6

Preparing for hell or high fever to come

Between 1970 and 2014, natural disasters accounted for more than 2 million deaths in the Asia-Pacific, 57 percent of the global total. [Former US Pacific Command commander] Admiral Locklear routinely told his subordinate commanders, 'While you're here you may not have a conflict with another military, but you will have a natural disaster that you have to either assist in or be prepared to manage the consequences on the other side.'[1]

—Timothy McGeehan, 'A war plan orange for climate change'

[Los Angeles was] prepared for the [1994 Northridge] earthquake because we had just gone through a similar disaster (i.e., the 1992 riots) where we had a similar result where we had entire blocks of properties destroyed. So, we had a kind of blueprint on the shelves that we could turn to in our disaster plan … We had a lot of … emergency ordinances after the riots that we just kind of took off the shelf real quick, changed a few little items, and threw it back into the books in response to the earthquake. We waived permitting fees. We waived a lot of requirements to get buildings built again.[2]

—Aseem Inam, *Planning for the Unplanned*

1 Timothy McGeehan, 'A war plan orange for climate change', *Proceedings* 143(10) (October 2017): 48–53, [Annapolis, MD: US Naval Institute], available from: www.usni.org/magazines/proceedings/2017/october/war-plan-orange-climate-change.

2 Inam, *Planning for the Unplanned*, 182.

> I came away with the firm belief that America's medical infrastructure remains extremely vulnerable to natural hazards, and there is an urgent need for disaster planners to involve the larger community in deciding how resources are allocated.[3]
>
> —Sheri Fink, 'Beyond hurricane heroics'

This and the following two chapters turn to history and draw on the hypothetical to offer observations hopefully of value to those responsible for preparing for, responding to or recovering from future urban catastrophes. With the occasional exception, each chapter looks for ways to overcome challenges and seize opportunities by considering the:

- *context* for the disasters drawn on
- wisdom of viewing operations from a *collective* or systems perspective given megacities' extraordinary internal connections and broader interconnections
- importance and ways of maintaining *control* during crises
- need for an effective *comprehensive approach* that includes all relevant parties
- special issues brought about when *combat* underlies a megacity's suffering
- considerations key to maintaining or restoring *capacity*.

Pre-disaster context: The case of Mumbai in 2008

> Chicago pioneered the use of steel and electricity in the construction industry, catalyzed by the great fire of 1871 which destroyed the city's commercial center and literally cleared the way for innovative building techniques to be applied. By the 1890s, Chicago was the world capital of the skyscraper, with New York a close second.[4]
>
> —Manuel De Landa, *A Thousand Years of Nonlinear History*

3 Sheri Fink, 'Beyond hurricane heroics: What Sandy should teach us all about preparedness', *Stanford Medicine*, Special Report (Summer 2013), available from: sm.stanford.edu/archive/stanmed/2013summer/article5.html.

4 De Landa, *A Thousand Years of Nonlinear History*, 92.

> TEPCO [Tokyo Electric Power Company Holdings] and the Nuclear and Industrial Safety Agency (NISA) were aware of the need for structural reinforcement in order to conform to new guidelines, but rather than demanding their implementation, NISA stated that action should be taken autonomously by the operator. The Commission has discovered that no part of the required reinforcements had been implemented on [Fukushima Daiichi] Units 1 through 3 by the time of the accident. This was the result of tacit consent by NISA for a significant delay by the operators in completing the reinforcement. In addition, although NISA and the operators were aware of the risk of core damage from tsunami, no regulations were created, nor did TEPCO take any protective steps against such an occurrence … If NISA had passed on to TEPCO measures that were included in the B.5.b subsection of the US security order that followed the 9/11 terrorist action, and if TEPCO had put the measures in place, the accident may have been preventable.[5]
>
> —National Diet of Japan, *The Official Report of the Fukushima Nuclear Accident Independent Investigation Commission*

Hearing gunfire, eight police officers arrived at the Taj Mahal Palace and Tower Hotel (the Taj) just before midnight. They found they were significantly outgunned by terrorists working their way through the massive structure, killing any guests and staff they found. The officers' plastic-lined riot vests could stop a hand-thrown rock but not much more. The assassins weren't throwing rocks. They hunted with automatic weapons, grenades and bombs. The police's vintage .303 bolt-action rifles with only a few rounds of ammunition and their wooden sticks known as *lathis* would have been laughable in comparison with the AK-47 rifles carried by the Lashkar-e-Taiba members were the situation not so tragic. Those in the next level of response, the emergency response police, were little better off. So, the eight men representing law enforcement in India's most populous city backed off to await better-equipped and better-trained commando forces.

The two—later four—terrorists in the Taj were not alone. Companions elsewhere struck the Chhatrapati Shivaji Terminus (CST) railway station. More than 50 people died at the hands of that pair of perpetrators while police—poorly trained in how to use their inadequate weapons—ran

5 National Diet of Japan, *The Official Report of the Fukushima Nuclear Accident Independent Investigation Commission*, 16.

from the danger.[6] Law enforcement failure would be the order of the day as the terror dragged on, the perpetrators shocked by how little resistance the so-called public defenders offered. Police only four blocks from a besieged maternity hospital chose to remain in their headquarters. The 2008 siege at the Taj began on a Wednesday. It would not end until the following Saturday. Across the city, some 174 innocents and security force personnel died. Another 300 were wounded. The terrorists numbered 10.[7]

It need not have been this way. Or, at least, it need not have been the tragedy it was. Retrospect is a wonderful perspective, knowing now what those then did not. But that should not forgive the lack of preparedness—a preparedness that would have saved lives and spared others of their wounds. Officials received warnings before the attacks—more than 25 of them. Some came from sources such as the US Central Intelligence Agency.[8] Nor was Mumbai virgin terrain when it came to such criminality. The city had previously experienced 12 prominent acts of terrorism that tallied more than 500 dead and nearly four times that number injured. It had taken less than 11 minutes for 181 people to die in the bombing of seven of the megacity's trains a little over two years earlier. Responses to the scattered attacks that hit the Taj, another hotel, a café, a Jewish centre, the train station, a hospital and several other targets could have benefited from the lessons of these previous events had officials been willing to learn and act—lessons complemented by others from earlier strikes elsewhere such as in London on 7 July 2007. Looking over our shoulder with a critical eye is therefore not without justification. That retrospective offers a striking number of 'what ifs' valuable in terms of preparing for and reacting to future megacity disasters, orchestrating response capabilities, practising mission command, understanding the (sometimes bizarre) behaviour of noncombatants and managing information during a crisis. The Taj Mahal Palace Hotel will be the primary focus from which to draw questions and insights.

6 Sources differ regarding the number of casualties suffered during the 2008 attacks in terms of both individual locations and total. Those used here draw on what are thought to be particularly well-researched sources.

7 Shanthie Mariet D'Souza, 'Mumbai Terrorist Attacks of 2008', *Encyclopedia Britannica*, [Online], n.d., available from: www.britannica.com/event/Mumbai-terrorist-attacks-of-2008.

8 Material in the remainder of this discussion is from the following unless cited otherwise: Cathy Scott-Clark and Adrian Levy, *The Siege: 68 Hours Inside the Taj Hotel*, New York, NY: Penguin, 2013.

The lack of preparation, including of both plans and rehearsals, was evident in the opening minutes of the strikes. Efforts to keep the unknown number of assailants out of the Taj included locking virtually all street entrances to the building. These were, of course, also exits, meaning the effort to deny access trapped hundreds of guests and staff within the building. (The closures failed. Two of those who had first slaughtered diners in the Leopold Café later forced their way into the hotel.) Some threw tables or chairs against lower-floor windows in an effort to get out of the building only to find they bounced off the toughened glass that was designed to reduce injuries should a bomb go off outside the building. Twenty-five minutes after the attacks began, people were still trying to get *into* the Taj, fleeing from gunfire and explosions elsewhere in the vicinity. There was as yet no organised police response or effort to communicate with or control the frantic citizenry.

Confusion would have been inevitable. It was made all the worse by the tactics of the 10 terrorists deliberately seeking that end. Rifle, grenade and bomb attacks struck 13 different locations within two hours during the late evening of 26 November 2008.[9] A taxi was destroyed 5 kilometres north of the Taj, killing the driver and passenger while injuring 19 others nearby. Other bombs were placed at various locations and in vehicles to spread further panic. The police commissioner could not be located. The law enforcement response was either non-existent or scattered in the meantime. When the commissioner did show up, he was concerned more with bureaucratic procedure than decisive action. Further complicating the reaction: the force best equipped to take on the terrorists' weaponry was the National Security Guard (NSG), which was hours away in the capital of New Delhi and requests for help from the military were the responsibility of Maharashtra State (of which Mumbai is the capital), not city authorities. That force waited as Maharashtra State officials refused to admit their own capabilities were overwhelmed. India's central government, the Maharashtra Government and city authorities further delayed effective response by arguing with one another before finally agreeing on how to deploy NSG forces when the state finally asked for assistance. The worst of the slaughter would be over well before they finally arrived.[10] Another specially trained force was stationed within Mumbai:

9 Angel Rabasa, Robert D. Blackwill, Peter Chalk, Kim Cragin, C. Christine Fair, Brian A. Jackson, Brian Michael Jenkins, Seth G. Jones, Nathaniel Shestak and Ashley J. Tellis, *The lessons of Mumbai*, Occasional Paper 249, Santa Monica, CA: RAND Corporation, 2009, 23, available from: www.rand.org/content/dam/rand/pubs/occasional_papers/2009/RAND_OP249.pdf.

10 Boo, *Behind the Beautiful Forevers*, 216–17.

India's Marine Commandos (MARCOS). Akin to US Navy SEALs, their training, it was felt, did not properly prepare them for operating in the city. Again, state authorities refused to request their help.

There was the occasional police officer who had the courage to enter the Taj. One was Vishwas Patil, Mumbai's deputy commander of police for Zone 1, the part of the city containing most of its tourist attractions and major hotels. Patil realised at one point that all four terrorists were in a single room of the building, thereby providing an opportunity to at least isolate if not destroy the threat. Monitoring the situation from the structure's closed-circuit television room, he called for action by the police force's assault teams. Never having rehearsed, exercised in or walked through the massive complex, those teams either could not find their way or simply chose not to respond. The gunmen soon resumed their prowling, operating in pairs, knocking on doors, declaring themselves providers of room service and killing anyone who answered.

The failure to prepare was crippling operations outside the hotel as well. Having determined the mobile phone number used by those managing the attackers from Pakistan, requests to tap the conversations were held up as the only individual who could provide the required written authorisation was trapped within the Taj. Such obstacles were eventually breached only after additional killings and the terrorists set the hotel on fire. MARCOS leaders were finally called into the fight—but only in numbers that totalled less than 20 from a force of more than 1,000. They showed up without helmets or protective vests after travelling from their base less than 2 kilometres from the Taj. They, too, were unfamiliar with the building. Requests for blueprints went unanswered.

Trapped guests included members of India's parliament and influential foreigners. Most conducted themselves as would be expected. They were scared, sought shelter to hide, accepted guidance from employees familiar with the building and remained concealed while awaiting a chance to escape. Many hunkered down in locations the terrorists never realised held more than 100 people. The behaviour of others defied logic. Crouched undetected and silent among many hiding in a restaurant, one held up a camera and took a flash picture as a terrorist walked by in an adjacent hallway. A high-ranking public figure elsewhere spoke on his phone, apparently giving an interview to a television reporter. 'We are in a special part of the hotel on the first floor call the Chambers,' he said. 'There are more than 200 important people: business leaders and foreigners.'

Fortunately, it seems the terrorists and their managers in Pakistan were not tuned into the interview at the time though the latter were monitoring the situation on television.

Hotel staff and guests reassured and assisted one another. In one restaurant, they collectively chose leaders and guides to help them when the time came to attempt an escape. Outside, it was the person on the street who at times stepped forward. Hotel chef Nitin Minocha managed to escape when his group chose to risk running from where they had sheltered for hours. He was wounded by gunfire but managed to get on to the street, where he bandaged his bleeding arm with a piece of cloth. Two riders on a motorbike stopped on seeing him covered in blood. They let Minocha use a phone to notify a relative he was alive, then wedged him between them so he wouldn't topple from the vehicle on the way to hospital. Elsewhere, hotel staff member Amit Peshave took it on himself to remain at a hospital where he found the situation one of chaos. He lobbied for care as injured colleagues arrived, recording their names and the ward to which they were transferred. Without a champion, he feared, those with whom he worked would be ignored or forced to wait while others pushed themselves to the front for treatment.

Security forces eventually killed nine of the 10 terrorists. The tenth was arrested. NSG personnel—the 'Black Cats'—finally overcame officials' hesitation and tore free of bureaucratic red tape to make their way from Delhi to the Taj. There, with the four gunmen trapped, they fabricated two explosive devices, hurling them into the large room and killing all. It had been nearly 58 hours since the first two terrorists' entry into the hotel.

The steps taken by Mumbai and Maharashtra State to improve readiness following what came to be known as '26/11' are a mixed bag.[11] Officials quickly seized on the apparent fix of buying better equipment. They made it known that police and other security forces would receive M4 carbines, sniper rifles, armoured vehicles, speedboats and more, some of which added to preparedness while other purchases seemed based more on their 'cool factor' than legitimate value. Mumbai enhanced its Quick Response Team numbers and upgraded both its training and its equipment. The state government formed a new Force One commando element.

11 Details in this concluding paragraph draw on Rhys Machold, 'Militarising Mumbai? The "politics of response"', *Contexto Internacional* 39(03) (September–December 2017): 477–98, doi.org/10.1590/s0102-8529.2017390300002.

The federal government installed an NSG team near the megacity. Less promising was the fact the number of personal protective vests purchased fell short of needs. Expensive M82 .50 calibre antimaterial rifles joined the inventory despite there being no local firing ranges able to support the weapon's maximum range. Perhaps most disturbing was a statement by the head of the Maharashtra Anti-Terror Squad (ATS) that a 'constable does not fight terrorism. We have NSG and Force One to fight terrorism'—a grievous failure to recognise that the cop on the street is a primary source of intelligence, the first echelon who (given sufficient training and commitment) can convert information into actionable form and get it to where it needs to go. Even taken out of context (the ATS chief later said the beat constable 'is the first line of defence, but not the ultimate line'), the remark fails to recognise the essentiality of emphasising how important the police officer, firefighter, city engineer, restaurant inspector and any other official is in preventing acts of terrorism and otherwise acting to protect a megacity's population. This assumes those officials are sufficiently professional to care about that population. When the situation is one in which 'the police continue to be capable of immense repression', as was the evaluation of one writer well after the 2008 attacks, little should be expected from law enforcement or the residents whose help could increase the number of information sources millions of times over.

'What ifs?'

