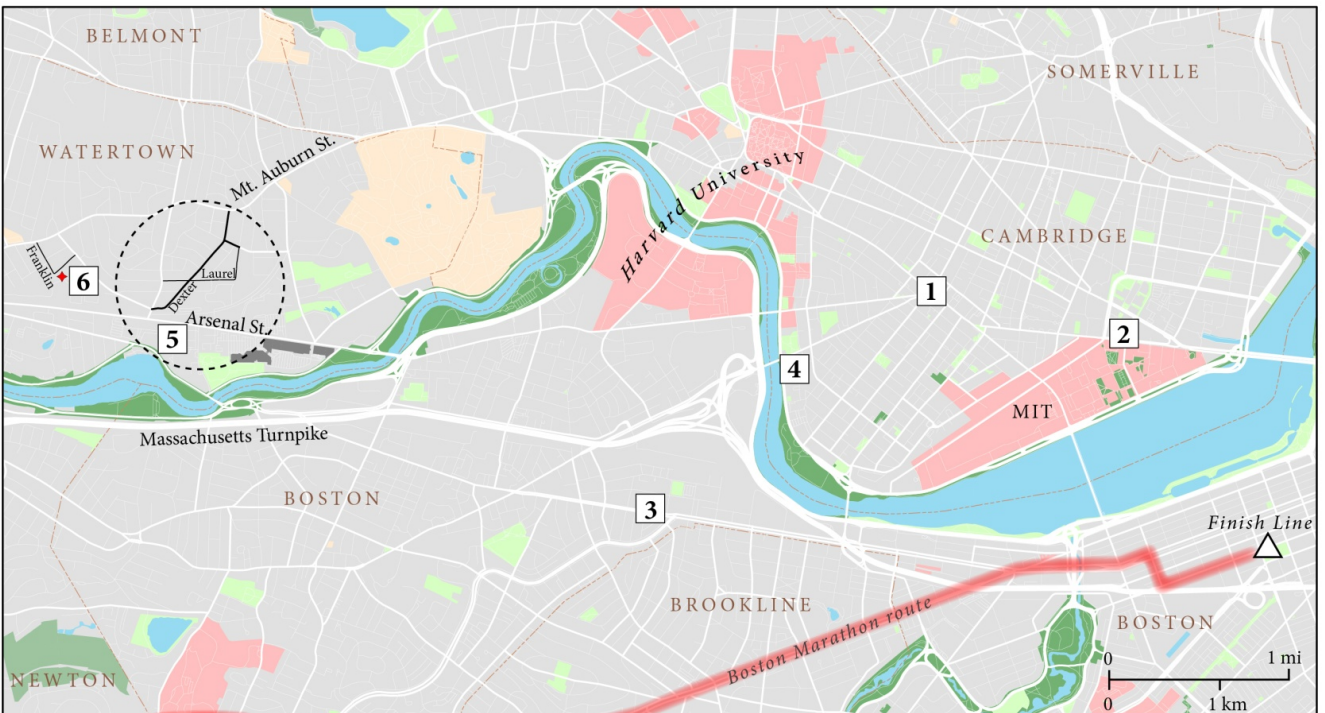
1	7-11 store robbery in Central Square	5	General area of shoot-out and search for Dzhokhar Tsarnaev
2	MIT Police officer shot and killed	6	Dzhokhar Tsarnaev captured
3	Mercedes SUV carjacked by suspects		
4	SUV owner escapes from the suspects		

Note: The boxed numbers indicate the approximate location of the series of events that began late Thursday, April 18, 2013; continued into Friday, April 19; and then culminated in the evening of the 19th with Dzhokhar Tsarnaev's capture on Franklin Street in Watertown (the dotted circle represents the approximate area in Watertown of the shootout and subsequent search for Tsarnaev).

Source: Scott Walker, Harvard Map Collection, using Open Street Map data.