> The largest uncertainly in this system is humans.[12]
>
> —Dr Andrea Dutton, University of Florida

> Lack of control, caused by decentralization of command, lack of observation for the commander, and the difficulty of maintaining communications, is perhaps the most perplexing problem of the commander … Command and control must be decentralized in view of the possibility that communications might fail at the most critical moment.[13]
>
> —Charles J. Canella, *The defense of small towns and villages by infantry*

12 Quoted in Mario Alejandro Ariza, *Disposable City: Miami's Future on the Shores of Climate Catastrophe*, New York, NY: Bold Type, 2020, 34.

13 Charles J. Canella, *The defense of small towns and villages by infantry*, US Army Advanced Infantry Officers Course 1948–1949 Paper, Fort Benning, GA, n.d., 24.

How many innocents would have survived had Mumbai's police rehearsed their response for an attack on their city? It was certainly a logical step after its recent history of terrorism. Well-run exercises would presumably have seen calls for access to blueprints of public and private structures, walk-throughs to familiarise security forces with major buildings and correction of flaws in policies and procedures that proved crippling in 2008. Responsibilities for building familiarisation could have been divided between various law enforcement, local military, fire and other officials with the understanding that each could call on the other when necessary. A common repository of this and other critical information on a limited-access intranet would have put floorplans at the fingertips of organisations with legitimate call for use. Rehearsals—even in so simple a form as talking through challenges—could have detected the need to allow multiple layers of authorities to make critical decisions and grant vital approvals when the first, second or third-tier individual in a hierarchy was unavailable, as was the case with Mumbai's police commissioner.

We remind ourselves that a basic premise of this book is that preparation for *any* urban disaster does much to ready a megacity for catastrophes regardless of cause or type. But making plans is not the same as being prepared. The totality of disaster guidance for Memorial Hospital in New Orleans ran to nearly 300 pages before Hurricane Katrina. Yet, it took only five days for its staff—suffering from lack of information, sleep, medicines and outside assistance—to suffer a downward spiral that saw the facility go from effective patient care to euthanising its trusts. Memorial Hospital was only one of many institutions to suffer unmet needs during those trying days. Failures came at great cost in lives and property but also in trust, the city's reputation and belief that officials who should have led were capable of doing so. The benefits of preparing by bringing together all relevant parties for planning, rehearsing and circulating lessons offered by practising procedures during major urban events such as conventions, sports games and Mardi Gras are obvious when one realises the State of Louisiana's federal recovery funding of some $120 billion was more than three times the size of the state's annual budget.[14] The cost of preparations

14 Andre M. Perry, 'New Orleans is still learning from the lessons of Katrina—Houston should too', *The Avenue Blog*, Washington, DC: The Brookings Institution, 29 August 2017, available from: www.brookings.edu/blog/the-avenue/2017/08/29/new-orleans-is-still-learning-from-the-lessons-of-katrina-houston-should-too/.

would have been a fraction of that for recovery. Another benefit of proper preparation: buy-in. Organisations and individuals tend to be more willing to support activities if they play a part in planning.

Planning is vital, but the resulting plans must be executable and kept up to date. They should also be 'red teamed' (of which more below).

Pre-disaster systems considerations

> It was also well known in London that China could effectively ruin the Hong Kong economy by cutting its supply of food or, more importantly, water.[15]
>
> —Neil Monnery, *Architect of Prosperity*

> Stations had no gas to pump. This was due to severe breakdowns in the supply chain serving New York … Flood damage at critical facilities in Southern Manhattan, Red Hook, and the Rockaways disrupted landline and Internet service throughout the neighborhoods they served for up to 11 days … In areas with power outages, the pumping systems in high-rise buildings ceased to function, leaving residents on upper floors with empty taps and no way to flush toilets.[16]
>
> —NYC Special Initiative for Rebuilding and Resiliency, *PlaNYC*

Whether Hong Kong in 1941, Manila in 1945, Mosul in 2016 or Tokyo, New York or Los Angeles today, residents do not drink, bathe, wash or flush a toilet if water cannot make its way from outside the city to its residents. The city becomes a desert packed with humanity that cannot long survive without what deserts by definition lack.

Those suffering will have vastly different abilities to deal with a crisis. We have noted that slums are more likely to occupy low-lying ground prone to floods or landslides. The average poor resident of Bogotá, Colombia, lives on land with twice the seismic risk of that under rich households.[17] Cupboards fat with food are a luxury of which the less well-to-do only dream. Meals are fewer for the poor; hunger a frequent companion. Food is routinely purchased and cooked on the day it is eaten

15 Monnery, *Architect of Prosperity*, 282.
16 NYC Special Initiative for Rebuilding and Resiliency, *PlaNYC: A Stronger, More Resilient New York*, City of New York, 2013, 15, 16, 17, available from: www1.nyc.gov/site/sirr/report/report.page.
17 Lall and Deichmann, *Density and disasters*, 19.

either due to lack of money to buy more or for want of a means to keep it from spoiling.[18] Interruption in the supply of drink, food or the fuel to prepare meals quickly turns the destitute into the distressed—and dangerously susceptible to the diseases that prey on the malnourished. The problem is greater when flood, earthquake, war or other calamity forces the poor from their homes. Lacking the funds to pay for food, much less alternative shelter, the chances of megacity internal refugees (or 'internally displaced persons' in aid-speak) avoiding disaster are worsened by ignorance of where they can find sources of essentials once they move. Authorities able and willing to help, when they exist, often do not know where the displaced moved to. The lucky poor will find official shelters or stay with relatives. The less fortunate scatter to abandoned buildings or live rough beneath bridges, in parks and on sidewalks.[19] All are vulnerable. Those with medicine dependencies, limited mobility or chronic conditions requiring treatment soon find themselves at the precipice. Despite the wealth associated with Western countries' largest cities, the Bronx in New York City is home to the poorest urban county in the United States. Nearly 40 per cent of South Bronx residents live below the poverty line (the value for the city as a whole is just under 20 per cent).[20] Neighbouring Queens might be less impoverished, but those wanting to aid its residents during a future crisis will be challenged by the linguistic and cultural variety inherent in half its population being foreign born.[21] Adversity quickly stresses officials responsible for an urban population at risk—a population that can swell as rural residents seek relief in nearby urban centres thought to be hubs for aid distribution.

Addressing social media's potential during crises, public information officer and 25-year veteran of the Los Angeles Fire Department Brian Humphrey recalled: '[P]eople want to help in a crisis and the currency is not dollars. It's information … Every citizen is a communicator or contributor.'[22] Cities are seas of knowledge and information; megacities, it follows, are oceans. We have noted that the greatest knowledge lies

18 Acción Contra El Hambre [Action Against Hunger], *Urban Disaster Lessons Learnt*, Paris, n.d., 21, available from: silo.tips/download/urban-disaster-lessons-learnt.

19 Internal Displacement Monitoring Centre, *Global Report on Internal Displacement 2018: Part 1. On the GRID: The Global Displacement Landscape*, Geneva: IDMC, 2018, available from: www.internal-displacement.org/global-report/grid2018/downloads/report/2018-GRID-part-1.pdf.

20 Kevin Baker, 'The death of a once great city: The fall of New York and the urban crisis of affluence', *Harper's Magazine*, 8 July 2018, available from: harpers.org/archive/2018/07/the-death-of-new-york-city-gentrification/.

21 ibid.

22 American Red Cross, *The case for integrating crisis response with social media*.

within the urban area's citizenry, authorities and local aid organisations. Who better knows an apartment building than its manager or long-time doorman; a neighbourhood than its shopkeepers, police or firefighters? These men and women are holders of *individual* information: who resides where, who has particular needs, which families have children or elderly relatives and where they might be should an earthquake or other disaster strike unexpectedly, who goes to which schools and daycare centres or plays what sports where and when. Establishing procedures to mine such knowledge before it is needed is time and money well spent. Preparations also pay off in times of lesser crises.

Crime, medical, transportation, tax and other statistics; data on construction sites, storage locations or warehouse facilities holding construction materials; and information regarding access to trucks, construction equipment, food or other resources provide *collective* information that complements the individual. Knowing how to access these data means police are aware of where looting or gang-on-gang violence is likely to rear its ugly head when the lights go out. Understanding where the worst will make its appearance also helps when demands are many and resources too few. Which areas will be most at risk in times of flood should be common knowledge thanks to flood-zone maps and databases—if they are well kept, as is the case in Tokyo. Less known, perhaps, is what types of buildings (and therefore which occupants) will suffer most as waters rise or tremors strike. Hurricane Sandy's visit to New York City revealed that edifices of 1) one storey, 2) wood construction, 3) built before 1961, and 4) (no surprise here) close to shorelines proved the most vulnerable. These accounted for 18 per cent of the urban area's structures but proved to be 73 per cent of those destroyed or left structurally damaged.[23] Knowledge of needed practices is likewise vital. Based on her study of Hurricane Katrina, Pulitzer Prize–winning author Sheri Fink made clear the need for authorities to triage the truly needy from others who believe themselves physically suffering but who are in fact 'worried well' or 'sympathetic casualties'—individuals whose 'injuries' are psychological in nature (though those psychological beliefs can result in very real physical symptoms similar to those of the actually exposed).[24] Hospitals serving patients during the 1995 Tokyo sarin attack faced the same problem. Doctors found that roughly 70–80

23 NYC Special Initiative for Rebuilding and Resiliency, *PlaNYC*, 75.

24 Fink's comments can be found in Glenn et al., *Where None Have Gone Before*.

per cent of those seeking care fell into the worried-well category.[25] These individuals wrongly believed they had been physically affected by the nerve agent. Many demonstrated symptoms like those of the exposed victims, overwhelming medical personnel who were providing treatment for more than 5,500 individuals, of whom some 4,000 were merely worried well.

Though larger urban areas tend to have younger populations than their countries at large, megacity populations will nevertheless reflect national ageing trends, if to a lesser extent. That means more of a megacity's population will suffer from reduced mobility, diminished mental capacity and greater need for medical assistance when catastrophe strikes. More than one in every 14 citizens in Japan's 2019 population was disabled.[26] Other countries—and their cities—are evolving in the same direction. Only those in Africa resist the trend.

Pre-disaster control

> Most people, in fact, will not take trouble in finding out the truth, but are much more inclined to accept the first story they hear.[27]
>
> —Thucydides, *History of the Peloponnesian War*

> In solving a problem of this sort, the grand thing is to be able to reason backwards.[28]
>
> —Arthur Conan Doyle, *A Study in Scarlet*

Mumbai in November 2008 and the Taj Mahal Palace and Tower in particular offer a good starting point for understanding the variety of challenges that include essential decisions, unexpected behaviours and many other aspects when dealing with a catastrophe. Could toughened glass be designed so that it shields against exterior pressures while being breakable from the interior in case of fire or other need to flee? Could those window designs include panes opened manually to achieve the same purpose? Given that panic, confusion or arrogance will cause some who are at risk to behave in ways that endanger others, what steps could be taken to control or cut select communications or media access

25 Glenn et al., *Achieving Convergence during Humanitarian Assistance and Disaster Relief Operations*.
26 'Chairbound but seated: Japanese with disabilities', *The Economist*, [London], 3 August 2019, 29.
27 Thucydides, *History of the Peloponnesian War*, trans. Rex Warner, New York, NY: Penguin, 1972, 47.
28 Arthur Conan Doyle, *A Study in Scarlet*, London: Ward Lock & Co.,-1887, Pt II, Ch. 7.

within specified areas? Does the apparent wisdom of these steps bear out during a rehearsal? (Note that 'control' as used in these pages refers to restoring or maintaining a desirable condition of public safety, stability and confidence during or after a catastrophe rather than imposition of unjustified coercion.)

That the forces responding in Mumbai were poorly coordinated is obvious. The responses within medical facilities and for getting injured to those facilities (or treated onsite) were likewise. The striking of numerous targets demonstrated that the Mumbai terrorists recognised the value of assaulting multiple sites to confuse emergency response systems. It was fortunate that the 9/11 attacks in New York City struck only a single target. What responses might an exercise addressing future misfortunes reveal given a scenario that includes bombs going off throughout the urban area and multiple teams of shooters moving between widely dispersed targets? Paris's effective response to its 2015 tragedy is an excellent example of a megacity that internalised lessons from previous terrorist attacks; we will look at that response in pages to come. New York City is another among major urban areas around the world that has done likewise. Its Strategic Home Intervention and Early Leadership Development (SHIELD) program is a way for the NYPD to educate some 3,000 private security managers in the megacity area. It joins another partnership, Operation Nexus, in which detectives visit companies to educate commercial enterprises about how to identify and report suspicious activities at hotels, truck rental companies or companies selling relevant goods, for example.[29]

Dramatic as the 2008 attacks on Mumbai were, nature and humankind possess the power to make even those horrendous losses seem an afterthought. Regardless of a disaster's cause, the punishment suffered must be viewed as the starting point for relief and recovery. Better-led urban leaders will have already put appropriate steps in place before the last raindrops fall, shaking stops or shots are fired.

Effective plans require looking much deeper in time than one might expect. As the renowned philosopher 'Yogi' Berra put it, 'If you don't know where you are going, you'll end up someplace else.' Without a point from which to backward plan, government officials and others joining the effort will each follow their own paths—paths more likely to point in different directions than join in pursuit of a common goal. Given the

29 United States Senate, *Lessons from the Mumbai Terrorist Attacks*.

impossibility of predicting when a disaster will strike, planners should define this distant planning point in terms of a situation rather than a point fixed in time. That planning point might be a return to normalcy. More likely, it will be some form of what existed before the disaster and what could be should leaders seize opportunities for improvements presented by the event's destruction (think of Chicago and its post-fire skyscrapers). Once the base plan is in place, other plans can use this foundation to prepare for conditions varying from the original assumptions: greater or lesser magnitude quakes than the base plan assumes, terrorist attacks striking different locations or numbers of locations or a combination of interconnected catastrophes such as the quake, tsunami and nuclear facility disaster experienced in 2011 in Japan. Additional plans founded on a base plan will adapt new courses of action given changed conditions (called 'branch plans' in the military). Plans that extend beyond the base plan are 'sequels'.

Control during and in the aftermath of these events is impossible without effective communications. Language would seem an obvious challenge easily identified before an outsider's arrival. Recall the 800 languages spoken in New York City or the 199 in Los Angeles schools. The problem will be less but not absent in more homogeneous megacities such as Tokyo, Seoul or Jakarta. Knowing which languages are spoken is but a snowball on the tip of an iceberg. Which languages are spoken across the city? Which primarily only in certain communities? Which groups speak a second language but understand the one most used in the urban area, meaning that translation might not be necessary, that demands for translators are therefore reduced or that the pool of potential translators is larger than would otherwise be the case? Little wonder the NYPD in the aftermath of 9/11 could call on 275 certified interviewers able to communicate in 45 languages—in addition to officers fluent in one or more of a variety of languages including Farsi, Pashto and Urdu. NYPD linguists are sometimes shared with federal agencies lacking similar capabilities.[30]

And this addresses only varieties of languages. What medium will best reach the audiences who need to receive the messages ('receive' not merely 'hear' is the appropriate word as some of those on the receiving end will be hearing impaired)? The answer can be less obvious than it

30 Nussbaum, 'Protecting global cities', 221.

might seem. Apps purpose-designed for emergencies, blanket mobile phone messages or relying on Twitter, Facebook or other platform users to forward messages all have value—until batteries run low and there is no electricity to recharge or power phones, iPads and computers. Recall that reliance on the internet failed to touch many in the aftermath of the 2011 Fukushima disaster because the population in affected areas included many non-users. Television, radio and other electricity-dependent ways of communicating suffer similar limitations. Dropping leaflets could work, though design, printing, translating into all languages needed and distribution would cause a lag in getting messages to some audiences. A comic book or cartoon format can overcome language and literacy issues if the message can be communicated pictorially (remembering periodic issues of comic books published to spread pro-government messages during ongoing insurgencies in the southern Philippines and Iraq proved effective in reaching targeted teenagers and males in their early twenties. Unfortunately, terrorists also use this method to recruit as was the case with the Pakistani Lashkar-e-Taiba before the Mumbai attacks).[31] Another challenge is that details can be hard to get across without the written word. Clever 'mascots' can help in communicating a message and supporting recall of information; think the Geico gecko, long a spokesperson for that American insurance company (well, spokeslizard actually). (When I was an exchange officer with the British Army, billboard advertisements in our community pictured nothing but a piece of purple cloth being sliced, clipped, snipped or sheared in some way. It turns out that what at first was indecipherable to we Americans was marketing for Silk Cut cigarettes. The visual image was so well established that words were unnecessary … other than the mandatory antismoking warning.)

Newspapers can be an effective means of getting the word out even if literacy is limited. Posting them (or other written messages) in gathering spots such as markets or outside police stations draws crowds where the literate read for the benefit of others. Mixing key messages with other news of interest such as sports scores or the doings of popular personalities can increase the crowds drawn to these sites. Those personalities might help by lending their voices on TV or radio. The *Story Story* radio soap opera that was helpful in teaching listeners facts and debunking the many myths and rumours infiltrating communities during the 2014 Ebola crisis provides an example of how critical messages can reach a public before, during

31 Scott-Clark and Levy, *The Siege*, 104.

and after a crisis. These examples only begin to touch on the possible ways of communicating with an urban area's many audiences. Disaster communications are the playground of the innovative and imaginative—given bosses willing to listen to them.

Though tainted in some circles due to their past or present coercive use in the Soviet Union, China, Tanzania and elsewhere, community associations or neighbourhood committees have tremendous potential for helping authorities with messaging and managing the potential of the person on the street. Day-to-day benefits are evident in New York City, for example, where Orthodox Jews' Shomrim neighbourhood watch groups work with local police. It is often to the Shomrim that residents first go when a crime has been committed or a child is missing.[32] Tokyo and Beijing are well known for the benefits of their neighbourhood committees. Those in the latter city were key to containing Covid-19 in the country's capital and elsewhere. They stood guard outside housing complexes, restricting who could leave or enter and monitoring those in self-quarantine, even using alarms and webcams to restrain potential violators of official dictates. They also oversaw delivery of food and kept their neighbourhoods advised of government policies.[33] Extreme by Western standards? Yes, but that should not cause us to overlook the benefits of authorities having a single neighbourhood point of contact if face-to-face communications are among the limited communication means available. Getting word out regarding how to access water, food, medical care or other supplies and services is quicker if those delivering the message can go to one individual who then uses a neighbourhood 'alert roster' to spread the information quickly (for example, the head of the committee notifies five prearranged contacts, each of whom calls five more, and so on). As with the Shomrim, committee representatives can also be the first point of contact for the police when trouble arises. That is particularly important in times of crisis when these representatives might settle issues without causing law enforcement officers to be rerouted from higher-priority calls. And there may be cases where keeping officials informed of behaviour that threatens general welfare is essential, as in the case of those who would, Patrick Sawyer–like, refuse to obey dictates necessary to containing the spread of biological or chemical contamination.

32 Patrick Sharkey, *Uneasy Peace: The Great Crime Decline, the Renewal of City Life, and the Next War on Violence*, New York, NY: Norton, 2018, 226n.20.

33 'On every street: Urban society', *The Economist*, [London], 13 June 2020, 31–32.

Recent years have seen a dramatic increase in the risk of cyberattacks. Estonian and Ukrainian urban residents are among those who can attest to cities' vulnerabilities. Interruption of power, water, communications or other resources essential to human survival would dramatically complicate operations and potentially undermine government legitimacy. The number of vulnerable nodes, inexperience in defending against such attacks or their second, third and higher-order consequences and difficulty in determining the perpetrator are problems officials are only beginning to consider much less address effectively. Determining the cause of an outage can be hard; savvy operators might strike ultimate targets by capitalising on second or higher-order effects, meaning the initial attack is distant from the desired end in terms of both time and space. Smart city initiatives complicate the situation further. These capabilities can speed road repairs, reduce flooding and otherwise greatly benefit communities. Ironically, while urban authorities tend to be cautious regarding resident concerns about protection of private information, they are sometimes less mindful of criminal, foreign power or other cyber threats that exploit their city's smart components to ill effect. Hackers have already been successful in manipulating access-control systems to facilitate denial-of-service attacks and open smart software–controlled doors.[34]

Containing the number of those suffering loss of resources is one benefit of decentralisation. Design of infrastructure systems that avoids overcentralisation and provides redundancy means controlling authorities can selectively reduce or deny specific areas of select services. So-called graceful failures[35] allow limiting consumption in some communities to restore interrupted services elsewhere. This control also permits officials to employ infrastructure when influencing behaviour is essential to public safety or security, where riots, enemy action or other activities act counterproductively to the welfare of the whole city, for example. Depending on the sophistication of infrastructure control, authorities could conceivably deny resources to an individual city block, building or even apartment level—all from a remote location. Such partial or total restriction of access also provides ways to protect communities from contaminated water, cyberattacks targeting specific or general software (acting as the equivalent of a cyber circuit-breaker) or contaminated public transportation. Decentralisation comes with costs. A primary

34 Alexander Braszko, 'Military implications of smart cities', *Mad Scientist Blog*, 4 June 2020, available from: madsciblog.tradoc.army.mil/242-military-implications-of-smart-cities/.

35 Townsend, *Smart Cities*, 300.

reason fewer, larger, more centralised infrastructure nodes such as power or water treatment plants are attractive is because they offer economies of scale. It's cheaper to build and maintain one large facility than many smaller ones scattered across an urban landscape. Post-disaster and other future designs could nonetheless seek a better balance than currently exists between cost and security. Infrastructure decentralisation receives more attention in later pages.

Providing a bit of early warning when service losses threaten might be the best officials can do under some circumstances. Israeli authorities turned to an innovative solution to warn vulnerable civilians of rocket attacks from Gaza during 2014's Operation Protective Edge:

> The Yo app was thought to be nothing more than a gimmick; all it did was allow an individual to send the one-word greeting of 'Yo' to another. It has come to serve a far more valuable service in Israel. The country developed its Red Alert real-time missile notification system following the 2012 introduction of a siren-based emergency warning system. Fearing that some might not hear the audible signal, Red Alert was an app that provided an additional alert to RedAlertIsrael followers on phones whenever a missile or rocket threatened an entire urban area, e.g., Tel Aviv. By partnering with Yo, an expanded number of individuals—those in the vicinity of Gaza in areas not covered by Red Alert, for example—can now get a 'Yo' signal that gives between 15 and 90 seconds warning of incoming munitions.[36]

How might a similar app serve elsewhere? During New York City's 2003 loss of electricity (part of the larger US East Coast blackout), utility provider ConEd had about 40 seconds between when it detected a problem and the loss of power.[37] Yo! Get out of that elevator on the next floor or be like the hundreds stuck in 2003.

Knowing where to look before you have to look

> The chaos of the immediate aftermath of a disaster is not the best time to be thinking about far-reaching policies.[38]
>
> —Elizabeth Ferris, 'Urban disasters, conflict and violence'

36 Glenn, *Short war in a perpetual conflict*, 72–73.
37 Rodin, *The Resilience Dividend*, 19.
38 Ferris, 'Urban disasters, conflict and violence'.

> A difference in scale can at some point become a difference in kind.[39]
>
> —Phil Williams and Werner Selle, *Military Contingencies in Megacities and Sub-Megacities*

It was popular in early twenty-first-century writings on counterinsurgency to consider the population of a country as the 'centre of gravity'—a military term referring to those elements that in and of themselves could in some manner prove decisive to success or failure.[40] This is nonsense. As we observed in the above discussion about the continuum of relative interests, expecting to mould the thoughts or behaviour of an entire city's population is like a politician spending their time and money trying to convince everyone in a constituency to vote for them. It is the same with populations in general. Wiser leaders allocate their always limited resources to winning over key personalities or groups who can then help to sway others who are potentially swayable. But how do we identify and communicate with those who are the mediums for our messages?

The sheer size of megacities means identifying social or physical centres of gravity will take on fundamental, even decisive, importance. We recall that it was only after Gaza's more influential residents complained about the loss of their homes that Hamas agreed to a ceasefire during the 2014 Operation Protective Edge.[41] Savvy megacity authorities often identify similar key social nodes to help them in their day-to-day efforts to protect residents. Los Angeles Police Department officers plotted the locations of gang-related violence and found that the seams along different groups' territories were where frictions sparked conflict. Forty per cent of Chicago's firearm deaths are attributable to just 4 per cent of its population. Two-thirds of Boston's street robberies occur in only 8 per cent of its area.[42] In Seattle, police analysed 14 years of statistics and found that half of all crimes were committed on less than 5 per cent of the city's streets.[43] In large and medium-sized Latin American cities,

39 Williams and Selle, *Military Contingencies in Megacities and Sub-Megacities*, 7.

40 This description is admittedly oversimplified. The definition and meaning of centre of gravity—a concept originally introduced by Carl von Clausewitz in *On War*—have long been and continue to be items of vigorous debate in military circles. The United States' interservice (or joint) doctrine defines centre of gravity as 'the source of power that provides moral or physical strength, freedom of action, or will to act'. Department of Defense (DOD), *Department of Defense Dictionary of Military and Associated Terms*, Arlington, VA: US Department of Defense, 1972, 29.

41 Glenn, *Short war in a perpetual conflict*, 77, 84.

42 Sharkey, *Uneasy Peace*, 158–59.

43 'Algorithm blues: Predictive policing and sentencing', *The Economist*, [London], 2 June 2018, [Technology Quarterly] 9–11, at 9, 10.

approximately 80 per cent of homicides occur in only 2 per cent of an urban area. In 2011 in Karachi, 47 per cent of murders took place on 3.5 per cent of land that housed less than 10 per cent of the city's population.[44] New York City and Los Angeles have used such data to prioritise where they focus local law enforcement efforts.[45] In an example from New York City's 2020 Covid-19 crisis, the issue of how to allocate ventilators became a life and death decision for its victims. Presciently, the city had put together a taskforce in 2007 to recommend policies for just that issue should a pandemic such as the Spanish flu recur. A report released in 2015 provided recommendations—for example, that patients with some conditions are not put on a ventilator when availability falls short of demand. These included unresponsive patients or those with severe burns, traumatic brain injury or suffering cardiac arrest. Members of the group involved in the initial taskforce participated in a mid-March 2020 renewed discussion of the problem. Reconsidered issues included tough choices such as which hospitals should receive newly arrived funding or equipment. Recommendations included favouring previously underresourced hospitals. A counterproposal noted that better-funded hospitals tended to receive and treat the most vulnerable patients. Fevers burned and patients died as politicians dithered rather than made the tough decisions. The number of deceased became so great that morgues could not keep pace. Refrigerated trailers parked outside medical facilities served as temporary morgues while the report's recommendations disappeared into the mire of bureaucracy. Doctors, lacking policy guidance, spent resources attempting to save those with little chance of survival.[46] Indecision is a decision in times of crisis.

Time for another brief pause before we move on. Given the below, we might find it helpful to distinguish between 'prediction' and 'forecasting'. The Pacific Northwest Seismic Network provides a pragmatic description that allows us to see the critical difference between the two:

> A prediction of an earthquake needs to state exactly where and when the event will happen with enough specifics to be useful for response planning purposes. For example, the statement 'there will be an earthquake tomorrow at 7:45 AM' is almost certainly going to be correct somewhere in the world, but it has no value as

44 Gayer, *Karachi*, 7.
45 'Shining some light: Latin America's homicide problem is a harbinger for the developing world', *The Economist*, [London], 7 April 2018, 16–18, at 17.
46 Tyler Foggatt, 'Protocols: Who gets a ventilator?', *The New Yorker*, 20 April 2020, 13–14, at 14.

> a prediction. Similarly, saying that there will eventually be a large earthquake on a very active fault is useless; while it is true, almost nothing can be done with this information. Without a specific date or location, a statement cannot be a prediction. Currently, no one can predict where or when big earthquakes will occur to meet these criteria. However, seismologists have gotten much better at forecasting earthquakes. On a sunny Monday afternoon, meteorologists may forecast a wet weekend ahead, and can add an estimate of how certain they are that their forecast will be accurate; i.e., 'we forecast a 60% chance of rain on Saturday.'[47]

No-one should expect even the most able of leaders or staff to predict crises, but forecasting might be within the realm of the possible. Accurate forecasting only helps the prepared, however. The better readied a megacity is for disaster, the better are the chances that misfortune falls short of achieving disaster status. Tokyo, with its phenomenal combination of threats—typhoons, the active Mount Fuji volcano, floods, tsunamis and earthquakes, much less missile attacks from North Korea or the failure of another nuclear power facility—has taken steps to ensure its residents are among the best prepared in the world. We have mentioned neighbourhood governments' disaster preparedness maps that highlight areas prone to earthquake, fire, flooding, tsunami, landslide or other dangers. Newly constructed buildings must meet stringent structural standards; older structures once deemed vulnerable can be spotted thanks to their retrofitted earthquake bracing. Open areas are set aside not only for recreation purposes. A bit of searching will reveal a public information map showing what nearby terrain is exposed to natural hazards. Parks have benches that can be converted into grills for cooking by those left homeless. Locations have been fitted with underground receptacles that can be covered by a tent or surrounded by screens while serving as public toilets. The city has contracted with local ferry companies to move people or goods by water should ill fortune isolate communities due to blocked roads or fires. The list goes on.

Los Angeles has some way to go before achieving anything close to Tokyo's accomplishments, but officials have in the past been good about drawing on previous events as opportunities to learn, design rehearsals and develop

47 Lauren Burch, 'What's the difference between predicting and forecasting earthquakes?', *Blog*, Seattle, WA: Pacific Northwest Seismic Network, 23 May 2016, available from: pnsn.org/blog/2016/05/23/what-s-the-difference-between-predicting-and-forecasting-earthquakes.

response policies as the megacity readies for the inevitable quakes to come. 'Advanced notice allows citizens to prepare', former Los Angeles County Sheriff's Department commander Sid Heal observed:

> We've had people die trying to save cats … Many have taken steps to find their own shelter, which in turn lightens the logistical burden on us. When we have mass casualty incidents, it has proven far better to move medical personnel to the scene rather than move victims to a medical facility. Victims can be stabilized; the transportation time is not working against the 'golden hour' and we are not wasting time and effort moving people who are going to die enroute or live without the transportation. Linking friends and families to victims allows an informal support system to develop that often takes uninjured or lightly injured victims out of the emergency response logistical systems … Linking the public emergency response system to private enterprises provides and enhances capabilities without requiring a heavy logistical burden. This usually takes the form of retainer contracts so that emergency response has access to heavy equipment, facilities, tools, vehicles, etc. without actually owning them. Moreover, we usually contract with the skilled operators at the same time so that we have a turnkey system. A bulldozer comes with an operator, a helicopter comes with a pilot, etc.[48]

Pehr Lodhammar was senior program manager for the UN Mine Action Service during and in the aftermath of operations in Mosul. His mine-clearing team could not enter Mosul until the fighting stopped, but they distributed water bottles with labels warning recipients of the dangers of IEDs ('If you see this, don't touch it!'). They also conducted safety classes. Lodhammar recommended similar instruction be provided to urban residents before a disaster—perhaps having teachers give brief classes twice a year and including basic first aid and precautions for when an individual comes across a possible explosive device.[49] Obviously, similar training for dealing with hazards other than those with wartime origins would likewise have benefits.

With some notable exceptions, disaster lessons learned by one urban area too rarely reach others. Douglas Brinkley, identifying one of the many failures in preparing for and reacting to Hurricane Katrina in New Orleans, confirmed Sid Heal's observation about the importance of accounting for

48 Charles S. Heal, Email to Russell W. Glenn, Subject: Megacities research, 17 March 2016.
49 Pehr Lodhammar, Skype interview with Dr Russell W. Glenn, 7 June 2021.

the importance of pets to many residents. The city did not allow pets on evacuation buses after the city's flooding—a decision that 'caused a lot of grief' and has elsewhere more than once resulted in owners' deaths.[50] Some sense of how many evacuees will have pets and what type they are provides planners with important information when readying housing, food stocks and other support.

Pre-disaster readiness and the comprehensive approach

> In *Democracy in America*, Alexis de Tocqueville marveled at Americans' propensity to solve problems outside the bounds of government … 'Wherever at the head of some new undertaking you see the government in France, or a man of rank in England, in the United States you will be sure to find an association.'[51]
>
> —Anthony M. Townsend, *Smart Cities*

> The unprecedented terrorist attack that France experienced in 2015 marked a major change … After decades that had seen war kept at bay, our population has once again become a target in need of protection. But our population might also be the best weapon to oppose the enemy.[52]
>
> —Jean-Yves Le Drian, *Who Is the Enemy?*

Even the best-prepared megacities cannot take readiness for granted, as Tokyo's experience with the religious cult Aum Shinrikyo's 20 March 1995 sarin nerve agent attack makes clear. Five members of the group grasped their umbrellas and drove the sharpened points home, penetrating the membranes at their feet to free the liquid contained therein amid Tokyo's morning rush-hour commuters. The subway cars were packed; rush hour sometimes sees them carrying up to 200 per cent of their design capacity. Delays in recognising the nature of the threat meant trains continued to run for more than an hour after the first release of sarin. Contamination would ultimately spread to 15 stations. Twelve of the more than 5,500 patients seeking medical attention would die. The deceased included

50 Douglas Brinkley, *The Great Deluge: Hurricane Katrina, New Orleans, and the Mississippi Gulf Coast*, New York, NY: William Morrow, 2006, 592.
51 Townsend, *Smart Cities*, 308.
52 Jean-Yves Le Drian, *Who Is the Enemy?*, trans. Sandra Smith, Paris: Les Éditions du Cerf, 2016, 64, 65.

police and maintenance personnel who unwittingly exposed themselves either to vapor or, in the case of those cleaning up the spills, when they mopped up the liquid without protecting their skin or airways. At the time of the attack, Dr Tetsu Okumura was on staff at St Luke's International Hospital, the facility that treated the largest number of patients. Okumura wrote of communications and responder capabilities quickly being overwhelmed.[53] Delays in identifying the toxic agent not only resulted in deaths but also contributed to 10 per cent of medical and other personnel in some facilities suffering contamination. Onsite treatment was limited and often inadequate. City policies did not include moving physicians to disaster sites. Emergency medical technicians were not allowed to intubate patients unless under a doctor's supervision, nor were they equipped with auto-injectors, decontamination lotion or other medications for dealing with chemical exposure.

Firefighters, police and hospitals struggled to communicate in the immediate aftermath of the sarin attack. This hindered coordination, undermined effective responses and delayed identification of the agent involved. The first report mistakenly attributed casualties to an explosion. Not knowing the identity of the contaminant meant medical personnel did not think to don protective equipment (which was in most cases not available anyway). Nor were patients or hospital staff initially decontaminated (and, again, the specialised equipment needed was not on hand). Ventilation in treatment rooms was insufficient. Police and fire representatives sent to hospitals sought information but provided little in return. Centralised crisis management was lacking due to the communications issues. Tokyo's fire department, which was responsible for coordinating patient movements to avoid overwhelming facilities, therefore could not do so. There was no overarching policy regarding responder coordination. Further complicating effective response: recall that between 70 and 80 per cent of those seeking medical attention were the 'worried well' or 'sympathetic casualties'—individuals who had not been exposed to sarin but believed they were victims of contamination. Triage at hospitals attempted to separate such individuals from the contaminated—a task made harder by the delays in identifying sarin as the contaminant and the similarity of worried-well and exposed patients' symptoms.

53 Those wanting more detail on the response to this attack should access Dr Tetsu Okumura's excellent article: Okumura et al., 'The Tokyo subway sarin attack', 613–17.

Steps have been taken to address shortfalls identified on that March day more than 25 years ago. Not all are sufficient. Decontamination equipment and procedures are more readily available. The Japanese Poison Information Centre has since been designated national coordinator for information about chemical disaster management. The centre has created a model for incident information flow and coordination of response assets. Japan's government compiled a list of chemical agent–knowledgeable personnel who meet regularly and are linked by mailing lists and other means.[54]

However, though Tokyo police and fire personnel now reportedly have sufficient protective equipment, hospitals remain badly underequipped. Emergency medical technicians in 2019 in Tokyo were still not authorised to intubate or perform some other lifesaving procedures during mass-casualty events barring oversight by a licensed doctor (with exceptions granted for cardiopulmonary arrest patients). Tokyo's doctors do not routinely move to disaster sites—this a quarter-century after the attack and despite the value of doing so being demonstrated during responses to Paris's 2015 terrorist attacks and elsewhere.[55] Officials have yet to develop procedures for situations in which normal communications capabilities are overwhelmed or lack of power renders them inoperable. Cooperation between agencies responsible for disaster response leaves much to be desired.[56]

A small step too rarely taken: Rehearsals

> The FBI had [terrorist suspect] Iyman Faris down at Quantico talking about his plans … 'Oh, I was gonna drive my truck over the Brooklyn Bridge,' remembers one of the frustrated [NYPD] investigators. 'Well, any New York cop knows you can't take a truck over the Brooklyn Bridge. But the FBI agent may not know that, because none of them live in Long Island. They all live in New Jersey.'[57]
>
> —Christopher Dickey, *Securing the City*

54 Glenn et al., *Achieving Convergence during Humanitarian Assistance and Disaster Relief Operations*.
55 ibid.
56 ibid.
57 Dickey, *Securing the City*, 154.

> Jungle fighting skills and determination couldn't compensate for lack of training in urban operations and special tools such as smoke grenades.[58]
>
> —Charles Knight and Katja Theodorakis, *The Marawi Crisis*

A record 945 millimetres of rain fell on Mumbai within 24 hours on 26 July 2005. Just under 760 millimetres of that amount fell within only five hours during in the same period. At least one-third of the city flooded, the city's airport runways and terminal buildings included. Lower-lying areas were submerged under 3 to 4.6 metres of water. Those living in slums were especially hard hit, with thousands of homes washed away or otherwise destroyed. Lingering floodwaters fed outbreaks of dengue fever, malaria, leptospirosis and diarrhoea.[59] This can in part be explained by the poor condition of human waste facilities in the city. Approximately 9,700 public toilet blocks were in place two years before the floods. A survey found that roughly 80 per cent were inoperable; the number was sufficient to address the needs of only half of Mumbai's more than 18 million residents even had all been functioning.[60] Most of the city lost wired telephone services. It would be weeks before some locations saw it restored. Parts of the city were likewise without mobile phone service. Much of the megacity lost power for days. In some cases, the electricity was deliberately cut to prevent electrocutions. All three of the megacity's suburban rail lines shut for the first time in Mumbai's history. Looking back on the disaster seven years later, city disaster planners noted:

> [T]here was a total collapse of the transport and communication system. The domestic and international airports were closed for two days and the major roads linking the city to other centres in the country were submerged. Intercity train services were cancelled for over a week, while suburban trains, which are the lifeline of the city, could not operate for 36 hours … ATM transactions could not be carried out, not only in the city but in several parts of the country during this period due to failure of connectivity with their central systems located in Mumbai.[61]

---

58 Charles Knight and Katja Theodorakis, *The Marawi Crisis: Urban Conflict and Information Operations*, Special Report, Canberra: Australian Strategic Policy Institute, 31 July 2019, 14, available from: www.aspi.org.au/report/marawi-crisis-urban-conflict-and-information-operations.

59 Conservation Action Trust, *Mumbai Marooned: An Enquiry into Mumbai Floods 2005*, Final Report, Mumbai, India: Conservation Action Trust, 26 July 2006, 4, 57; and Boyd et al., 'Climate Change Adaptation in Mumbai, India', 219.

60 Conservation Action Trust, *Mumbai Marooned*, 30.

61 Narvekar and Kewalramani, *City Profile*, 106.

All India Radio reported that 150,000 people were stranded at various rail stations, some for nearly 24 hours.

Residents stepped forward. Strangers risked their lives to save others—even in areas known for communal violence. There was very little looting or robbery and no reports of rape. At the same time, outrage rose as the consequences of official incompetence and corruption became known. The authors of an independent report wrote that 'it was clear that if any people and their belongings were saved, it was due to the intervention of common people, not because of the government but in spite of it'.[62] Reminiscent of Mexico City after its 1985 earthquake, in Mumbai, examples of mismanagement and corruption included aid showing up on the black market and up to one-fifth of all aid going unaccounted for. Slum areas comprised roughly half of the megacity's population at the time. They received very little assistance. It was alleged that officials feared doing so 'would be an acknowledgement of their illegality'—even as both public and private construction had long been tolerated in areas that experts would later attribute to worsening the flooding's destructiveness. NGOs stepped in to assist. Authorities demanded they disperse their money through government offices instead of going directly to those in need—a step that would have both delayed distribution to the needy and increased graft.[63] At the same time, the central control facility responsible for providing overarching coordination of rescue and recovery was deemed 'completely nonfunctional'.[64] Officials failed to inform residents which parts of Mumbai were flooded, meaning commuters put themselves at risk as they tried to return home. The response was further crippled as key agencies like the Slum Rehabilitation Authority, Maharashtra Housing Area Development Authority, Mumbai Metropolitan Region Development Authority (MMRDA) and Maharashtra State Road Development Corporation (MSTDC) failed to cooperate. It was a situation not helped by each reporting to different government departments (recall that Mumbai is the capital of Maharashtra State). We can add bad planning to this lack of cooperation between organisations that should have been arm-in-arm during preparation and response. The same report concluded that 'the flooding in the city is more the result of bad planning than unprecedented rains or high tides'.[65]

62 Conservation Action Trust, *Mumbai Marooned*, 6.
63 ibid., 10.
64 ibid., 11.
65 ibid., 18.

Reflective of both this fragmentation and a lack of good plans were official policies that designated no statutory role for the police. A former Mumbai police commissioner related that the police appeared nowhere in the disaster management plan. Neither the MMRDA nor the MSTDC sent representatives to the regional monsoon preparedness meeting. It was discovered that MMRDA road upgrade projects had hindered storm drainage. This mismanagement—very likely complemented by Mumbai's notorious corruption—existed at higher levels as well. The MMRDA should have been the megacity's premier planning body. It had been studiously ignored by the BJP–Shiv Sena political coalition that ran the Maharashtra State Government in the decade before the flooding. This might help to explain the flaunting of regulations dictating that 15–25 per cent of land in commercial and residential zones be left as recreational open space—space that would have decreased runoff by permitting percolation of rainwater.[66] Were these failures to prepare not enough to anger the megacity's residents, the Maharashtra State Government declared a holiday for the two days after the flooding. Its offices were therefore closed during the worst of the crisis.[67]

An exception to the seemingly near-universal failure among Mumbai and Maharashtra's officials was the Indian Coast Guard, which is part of the country's Department of Defence. While much of the city suffered communications challenges, the Coast Guard relied on satellite phones and thus maintained contact independent of local telephone and mobile systems. While Mumbai's fire department took 15 hours to reach the Saki Naka landslide site where more than 100 slum-dwellers died, the Coast Guard had one-third of its personnel on call. Yet, reminiscent of what would happen three years later during the 2008 terrorist attacks, Maharashtra authorities failed to request use of this valuable capability.[68]

What plans existed before the deluge had been left uncoordinated, untested and unrehearsed. The notorious corruption and lack of commitment underlay the general ineffectiveness. In addition to turning a blind eye to builders creating slum homes on flood and landslide–vulnerable land, officials had likewise done little to stop destruction of the mangrove swamps that were vital to mitigating flood extremes or

66 ibid., 29.
67 ibid., 22, 23, 25.
68 ibid., 61. Other sources put the number of deaths significantly higher. For example, see page 219 of Boyd et al., 'Climate Change Adaptation in Mumbai, India', who state that more than 1,000 were killed.

projects that reduced the width of local rivers. The flood's surging waters thus backed up into areas once at little risk. Maharashtra state employees taking their two-day holiday had company in the failure of some police stations to respond to nearby disaster sites (again, repeated in 2008). Corruption resulting in the misdirection of relief aid paled in comparison with manipulation of flood recovery funds that saw builders illegally upgrade wealthy properties at public expense while slum residents who had lost everything received no support. One can only wonder how many of Mumbai's 447 lives lost would have been saved had relevant Mumbai, state and federal representatives rehearsed and then revised disaster plans based on rehearsal findings.

The failures behind the deaths, injuries and extensive property damage would be inexcusable even without a history of disasters from which to draw lessons. A Mumbai flood almost five years to the day before this one had provided many insights that unfortunately went all but unheeded despite severe devastation. Official reactions during the later event were in some ways worse than during the earlier calamity. The Mithi River flows through Mumbai. Residents on its banks were stranded during the 2005 flooding, with government officials claiming they could not requisition naval boats to help them. Those vessels' quick requisition during the 2000 flooding had allowed an almost immediate rescue of those who stood in the same locations five years later.[69] This lack of effort to improve interorganisational cooperation and coordination was evident in the comment in the post-2005 flood independent report that 'there are too many agencies involved in disaster management, with no clear chain of command'.[70] What is clear is that the residents of one of the world's most populous urban areas were poorly served by administrators more skilled in post-event finger-pointing than effective action. The same report reinforces a conclusion that it was often corruption that was behind these enduring and seemingly wilful failures:

> Corruption has become so much a part of our life that many of us no longer stop to question it or deal with it as a separate issue. Yet corruption is the underlying reason behind the open flouting of development norms; building violations; ecological destruction in the name of development; an ill-equipped fire brigade/police/BMC [Brihanmumbai Municipal Corporation, Mumbai's civil

69 Conservation Action Trust, *Mumbai Marooned*, 63.
70 ibid., 65.

> government authority; and] inadequate, badly constructed or maintained roads, sewerage, and sanitation. The roots of almost any problem in Mumbai can be traced back to the twin bedfellows of corruption and politics. The common Mumbaikar has been forced to endure this, with tragic consequences, for too long.[71]

Emily Boyd and fellow researchers separately reinforced these findings:

> The cause of inundation needs to be clearly understood. All identified causes—choking of Mithi River, overuse of plastic bags, failure to implement segregation of domestic waste, narrow storm-water drains, programmatic failures in disaster management, and the failure to disseminate weather forecasting—are not climate-induced [crises] but long-pending administrative lacuna [*sic*] … It also underlines a pronounced two-culture debate, between science and society in India.[72]

Given the above, the inadequate reaction to the 2008 terrorist attacks three years later can be seen as simply a continuation of a well-established trend. Nor has the threat of floods been dealt with effectively. At least 43 people died in flooding in July 2019 in Mumbai, as did another 31 two years later.[73]

The value of rehearsals

> It means that we are willing to be quite plugged in with regard to what a coalition is doing, but we would never be a part of a coalition … We would be willing to share information regarding humanitarian needs … We will not inform either side of the other's pending military operations … [T]he military also understands that if we did share with the military, it would be the end of our operations there. There would be no access to prisoners … The military should not rely on us for their intelligence … We are the people who will be the neutral intermediary … We have to preserve that role. What we do in one country reflects on another.[74]
>
> —Michael Khambatta, International Committee of the Red Cross

71 ibid., 64.

72 Boyd et al., 'Climate Change Adaptation in Mumbai, India', 226.

73 Rhea Mogul and Swati Gupta, 'At least 31 people killed after Mumbai hit with torrential rain', *CNN*, 19 July 2021, [Updated 20 July 2021], available from: www.cnn.com/2021/07/19/india/mumbai-heavy-rain-landslide-intl-hnk/index.html.

74 Michael Khambatta, Interview with Dr Russell W. Glenn, Washington, DC, 26 February 2008.

> No one apparently had thought that an event fierce enough to damage a reactor might also disrupt basic communications.[75]
>
> —David Lochbaum et al., *Fukushima*

> Always try for perfection. There's never been a perfect ball player. Willie Mays came closest. But always try.[76]
>
> —Joe DiMaggio

Thinking through, planning for, rehearsing and otherwise readying to deal with megacity disasters before an event and converting the results into policies will pay off whether the episode is overseas or at home. Bringing participating parties together during these preparations—including those from local communities as well as outsiders—gives leaders a chance to work on solutions before challenges show themselves. NGOs in Somali urban areas during the near anarchy of the 1990s paid local armed groups to protect their members and relief stores from violence or theft. The role as defenders came with permission for the hired guards to carry weapons—a privilege denied other locals in an attempt to control the rampant brutality that plagued the country. But international military forces found it hard to determine which groups continued to faithfully serve the NGOs that had hired them and which instead had turned on the organisations for which they worked—until the armed locals fired on international coalition soldiers.

Intramilitary disconnects and disregarding the need to vet and monitor contractors had similar effects during actions in early twenty-first-century Iraq and Afghanistan and—barring change—will do so again when nature or human-induced misfortune touches the world's most influential urban areas. Failure of a special operations forces (SOF) unit to communicate with the US Army commander responsible for a village resulted in the fracturing of carefully constructed relations with local Afghans when SOF soldiers burst into a home and seized a suspected enemy leader. Hearing of the damage left unaddressed by the raiding soldiers, the US unit responsible for the sector sent men to complete needed repairs. They found them already done, complete with an accompanying sign crediting the local Taliban.

75 Lochbaum et al., *Fukushima*, 16.

76 Quoted in Louis D. Rubin, Jr (ed.), *The Quotable Baseball Fanatic*, Guilford, CT: Lyons Press, 2000, 262.

Most private security companies operating in Iraq and Afghanistan stayed within the constraints of local law and were appropriately sensitive to how their behaviour impacted on coalition efforts to secure public support. Most. Not all. I recall accompanying a patrol of soldiers from the 2nd Brigade, 1st Infantry Division in September 2007 in Baghdad. The soldiers left their vehicles, patrolling on foot to make themselves more accessible while speaking face-to-face with shopowners and their clientele. It was early dusk. The gentle light was fading, giving the street an atmosphere of calm after a busy and hot day. The sense of peace was brutally shattered by the speeding arrival of four black sports utility vehicles (SUVs), blue lights flashing, a well-known international security company's men protruding from hatches in roofs, guns at the ready. It was a garish demonstration of force ill suited to a becalmed community—one that at best impressed its residents with the vehicle occupants' fears rather than any aura of power. Such events were unfortunately not uncommon.

Never completely avoidable, episodes like these can be reduced by stricter screening and mutual agreement regarding objectives and operational approaches. The earlier-mentioned Los Angeles TEWG was an effort to reach this desirable state. The monthly group meetings of local, state and federal authorities included private sector counterparts' infrastructure liaison officers who would help to ensure the flow of information between government authorities and local for-profit and nonprofit groups when calamity struck.[77] Familiarity born at these meetings and the all-important informal discussions that were inevitably part of each meant members at a minimum understood what would be expected when an event brought them together under more demanding circumstances. TEWG meetings increased mutual understanding, reducing chances that actions by one party would undermine those of another while boosting the likelihood those parties spoke with a consistent voice in times of crisis. Another benefit—one that might easily be overlooked until too late—is that the resultant bonds enhanced the chances the organisations' members would understand one another even if they continued to speak their unique professional languages.[78] (The TEWG was unfortunately suspended after its replacement with the Los Angeles Joint Regional Intelligence Center, or JRIC, in 2010. As its name implies, the JRIC's role is primarily an

77 John P. Sullivan and Alain Bauer, *Terrorism Early Warning: 10 Years of Achievement in Fighting Terrorism and Crime*, Los Angeles, CA: Los Angeles County Sheriff's Office, October 2008, 29.
78 CALL, 'Operation United Assistance', 22.

intelligence/information integration and dissemination one rather than a more general coordinating or orchestrating one, as was the case with the TEWG.)[79]

Such cooperation is all for the good, but how can those authorities ensure their informal relationships translate to effectiveness when disaster visits? New Orleans city government representatives originally turned away small boatowners responding to fellow citizens' needs in the aftermath of Hurricane Katrina. Only later, when it became obvious that official resources fell far short of what was necessary, did the call go out to correct the misjudgement. (Tokyo's standing arrangement with commercial tourist boat services provides a well-considered counterexample.) Later estimates credited this 'ragtag flotilla' with rescuing thousands[80]—an eventual happy ending of sorts, perhaps, but bringing government, commercial, neighbourhood and other relevant organisations together before the event is greatly preferable.

The bottom line: the challenges world megacities confront in times of catastrophe make preliminary planning and rehearsal of plans essential. Participation in pre-disaster gatherings and familiarity with other parties likely to join forces during and after a crisis are only the first steps. Partners will range from those with membership in the tens of thousands to others of only one or two. The quality of their preparations will span an equally vast scope. Establishing relationships before they are put to the test offers the chance for each party to offer to others knowledge of its strengths and limitations. Conducting exercises and rehearsing plans with even a limited number of those who will be part of a response can reveal capability gaps and where orchestration of available capabilities needs fine-tuning, making it easier to incorporate new arrivals when the time comes.

Bringing these groups together offers the additional benefit of providing a chance to test the strength of plans by having designated experts play the role of devil's advocate (the civilian term) or conduct what military types call 'red teaming' (the good guys are generally depicted on maps with blue symbols in the United States, Australia and among their partners;

79 For more on the Los Angeles TEWG and JRIC, respectively, see Sullivan and Bauer, *Terrorism Early Warning*; and Robert Fox, Los Angeles Joint Regional Intelligence Center, Los Angeles Police Department Briefing, n.d., available from: docplayer.net/3600423-Los-angeles-joint-regional-intelligence-center-lieutenant-robert-fox-los-angeles-police-department-jric-co-program-manager-562-345-1102.html.
80 CALL, 'Operation United Assistance', 22.

the bad guys with red). The processes seek the same end by challenging assumptions, questioning the viability of plans and otherwise helping those with other than thin skin detect where their readiness merits improvement. Devil's advocacy/red teaming recognises that plans do not equal reality. Prussian General Helmuth von Moltke is famously known to have said, 'No plan survives contact with the enemy', meaning that while plans are essential to preparation, the best are flexible and designed to be moulded to the unpredictable and unexpected. The organisations that execute (and inevitably will have to adapt) those plans similarly need to be agile. Crisis response requires quick and effective adaptation when conditions demand. Yet, designing agile organisations only provides the vehicle. Training and rehearsals prepare the drivers to steer them to success.

In her intriguingly titled *The Resilience Dividend: Being Strong in a World Where Things Go Wrong*, Judith Rodin highlights the US Coast Guard's 'culture of preparedness [that] allowed them to generate rapid situational awareness, make smart assessments, and take immediate action without a specific action plan and without the go-ahead from higher ups'—the last sounding much like the mission command we noted earlier. That does not mean the Coast Guard fails to plan but rather its plans provide an outline for potential actions by units trained to assess a situation effectively and accordingly shape their actions to meet mission command guidance. Rodin contrasts this desirable combination of good planning plus organisational agility with New Orleans' Memorial Hospital during Hurricane Katrina, the facility that was at the centre of Sheri Fink's *Five Days at Memorial*. Rodin relates that the facility had 20 distinct emergency plans, but there was little evidence the separate plans had been coordinated or that staff and facility had been properly readied to react effectually in the event of a major disaster. She uses the example of expectations that the hospital's generators would run for at least 72 hours under emergency conditions—without them ever having been tested to see if they could.[81]

Other organisations share similar shortcomings. It is standard procedure for the best of them to plan, then repeatedly rehearse the plan, before ever having to put it into action. Rehearsal is all the more important when organisations unfamiliar with one another are part of an undertaking. That this did not happen before the tragedy of 3–4 October 1993 in Mogadishu—the event later known as 'Black Hawk Down'—is obvious

81 Rodin, *The Resilience Dividend*, 202.

from the comments by one of the young officers from the US Army's 2nd Battalion, 14th Infantry Regiment, 10th Mountain Division. Looking back on his participation in the operation in which two helicopters were shot down, 18 US soldiers died and another 73 were wounded, Lieutenant Mark Hollis said he:

> thought the plan 'was simple: Pakistani tanks would lead Malaysian armored personnel carriers carrying 2d Battalion soldiers … I had never seen or heard of a German Condor [the Malaysian personnel carrier] until the day of execution. Finding out how to open the door to a vehicle 15 minutes before rolling out the gate is not the way to start a mission. A platoon leader needs to coordinate through his company commander to arrange a time when the allied forces can come over and teach his soldiers about their equipment. This is particularly significant at a time when operations with other United Nations forces are becoming more frequent … How do we communicate with those who do not speak English in the midst of battle, with no interpreters available?'[82]

Good plans get better when they are rehearsed. They get better yet as more organisations that are part of the plan participate. These rehearsals can take many forms. In their sparsest sense, when time is short, a rehearsal may be little more than various organisations' leaders briefing back to seniors and contemporaries what they understand their tasks to be, how they will approach them and how their actions will impact or depend on other participants. More time improves the chances that a plan is tested and corrections are made when it is found to be in some way wanting. Ideally, time allows for full-blown, deliberate progression through a plan using detailed models of the terrain or computer simulations. These might include creating life-size mockups of key buildings or entire city blocks and repeatedly practising various courses of action for days or weeks while other participants take the roles of population members, terrorist groups, criminals, local officials or an enemy force, any of whom can and should be comfortable in that devil's advocate/red teaming role.

Bringing key personalities together to 'war game' a plan falls between these two extremes. Irreverently referred to as a BOGSAT (Bunch of Guys Sitting around a Table), the value of bringing those with the needed expertise together to identify and solve problems can pay big dividends. Another in-between approach is what the military calls 'sand table exercises' in which

82 Glenn and Kingston, *Urban Battle Command in the 21st Century*, 3.

a rough model of the terrain represents the area in which participants will execute their plan. I was once part of a sand table rehearsal where the label was more than a little appropriate. In what was a far cry from readying for an urban operation, it fell to several colleagues and me to prepare a terrain model for the US Army's 3rd Armored Division before it attacked into Iraq during the 1991 Persian Gulf War. Our planning team laid out the various boundaries between units and miniature representations of the geographic features the division would encounter—all on a large patch of Saudi desert sand. We then set about representing each of the division and supporting units on this model. Together these organisations included roughly 20,000 men and women and 12,000 vehicles of one type or another. Unlike wooded or other terrain types, the desert offered little in the way of material to help us represent infantry battalions, medical units, military police and the many other types of organisations that would participate in liberating Kuwait. There were certainly no shops nearby at which we could buy toy tanks, artillery, soldiers or other life-like pieces. Even rocks were in short supply. So, we raided a nearby tent and borrowed a few materials. The small (and flat) packets of toilet paper that come in soldier ration packs became tank battalions. Lip balm containers were artillery pieces, and so on. The result allowed the division's senior leaders to walk step-by-step through the pending attack, making sure each knew his or her role, how they would support each other and what problems might arise due to enemy action, weather or the play of chance. (The rehearsal went well, as did the attack, the only complaint coming from the Apache attack helicopter battalion commander. He was not amused that his units were represented by tampons during the rehearsal. Hey, you work with what you have.)

Another look at the 1995 sarin attack in Tokyo offers us a chance to consider might-have-beens had emergency responders, city government officials, hospital representatives and others regularly conducted detailed rehearsals (regularly being necessary because not only conditions but also individuals in key positions change). Might a rehearsal have revealed the need to create guidelines for police and maintenance personnel when confronting an unknown substance? Might a more effective way of screening the worried well from the exposed been identified? The fact that nearly 25 years after the attack it is still not routine for Tokyo's doctors to leave their hospitals and treat patients at a mass-casualty scene suggests current plans could benefit from both rehearsals and study of other megacities' experiences such as those in 2015 in Paris

(of which more later). We recognise that rehearsals offer a chance to identify previously unforeseen problems and that repeated rehearsals can likewise identify new approaches and their tailoring to specific situations. Alternatively, rehearsals provide an opportunity to address issues exposed during previous events. It is very likely that rehearsals of some sort lie behind Tokyo's commendable emergency preparations already in place. Cooperation between world megacity authorities means urban officials do not need to experience a disaster at first hand to learn from it, but each urban area will have to modify lessons to fit its own context. Yet, the case of New York City's leaders sidestepping tough decisions during the Covid-19 pandemic tells us that even the best preparations can be undone by personal shortcomings. Citizen responses to the contagion in that city, in Rio de Janeiro and in too many other cities in the United States and worldwide reflect the fact that ours is not as sophisticated a world as we might like to believe. Poking a bit of fun at itself, *The Economist* recalled a misguided passage from an 1849 issue that sounds all too familiar more than 170 years later:

> The belief in contagion, like the belief in astrology and witchcraft, seems destined to die out; and as we have got rid of all regulations … against feeding evil spirits and punishing witches, so we shall no doubt in time get rid of the quarantine regulations that were established from the old belief in contagion.[83]

Perfection is impossible. Mistakes will be made. But the prepared megacity is eons ahead of those unprepared even if flawed leadership and the wilfully ignorant seek to hamstring effective responses when crisis strikes.

Practising plans further assists in early identification of issues about the span of control (how many organisations a leader or higher-level organisation is to manage) and how participants will coordinate with one another. NGOs, IGOs and faith-based organisations, for example, are likely to number in the hundreds during a megacity disaster response. There are IGOs and NGOs that specialise in coordinating fellow organisations—obviously, excellent candidates for rehearsal participation. It is better to determine effective spans of control and symbiotic partnerships during rehearsals than later when communications are stressed, ports and airfields have become fields of competition and local authorities are overwhelmed by immediate demands. Should anyone think these challenges are overstated, let's remind ourselves of the scope of them when dealing with the number

83 *The Economist*, 'Cleanliness is next to growth', 70.

of jurisdictional entities in the San Francisco–Oakland–San Jose urban agglomeration. The number of separate governments exceeds 100 in the extended Bay Area alone. This includes 12 counties in addition to the many town and city authorities—and this is before we even begin to consider organisations formally unaffiliated with governments. The City of Palo Alto itself (neighbour to Stanford University and many associated establishments such as Stanford Health Care medical capabilities and partners that include the local Veterans Administration facility) has an extensive emergency volunteer establishment in addition to connections with various state response institutions.[84]

Rehearsals are also the time to identify what is in the realm of the possible when it comes to the nature of relationships between these many organisations. There is coordination, which in Australian Army parlance is the weakest of the trio (the Australians having provided admirably succinct definitions, of which we will take advantage here). Cooperation, synchronisation and orchestration follow in order—the last at once the strongest and by far the most difficult to accomplish:

- **Coordination (Australian Army definition):** 'An arrangement where parties operating in the theatre communicate their intended actions to one another and will self-synchronise their activities but will not negotiate the manner of their actions.'[85]
- **Cooperation (Australian Army definition):** 'An arrangement where parties operating in the theatre are under no agreement to undertake military actions together but through mutual interest will not only coordinate their actions but negotiate the manner of these actions.'[86]
- **Synchronisation (US multiservice definition):** 'The arrangement of military actions in time, space, and purpose to produce maximum relative combat power at a decisive place and time.'[87]
- **Orchestration (admittedly, my definition):** The arrangement of organisations' actions in time, space and purpose to produce maximum effects in the service of accomplishing objectives.

84 Ken Dueker (Director, Emergency Services, City of Palo Alto Office of Emergency Services), Interview with Dr Russell W. Glenn, 14 April 2016.

85 Australian Defence Force (ADF), *ADF Concept for Command and Control of the Future Force*, Version 1.0, Canberra: Commonwealth of Australia, 13 May 2019, 46.

86 ibid., 46.

87 DOD, *Department of Defense Dictionary of Military and Associated Terms*, 210.

The definitions of 'coordination', 'cooperation' and 'orchestration' are applicable to a broad spectrum of operations that include more than military or government undertakings alone (if we strike 'military' from the definition for cooperation). The definition for 'synchronisation', unfortunately and short-sightedly, fails in this regard given it is limited to military and, specifically, combat operations. Regardless, even partially attaining any of the four is a step in the right direction. Coordination is the least demanding and therefore the easiest to accomplish (recognising that 'easiest' need not imply 'easy'). It implies not only informing other alliance, coalition or partnership members but also taking steps to ensure one organisation's actions do not interfere with those of another. Even coordination will pose challenges as some organisations seek to avoid being seen as supporting, being supported by or working with military organisations. Cooperation takes coordination a step further but still falls far short of planning, preparing for and conducting actions with maximum effectiveness and efficiency. Synchronisation we can cast aside due to its definitional limitations. Orchestration is rarely attempted and seldom achieved even when numbers of participants are few and the tasks at hand are straightforward; it tends to be based on personal rather than institutional relationships. That it is hard does not mean it is not worth pursuing, especially when rehearsals give groups a chance to work out issues interfering with accomplishing their ends. Trying to achieve but falling short of orchestration should nonetheless mean better outcomes than merely shooting for the lesser goals of coordination or cooperation. Orchestration might be best viewed as a mark on the wall—one for which leaders and organisations can strive while recognising full realisation will prove elusive.[88]

This is all well and good, but expecting these literally hundreds of organisations to start working together while singing 'We Are the World' isn't going to cut it. The plans and preparations they can help improve are also vehicles for determining not only who does what but also the details of relationships as each plays its part. What will be the basis for cooperation: One organisation in charge? Rule by committee? Oversight by an orchestrating few? Chaos? Who will provide what logistical support to whom (it is helpful to determine this before a disaster or soon thereafter so organisations do not compete for limited resources, thus driving up costs and risking losing more urgently needed capabilities to others)?

88 Glenn et al., *Achieving Convergence during Humanitarian Assistance and Disaster Relief Operations*, 29–32.

Who establishes rules of engagement when lethal force might be brought to bear? Longstanding relationships with permanent members would suggest a formal alliance is the best form for laying out responsibilities. Less fixed membership with more flexible ties is far more commonplace, making a coalition the practical answer.[89] Regardless, it is better to work out as many decisions as possible before 'the balloon goes up'—decisions ideally made during rehearsals that test and work to perfect plans. Information and intelligence-sharing are sure to be points of contention. What agreements and procedures can be put in place to allow the exchange of sensitive material without undue risk of compromising participants' safety, security or intelligence-sharing policies? Much of the information needed to support emergency responses is available from open sources readily accessed on the internet, in libraries or otherwise available in unclassified, publicly available form. A well-orchestrated collective effort will have a component that consolidates information needs from members, suggests procedures for collecting that information, then gets the results to appropriate users in exploitable form in a timely manner. A good information-collection plan means every NGO aid provider, UN manager, infantryperson, local government representative, pilot, truck driver and other participant becomes a potential source and recipient if they have been told what material is of value. The quote from International Committee of the Red Cross (ICRC) representative Michael Khambatta at the start of this section makes it clear that not all members will be willing to share equally when it comes to information. For good reason. As in the case of the ICRC, some will not share specific types of information with military or other government organisations if the situation is one in which opposing sides are fighting—rightly recognising that to do so compromises their neutrality and, by extension, their value to all parties in the city or other area in which operations are taking place. Government organisations will be similarly justified in not freely sharing intelligence when it might put sources or sensitive activities at risk. Here again, the value of rehearsals comes into play as steps towards determining who shares what with whom can be addressed before the fact, reducing the likelihood of later flare-ups due to misunderstanding.

89 The long-held understanding of a coalition as 'an ad hoc arrangement between two or more nations for common action' merits reconsideration given responses to disasters now involve more than national assets. A better definition would account for the full range of participating organisations. A coalition then becomes 'an ad hoc arrangement between two or more organisations in the interest of common action'. Michael Khambatta's remarks at the top of this section make it clear that a coalition needs to be flexible in its definition of membership and willing to recognise varying degrees of participation or association. Glenn, 'Megacities'.

It will be the rarest of cases when planning and rehearsals manage to include all participants. Some will have no idea they might be dispatched to assist during a disaster. Others will not know what type of role they will be called on to play even if they suspect their talents might be of value when the time comes. Primary among these are community residents. Yet, urban authorities can support the creation of and recruitment for neighbourhood volunteer organisations. Steven Bucci makes clear the importance of recognising the person on the street's vital role in his review of New York City's reaction to the 9/11 attacks and Hurricane Sandy:

> The 'first' first responders on 9/11, as in most catastrophes, were private-sector civilians. Because 85 percent of our nation's critical infrastructure is controlled not by government but by the private sector, private-sector civilians are likely to be the first responders in any future catastrophes. It is the person whose family is safe and secure who is able to volunteer at a disaster relief center. It is a not-for-profit community food bank whose supplies are protected that can resume its delivery of meals to those who cannot leave their homes. It is the big-box retailer whose employees are accounted for and whose stores are assessed for damage that can donate bottled water and clothing to the victims of a disaster and reopen rapidly to serve its battered community.[90]

The importance of wrapping commercial representatives into the planning and rehearsal process is evident in retailer Home Depot's neighbourhood stores supporting the NGO Team Rubicon when disaster strikes a community, whether by providing parking lots to store equipment and supplies or providing goods and expertise. Another of many possible examples: bringing bus companies, school bus managers and others into the fold allows urban authorities to surge volunteers from less-affected neighbourhoods into areas where they can assist others.

As said, orchestrating (even coordinating) alliance members, coalition partners and other parties' actions in the spirit of consistency, efficiency and improved effectiveness will prove no easy task. Partners they might be, but objectives are more likely to be similar or overlapping than identical. Megacities themselves are likewise non-uniform in the sense of the various authorities governing them. City, town and other authorities that collectively are part of the megalopolis will have different motivations. The mayor of the City of Los Angeles has priorities of limited interest to

90 Bucci et al., *After Hurricane Sandy*.

the heads of Santa Monica's, Burbank's or Anaheim's governments even though all are part of the urban agglomeration that is the megacity. Even relationships at the lesser end of cooperation can have a short lifespan. This is particularly true as time goes on and success is increasingly within reach—a situation that tends to loosen the ties of shared commitment that once bound participants together. Yet, reaching for but failing to achieve that orchestration 'mark on the wall' still beats not trying at all. In Yoda-speak, hard it will be, but benefit from even limited success all will.

Despite the benefits available in harnessing residents' cooperation during planning and rehearsals, it is ore rarely mined. Politicians may feel threatened by neighbourhood groups as when Mexico City community associations stepped up after formal authorities failed to in the aftermath of the 1985 earthquake.[91] On the other hand, the Homeless People's Federation of the Philippines offers a counterexample demonstrating the benefits when governments partner with local groups. The federation has historically aided those of the established order by gathering community information during a disaster, assessing damage and making victims' needs such as for loans or building materials known, organising neighbourhood groups and acting as a trusted agent. Familiarisation with groups like the federation promotes participation during planning and rehearsals and allows early identification of who fills which niches or which niches remain unfilled.[92] Other examples of successfully mining this valuable ore include the privately owned Rockaway Beach Surf Club, in New York City's borough of Queens, and the surf life saving volunteer organisations in Sydney, Australia. The former saw flooding and some damage to its facility during Hurricane Sandy, as did the on-beach facility for the Coogee Beach life savers Down Under when storms struck. Both organisations stepped forward, continuing to operate despite the setbacks. The Rockaway club was a known location and community gathering spot. The club's leaders had a reputation for community support. It therefore made sense when it assumed the role of a local relief supply distribution centre. Anyone in need could make specific requests via the club's Facebook page—further increasing the value of its services.[93] Participation by such groups during pre-event planning and other preparations magnifies their ultimate value given they are well positioned, effectively organised and

91 Puente, 'Social vulnerability to disasters in Mexico City', 62–63.
92 IPCC, 'Urban Areas', 566.
93 Rodin, *The Resilience Dividend*, 184.

trusted. The extensive first aid and other training received by groups like the Coogee Beach Surf Life Saving Club mean they bring multiple much-needed skills that can be incorporated into plans.

A little imagination on the part of public officials and community-minded private enterprises can help in matching capabilities with sure-to-be needed requirements. Once again, New York City provides a pithy example. While Airbnb does not own the facilities it rents, it does have a potentially valuable database of empty dwellings. This potential was realised after Hurricane Sandy when one of its hosts contacted the company asking to help those rendered homeless. Airbnb employees responded by working all night to list housing for $0 a night when property owners agreed. A page was specially designed to identify owners who stepped forward—one where a click made their volunteerism known. More than 1,400 properties were made available in less than a week.[94]

Creating such a database pre-calamity could be invaluable during planning and again once catastrophe strikes. Megacities, particularly those in countries known to have stable economies and respect for the rule of law, are particularly rich in empty residential properties. It is in these urban areas that the ultrarich invest. Some residences are large enough to house multiple families. In Sydney, for example, a Chinese state-owned developer is constructing a 235-metre tall residential tower in the city's CBD. Mumbai's private Ambani residence is 168 metres high with 37,200 square metres of interior space.[95] Tax and insurance records should help with efforts to identify potential temporary residences. While the willingness of property owners to support the displaced will differ, procedures that facilitate sharing are worthy of pre-calamity consideration. Perhaps there is a need to create an emergency form of eminent domain when volunteerism falls short and suffering demands extraordinary action. In the longer term, building permits or the right to purchase by those who do not self-occupy for much of a year could be contingent on an agreement to permit others' use *in extremis*.

An observation from the 2003 Regional Assistance Mission to Solomon Islands (RAMSI) offers a chance to reconsider for those still questioning how difficult orchestration can be. Before reading, consider that at top

94 ibid., 187.

95 Robert J. Bunker and Pamela Ligouri Bunker, 'Plutocratic Insurgency Note No. 5: The Techno-Palaces of the Global Elite', in *Plutocratic Insurgency Reader*, Robert J. Bunker and Pamela Ligouri Bunker (eds), A Small Wars Journal Book, Bloomington, IN: Xlibris, 2019, 128–40, at 131, 133.

strength RAMSI had a total of only 2,000 or so participants representing the military, police, diplomatic corps, relief agencies and other organisations of 10 different countries. Any significant undertaking in a megacity might involve tens of thousands of military, aid and other personnel and their organisations. RAMSI's initial international force commander, Australian Lieutenant General John Frewen said:

> We were still discovering significant misalignment of capabilities and misunderstanding between RAMSI participants though deployment was but days away. Our saving grace was a whole of government rock drill. [This] synchronization rehearsal included all participating and supporting agency leaders along with those from academia who assisted us in better understanding the operating environment … It was to prove one of the most significant activities we conducted as a multi-jurisdictional and multi-disciplinary group. This interagency rehearsal helped all participants gain a common understanding of the plan. It also was invaluable in helping us to synchronize our efforts during the first days of the mission.[96]

Pre-combat preparations

> The worst policy is to attack cities. Attack cities only when there is no alternative.[97]
>
> —Sun Tzu, *The Art of War*

> The course of the fighting in Berlin showed that a battle for and in a large city is extremely difficult, not only for the defenders, but even for a far superior attacking force … The ability of large cities to defend themselves depended not so much on specially prepared installations, but rather on the extent to which the city is built up. The greater the destruction by fire and explosion in a city, the more suitable it is for defense.[98]
>
> —Wilhelm Willemer, *The German Defense of Berlin*

96 John J. Frewen [Lieutenant-General, Australian Army], 'The Solomon Islands Intervention: The Regional Assistance Mission 2003', in *Trust and Leadership: The Australian Army Approach to Mission Command*, Russell W. Glenn (ed.), Dahlonega, GA: University of North Georgia Press, 2020, 206–40.
97 Sun Tzu, *The Art of War*, trans. Samuel B. Griffith, New York, NY: Oxford University Press, 1982, 78.
98 Willemer, *The German Defense of Berlin*, 52.

It might seem odd to start a section on combat in megacities by looking at expanses reaching far beyond the urban area. Los Angeles depends on water sources hundreds of kilometres to the north in California. In Mexico City's case, the distance to its primary water source is almost 300 kilometres. Pumps must raise the water more than 800 metres during its flow to Mexico's capital—a literal case of the old saying that 'water flows uphill to money', for certainly the capital holds centre place as focus for the country's wealth.[99] (As a quick aside, there is solid evidence that cities were the eventual spur for the invention of money—even though cities existed for 3,000 years before someone got around to that invention.)[100] These examples and those of Manila, Hong Kong and Tokyo make it clear that one way to a megacity's heart is through its water supply. That is true whether an army needs to control all or part of an urban population or deny essentials to a defending enemy. Cities are similarly dependent on far-flung energy sources, food supplies, medical provisions (as Covid-19 made only too clear to New York City and others in early 2020) and much else without which they cannot function. Such reliance on remote resources is a vulnerability in cases where a natural disaster might sever the vital connection or when terrorists, insurgents or other malcontents seek to make the innocent suffer. Russia's Black Sea Fleet capitalised on such distant dependencies when it sailed against the Turkish port of Zonguldak on the northern coast of Anatolia during the opening weeks of World War I. It was from there that coal fuelling both Türkiye's naval vessels and the country's largest city of Constantinople came. Russia succeeded in blockading Zonguldak, denying both the Turkish fleet and the city.[101]

Human capital is another invaluable and often distant resource. Deny a city its commuting workers and it will soon cease to function no less than when it is without water, power or food. Such is the tyranny of the megasystem, much of which is not urban at all. The military commander failing to consider a megacity as part of a larger system courts failure, particularly if his competition is savvy. Theorists will tell you the character of war does not change, as it is but an extension—or tool—of politics (or diplomacy, or economics, or ideology). The nature of warfare—how

99 David Satterthwaite, 'How urban societies can adapt to resource shortage and climate change', *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences* 369(1942) (2011): 1762–83, doi.org/10.1098/rsta.2010.0350; and Villoro, *Horizontal Vertigo*, 9.
100 Smith, *Cities*, 153.
101 Mungo Melvin, *Sevastopol's Wars: Crimea from Potemkin to Putin*, New York, NY: Osprey, 2017, 353.

war is conducted—does evolve. Former general and US Secretary of Defense James Mattis observed: '[F]or all the "4th Generation of War" intellectuals running around today saying that the nature of war has fundamentally changed, the tactics are wholly new, etc., I must respectfully say … "Not really".'[102] And so it is with urban areas in wartime. Their value is not innate but rather dependent on their political, diplomatic, economic, ideological or symbolic role in a conflict's greater purpose.

Soldiers wrote much of and trained repeatedly for 'deep battle' during the Cold War. For the rifleman in the foxhole, this meant aircraft, artillery and other means of engaging the foe tens of kilometres distant to reduce what he would eventually confront at several hundred metres—the range of his weapon. The nature of those far-flung engagements might change dramatically when the focus is not an enemy force but control of some distant part of a resource delivery system. Letting Mexico City serve as a notional example of a megacity unfortunate enough to be involved in a war, the distant parts of the water delivery system let us see how many ways its parts might be used to deny the city—and how hard maintaining that vital flow of water could prove. That nearly 300 kilometres of distance and 800 metres of elevation mean the system includes reservoirs, kilometres of tunnel, stretches of aqueduct and canal and individual pumping stations all begging for a potential denier's attentions.[103] The opportunities for that denier are greater if we instead look to New York City for our notional example. That megacity's watershed of almost 5,200 square kilometres (roughly the size of Delaware), 19 reservoirs and its own system of dams, aqueducts, pumping stations and other components make those opportunities only too clear—even though the flows of the Hudson and East rivers and other smaller waterways bring freshwater directly to much of the world's most widespread megacity.[104] Among the historical sources of water for Los Angeles is Owens Valley, 307 kilometres away. Once rich with agricultural use, parts of the valley are now desert. The valley's Owens Lake has dried up completely. Beijing similarly draws so much water that most rivers in the vicinity are dry for much of the year.

---

102 Glenn, 'Megacities'. The Mattis quote is from Geoffrey Ingersoll, 'General James "Mad Dog" Mattis email about being "too busy to read" is a must-read', *Business Insider*, 10 May 2013, available from: www.businessinsider.com/viral-james-mattis-email-reading-marines-2013-5.

103 Reader, *Cities*, 189.

104 Alice Kenny, 'Ecosystem services in the New York City watershed', *The Ecosystem Marketplace*, 10 February 2006, available from: www.forest-trends.org/ecosystem_marketplace/ecosystem-services-in-the-new-york-city-watershed-1969-12-31/.

Its once primary river, the Yongding, was deprived of its last flow decades ago.[105] Both these urban areas therefore must reach further afield for their liquid sustenance, increasing their vulnerability to interruption.

Such is the situation for the commander having to attack or defend a megacity. Our rifleman in a foxhole must leave worries about those distant vulnerabilities to his seniors. His immediate concern is less one of distance than of density: that density of windows, doors, rooftops and other features from which an enemy can observe movement and bring fire to bear. Other challenges include the obstacles to his movement even when streets are not filled with rubble or other debris, the ease with which defender or attacker can manoeuvre to cut off supplies and many other features that translate what is meant by 'depth' for the soldier on the ground being at most a few blocks on a good day and a few tens of metres on a less favourable one. Should that soldier be tasked to interrupt a neighbourhood's or building's water supply, the opportunity might lie no more distant than a local shutoff valve or the nearest bridge under which pipes flow.

Even this small sample of concerns hints at why the US Army's guidance to leaders as late as 1979 directed 'that urban combat operations are conducted only when required and that built-up areas are *isolated* and *bypassed* rather than risking a costly, time-consuming operation in this difficult environment'.[106] The problem for soldiers fighting along urban streets or hacking passage through interior walls is that the sites set aside for urban combat training come nowhere close to the extent of demands found in a large urban area. That is especially true when the urban area is a megacity. Most megacities feature ocean shores or rivers. Very few urban training locations are on bodies of water, meaning it is hard to provide challenges like those police or soldiers would confront if a Mumbai-like terrorist attack or enemy amphibious landing was on the cards. Structures differ not only within each individual city but also between them—a fact evident in looking at even the small urban areas of Zamboanga and Marawi on the southern Philippine island of Mindanao. Many of the former's buildings had walls no more substantial than low-grade plywood, meaning it was one of those built-up areas where a misdirected or careless rifle shot could fell

105 Enjie Li, Joanna Endter-Wada and Shujuan Li, 'Characterizing and contextualizing the water challenges of megacities', *Journal of the American Water Resources Association* 51(3) (2016): 589–613, at 602, 605, doi.org/10.1111/1752-1688.12310.

106 Department of the Army, *Military Operations on Urbanized Terrain (MOUT)*, Field Manual 90-10, Washington, DC: US Government Printing Office, 15 August 1979, 1-1. [Emphasis in original.]

an innocent civilian or fellow soldier several rooms away. Move the soldier's unit to Marawi half the island away (and site of the vicious fighting in 2017 between the Philippine military and ISIS forces) and building materials tend to be more substantial thanks to *rido* ('clan conflicts') that make basements and concrete shelters a wise investment.[107]

Readying those who will have to fight in and around vast expanses of urban areas therefore remains an unmet challenge. Many military installations worldwide have one if not several major clusters of buildings designed to train urban attackers or defenders. Yet few of these sites challenge leaders and led with the types of highrise found in even small cities or large towns around the world today. It's an important shortfall; attacking an enemy in a 12-storey building isn't simply four times as hard as clearing one with three floors. Nor, if we reverse the lens, is the difficulty of defending taller buildings simply a matter of multiplying by the number of levels. Either task is more difficult because highrises rarely occur in isolation. They tend to have similar structures next-door, across the street and for blocks in all directions, especially in the case of megacity CBDs. The same challenges can exist in multiple locations in these largest of urban areas when the smaller cities they comprise have cores of their own. Los Angeles provides an example. The City of Los Angeles' cluster of downtown tall structures has junior companions in Burbank, Santa Monica, Newport Beach, Marina del Rey and a good number of others that are part of the Los Angeles megacity. Few if any of the installations set aside for training city fighters are vast enough to allow even a battalion taskforce (a battalion with all its added attached and other supporting units) to fight, manoeuvre, be resupplied, meet the challenges of thousands of civilian residents or realistically confront combat conditions without artificially leaving the built-up area. It is theoretically possible to cleverly use computer modelling and simulation to exercise leaders and staff at higher levels while smaller units conduct 'live' training on a training site's artificial streets and in its buildings. Unfortunately, modelling and simulation have a considerable way to go before they can accurately replicate urban combat conditions for the many levels, skill sets, responsibilities and other-than-military participants involved.[108]

---

107 Franco, *The battle for Marawi*.

108 Considerable progress was being made in the urban modelling and simulations arena during the last decade of the twentieth century thanks to the emphasis put on urban training after Operation Just Cause (Panama, 1989) and fighting in Mogadishu, Somalia (1993). That momentum was lost when focus and dollars shifted to commitments in Iraq and Afghanistan in the early years of the following century.

This inability to ready leaders and led for the social, physical, economic and other challenges at the strategic, operational and tactical levels of war has a companion temporal shortfall. Training also fails to prepare these individuals to deal with the need to look deeply in time. History tells us that the second and higher-order effects we have repeatedly mentioned often will not fully reveal themselves until fighting stops. Iraq in 2003 saw government buildings in the country's south stripped by vandals of wire, furniture and plumbing—anything that could be carried away—once US or other coalition soldiers continued their attacks northward. Governance stumbled in Iraq just as it had in post–World War II Germany when de-Nazification purged towns and cities of the individuals most familiar with their urban areas' functions. Those are the officials who know police and other officials capable of securing buildings and limiting wanton destruction of water, power, sanitation and transportation infrastructure. These are actions that if prevented do much to hasten recovery and convert battlefield success into lasting victory. Just as any urban area is a system, waging war in larger cities is a system of actions, people, decisions, immediate effects and longer-term consequences routinely addressed as separate parts and too rarely as part of their collective whole.

This need to grasp the consequences of second and higher-order effects applies to challenges short of combat as well: preparing for or denying acts of terror, and dealing with riots or mass demonstrations and other events nested in the grey area between war and more benign occurrences. Police must train for these much as soldiers must make ready for combat (and, as Charles Krulak's three-block war metaphor tells us, so, too, must those soldiers). This preparation should include equipping and training individuals who will be at the sharp end of contact about how and when to employ nonlethal in lieu of or as complements to lethal means. Both provide valuable arrows in a force's quiver of responses. Being able to draw those arrows provides a capability to render the evildoer inert while protecting innocent lives, thereby separating human chaff from society's wheat. As our long-time member of the Los Angeles County Sheriff's Department Sid Heal observed, security forces can use these less-than-lethal assets to:

- deny or protect logistics sites, gun shops, food and water distribution points and other facilities
- clear areas of demonstrators bent on violence or innocents who may unwittingly be exposed to manipulation or harm

- secure passage for security forces or relief supplies
- quarantine or isolate individuals exposed to a communicable disease or a chemical or biological agent—the latter two via either an accident or a terrorist act
- suppress undesirable behaviour such as looting, rioting or individuals bent on producing mass casualties.

Which facilities or communities to protect, which areas to clear, how to prevent the spread of a contagion and the choices made in containing those bent on disrupting megacity functions will have tactical, operational and strategic consequences locally and more widely no less than decisions made by military leaders in times of war. As is the case with those military leaders and their soldiers, the means available to prepare urban officials for making such tough decisions currently falls short of need. Lessons learned from urban responses to Covid-19 suggest much can be done to better prepare for the next bio-crisis—one unlikely to wait the century that separated the 1918 flu and the virus bursting on the New York City scene just over a hundred years later. Drawing on their years of studying quarantines, authors Geoff Manaugh and Nicola Twilley suggest recognising how public and private facilities might be designed to support infection control so they are 'substantially cheaper and faster to flip in an emergency situation—not to mention much easier to return to their original function once that danger had passed'.[109]

Pre-disaster capacity-building

> One very highly successful response to sudden shocks in cities is routine planning.[110]
>
> —Aseem Inam, *Planning of the Unplanned*

> Every disaster is a rehearsal if treated appropriately.[111]
>
> —Geoffrey Demarest, 'Urban Land Use by Illegal Armed Groups in Medellin'

109 Geoff Manaugh and Nicola Twilley, *Until Proven Safe: The History and Future of Quarantine*, New York, NY: Farrar, Straus & Giroux, 2021, 169.
110 Inam, *Planning for the Unplanned*, xiii.
111 Geoffrey Demarest, 'Urban Land Use by Illegal Armed Groups in Medellin', in *Blood and Concrete: 21st Century Conflict in Urban Centers and Megacities*, Dave Dilegge, Robert J. Bunker, John P. Sullivan and Alma Keshavarz (eds), A Small Wars Journal Book, Washington, DC: Xlibris, 2019, 102–20, at 115.

It is worth pausing to ask how much disaster preparation of a megacity's population is necessary, wise or economically feasible. Certainly, Mexico City's highrise apartment building earthquake drills are worth emulating regardless of whether the natural threat is shaking earth, floodtide, slipping soil, devastating storm or a volcano's ash and fire. The limits on physical interactions and wearing of masks during the 2020 Covid-19 crisis demonstrate that large numbers are comfortable with—even supportive of—inconvenience in the service of others' health, fellow citizens' employment and their own welfare even when the less enlightened are not. There will always be understandable, though not acceptable, efforts to sidestep policies dictated in the interest of the greater good. A grandfather with his grandchild in a megacity subway might seek to escape despite authorities' orders to remain in place to prevent spreading human contamination due to a chemical or biological attack. Those with similar intentions could quickly overwhelm police tasked with containing dissemination—another instance in which nonlethal means of enforcing quarantine or isolation could be valuable.

In the years before the Japanese invasion of the British colony of Hong Kong in World War II, residents successfully resisted the building of pillboxes and other unsightly defensive positions in their neighbourhoods. It would not be the only factor underlying the quick Japanese capture of the colony. It is nonetheless a revealing case of security nimbyism ('Not in My Back Yard')—a phenomenon more common today in the context of low-income housing, power plants, drug rehabilitation accommodation or other facilities thought to be unpleasant when nearby. Confronted with the question of whether to install generators to support flood-control pumps, experienced Miami Beach city engineers waved off the initiative. Experience told them citizens would never allow them because 'they were ugly'.[112]

We find that urban types are in some ways not much different from humans anywhere. There will be those as short-sighted as Hong Kong and Miami residents, sure to later complain that city officials failed to properly prepare them for disaster. As with those unwilling to wear masks and take other precautions in 2020, large numbers will fortunately show they are made of stronger stuff. Londoners, Hamburgers and Tokyoites were among the millions of residents who suffered tremendously yet prevailed

112 Ariza, *Disposable City*, 50.

during the bombings of World War II. It was not the first time these cities' populations demonstrated their resilience. London recovered from devastation wrought by the Black Death and the horrific fire of 1666. Hamburg was destroyed by fire in 1284 (apart from, reportedly, a single building) and its economy was devastated during French occupation in the Napoleonic Wars.[113] We know that Tokyo's 1923 fires were but one of many devastations by flame. Our discussion regarding the misnomer of cities being akin to organisms told us that the world's larger urban areas are survivors. It is the human organisms living within who ensure their recovery.

Responses to crisis should be guided by standing plans and procedures known to urban residents. Public education programs meant late twentieth-century Londoners were aware of how to report a parcel left unattended in public as terrorism from Northern Ireland threatened. Rehearsals should include devil's advocate input from residents capable of challenging officials by presenting realistic scenarios or countering false assumptions. Importing veterans of megacity disasters elsewhere brings fresh yet experienced minds to the task. Lessons might include those from 9/11 in New York City when both on-duty and off-duty emergency response personnel rushed to the point of attack. These were commendably good intentions, but one might ask how those living and working elsewhere in Manhattan would have been served had there been additional strikes elsewhere on the island. The conditions as police and firefighters dealt with the ongoing disaster at the Twin Towers lend a clue:

> The city's intricate network of safety coverage showed signs of unraveling that morning because of the headlong rush to Lower Manhattan. Police officers left their posts … At Ladder Company 16 on East 67th Street, four firefighters who were scheduled to go off duty wanted to stay and help. But Lt. Dan Williams told them 'to get the hell off the rig,' he said later. 'Why? I took one look at the TV and I said, 'We're going to lose people here today.' There was no doubt in my mind' … The men got off. Then they went outside and caught rides to the trade center in a police car and a city bus. One was killed in the collapse of the north tower. He was among the 60 off-duty firefighters to die … 'You have to train them,' said the Port Authority police chief, Joseph

113 Keith Lowe, *Inferno: The Fiery Destruction of Hamburg, 1943*, New York, NY: Scribner, 2007, 7, 11.

> Morris. 'You can't have everybody coming in' … At one point, the Emergency Medical Service had no ambulances for some 400 backed-up emergency calls.[114]

Multi-location terrorist attacks could become more common in future. We have already covered the example of 2008 in Mumbai and will look in detail at another, including assaults on Paris's Stade de France sports stadium, a restaurant and the Bataclan concert hall in November 2015. Effective response plans require that sufficient capabilities are held in reserve (as was the case with medical teams during the Paris contingency). Casualties need not be the only objective of attackers. Assessment of responses needs to incorporate how leaders can mitigate negative economic, diplomatic and other consequences not only for the city itself but also for the larger system of which the urban area is a part.[115]

Overcoming 'been there, done that' resistance to public guidance will be a particular challenge. Individuals who have survived previous hurricanes or typhoons are more likely to ignore orders to evacuate, the previous event having instilled a belief that they will be able to ride out what is to come. Bureaucracy can also play a hampering role. There are several reasons New York City failed to respond more effectively to Hurricane Sandy. A too-late call for evacuations was among them. So was an unexpected change in the way warnings were passed to city officials. The expected source of information, the National Hurricane Center, could no longer provide advisories or storm forecasts once the storm dropped out of hurricane status before making landfall. The centre's software would not allow for a continuation of those services. New York City authorities' ability to process information was handicapped once they were denied that source and information began arriving from another organisation in a different form.[116] New Orleans confronted a similar bureaucratic seam—theirs involving a post-disaster problem. 'After Katrina left hundreds of bodies to decompose in homes and streets,' one historian reported, 'Louisiana officials looked to the Federal Emergency Management Agency for help in removing them. But since cities and localities had historically recovered bodies from mass casualties, FEMA says, it had made no arrangements.'[117]

---

114 Dwyer and Flynn, 'Fatal confusion'.

115 This paragraph is adapted from Glenn, 'Terrorism and cities', 4–5.

116 Simon Worrall, 'Two years after Hurricane Sandy hit the US, what lessons can we learn from the deadly storm?', *National Geographic*, 19 October 2014, available from: www.nationalgeographic.com/adventure/article/141019-hurricane-sandy-katrina-coast-guard-hunters-ngbooktalk.

117 Brinkley, *The Great Deluge*, 610–11.

Planning and rehearsing before an event offer a chance to both ask and answer the many 'what if' questions sure to arise when knowledgeable citizens and officials gather (a solid reason for ensuring participants at such events are more than token representatives of their organisations).

The quote that 'every disaster is a rehearsal if treated appropriately' offers value for those willing to listen to its lessons. Junichi Hanawa's personal experience while travelling during the 5 September 2018 great Hokkaido earthquake is one such lesson. Used to relying on credit cards, as are most of us, he found himself short of currency when power outages rendered automatic tellers, credit card machines and other sources of cash or means of payment inoperable. Fortunately, the local airport and his hotel provided travellers food and drink free of charge. Realising such services might not always be available, Hanawa now carries a reasonable amount of emergency cash when travelling. His experience again reinforces one of this book's basic premises: lessons from and preparations for one type of disaster offer insights to those of another. The habit of always carrying emergency cash is a bit of insurance regardless of a calamity's cause. Hanawa's experience also tells us that officials or volunteer service providers should plan how they will tell both visitors and locals where necessities can be found when normal ways of communicating are lost.[118]

Concluding thoughts on preparation

> In many cities, there is evidence of what used to be a 'once in a hundred years' event becoming more common than this. In addition, cities are also vulnerable to any damage to the larger systems on which they depend—for instance for water supply and treatment, transport and electricity (and thus everything that depends on electricity, including lighting, pumping and communications).[119]
>
> —David Satterthwaite et al., *Adapting to climate change in urban areas*

> According to the Overseas Development Institute, a British think-tank, and the Global Facility for Disaster Reduction and Recovery … just 12% of disaster-relief funding in the past two decades

118 Glenn et al., *Achieving Convergence during Humanitarian Assistance and Disaster Relief Operations*.
119 Satterthwaite et al., *Adapting to climate change in urban areas*, 17.

> has gone on reducing risks in advance rather than recovery and reconstruction afterwards. That is despite evidence that a dollar spent on risk-reduction saves at least two on mopping up.[120]
>
> —'Disaster foretold', *The Economist*

Most megacity infrastructure was built when sea levels were lower and our understanding of urban systems' vulnerabilities was less. Backup generators, the circuit-breakers and fuel pumps on which they rely and other emergency features have again and again been proven to be located too low to survive recent events in New York City (Hurricane Sandy), Fukushima, New Orleans (Hurricane Katrina) and elsewhere.[121] Furthermore, accreditation standards for emergency generators tend to focus on short-term outages as would occur if a tree cut powerlines rather than days or weeks as is now not unusual. Even when working, backup power generation is often insufficient to meet all critical needs—for example, not only a hospital's medical equipment, but also its heating, airconditioning and ventilation systems.[122] In a world increasingly threatened by cyberattacks, plans that fail to consider strikes that simultaneously neutralise multiple parts of a system's electrical power, fuel supplies and traffic controls, for example, are inherently flawed. As megacities grow, the penalties for unpreparedness and the costs of recovery do likewise. Storms, earthquakes or other events that in the past might have been only inconveniences would now qualify as crisis-makers given sea-level rise, slum expansion into increasingly vulnerable areas, substandard construction and other factors. Were increased severity not enough, the greater frequency of climate change–related catastrophes will add to the suffering.

New York City's first Covid-19 case was confirmed on 1 March 2020. The number of confirmed or suspected cases by the end of May was 10,437 or more than 113 a day. Nearly one in five of those patients required

120 'Disaster foretold: Planning for El Nino', *The Economist*, [London], 7 November 2015, 55–56, at 56.

121 For example, during Hurricane Sandy in New York City, basement flooding overwhelmed fuel pumps in Tisch Hospital. Two blocks to the south, Bellevue Hospital, which also had its backup generators' fuel pumps in the basement while the generators themselves were on the thirteenth floor, had sealed the pumps behind 'submarine doors' made of steel and rubber after Hurricane Irene threatened in 2011. To no avail: Hurricane Sandy's floodwaters drowned the fuel pumps. David Oshinsky, *Bellevue: Three Centuries of Medicine and Mayhem at America's Most Storied Hospital*, New York, NY: Doubleday, 2016, 300–1, 304–5.

122 For example, see Fink, 'Beyond hurricane heroics'.

admittance to an intensive care unit.[123] Writing in his *The Plague Year*, author Lawrence Wright concluded that experience dealing with an epidemic or pandemic and leadership were the two factors most critical to successfully dealing with the onslaught of a major disease. Countries and cities that had dealt with SARS—Taiwan, Hong Kong and Vietnam among them—tended to better handle Covid-19.[124] Better-led countries, states and urban areas also tended to better handle Covid-19 in contrast with places where wavering, pliable or incompetent politicians were unwilling to introduce and enforce restrictions.

Mexico City lacked both pandemic experience and effective leadership when Covid arrived. Policymakers closed restaurants but allowed the city's subway system to continue service for its more than 5 million daily passengers.[125] While Seattle's public health system provided wise council, New York City's mayor urged residents to take advantage of public and private facilities. Another critical element in Seattle's success: while its citizens paid attention and took precautions, those in New York and elsewhere largely failed to do so until it was too late. Dangers unsurprisingly also proved greater when an urban area was a major transportation hub. The period December 2019 to March 2020 saw more than 3,000 direct flights from China to the United States, most of which arrived in New York, Los Angeles or San Francisco.[126] New York's death rate from Covid-19 would be 294 per 100,000, that of Los Angeles 201 while Seattle's was only 64—well below the 135 US average.[127]

Experience is a fickle mentor. Yes, living through a hurricane can cause someone to underestimate the danger even when the one threatening is far more powerful than the previous storm. But time also plays a role. US cities brutalised by influenza in 1918–19 remembered little from their century-old experiences, despite the means available for dealing with a pandemic being surprisingly similar whether in the early twentieth century or the second decade of the twenty-first. Those countries that had dealt with SARS effectively likely benefited from their governments'

123 Syra Madad, Nicholas V. Cagliuso, Sr, Dave A. Chokshi, Machelle Allen, Remle Newton-Dame and Jesse Singer, 'NYC Health + Hospitals' rapid responses to COVID-19 were built on a foundation of emergency management, incident command, and analytics', *Health Affairs*, 11 June 2020, available from: www.healthaffairs.org/do/10.1377/hblog20200609.171463/full/.
124 Lawrence Wright, *The Plague Year: America in the Time of Covid*, New York, NY: Alfred A. Knopf, 2021, 239–40.
125 Villoro, *Horizontal Vertigo*, 249.
126 Wright, *The Plague Year*, 76.
127 ibid., 241.

and populations' experiences being more recent. Masks, physical separation, quarantine, isolation and enforcement of health authority dictates were and remain vital:

> [In 1918, New York's] health commissioner, Dr. Royal S. Copeland, enforced compulsory isolation and staggered business hours. He allowed individual theaters and cinemas to remain open, but only if they were well ventilated and banned coughing, sneezing, and smoking. Sanitary police stood guard to yank anyone out of the audience if they violated the rules. [Meanwhile,] on September 27, about 200,000 Philadelphians crowded along Broad Street to watch the [World War I Liberty Loans] parade … Infections skyrocketed … Philadelphia had the second-worst mortality rate in the nation.[128]

Influenza killed roughly 40 million people worldwide during the 1918–19 pandemic, 550,000 of them Americans.[129] Ignorance was another feature common among too many of those dealing with the influenza and Covid-19 pandemics. Refusals to wear masks in 2020 had predecessors a century earlier in San Francisco's 'Anti-Mask League'—an organisation that included doctors and community leaders in its ranks.[130] Its reward: San Francisco's influenza excess death rate would rank among the worst of 43 US cities considered in a study looking back on the pandemic. St Louis ranked among the best thanks largely to early implementation and sustainment of policies that included a layered approach to defeating the disease's spread.[131] ('Layered' here refers to employing multiple policies such as closing schools and cancelling public gatherings. An early twentieth-century official compared it to Swiss cheese: one layer would be full of holes, but by layering the slices, many of the holes are closed.)[132] New Orleans

128 ibid., 51–53.

129 Howard Markel, Harvey B. Lipman, J. Alexander Navarro, Alexandra Sloan, Joseph R. Michalsen, Alexandra Minna Stern and Martin S. Cetron, 'Nonpharmaceutical interventions implemented by US cities during the 1918–1919 influenza pandemic', *Journal of the American Medical Association* 298(6) (2007): 644–54, at 644, doi.org/10.1001/jama.298.6.644.

130 Wright, *The Plague Year*, 54–55.

131 Markel et al., 'Nonpharmaceutical interventions implemented by US cities during the 1918–1919 influenza pandemic', 651.

132 Wright, *The Plague Year*, 54–55. Wright later (p. 105) cites Marchionne di Coppo Stefani, who provided a sense of the social devastation resulting from the Black Death in fourteenth-century Europe: 'Child abandoned the father, husband the wife, wife the husband, one brother the other, one sister the other … Those who were responsible for the dead … threw them into the ditch.' Cheese metaphors must be particularly popular when describing pandemics, as Stefani went on: 'The next morning, dirt was thrown on the bodies as new corpses were piled on, "layer by layer but like one puts layers of cheese in a lasagna".'

allowed Mardi Gras celebrations during the flu pandemic; Orleans Parish would soon have the country's highest death rate.[133] When city authorities were not quick to adopt effective policies, it was their citizens who paid in dead. New York City's response was early and sustained but not layered; its excess death rate reflected the flawed approach.[134] Pittsburgh, with the worst death rate in the country, was slow to implement interventions, did not sustain them and applied them individually rather than by layering.[135] Among the lessons: effective responses include four characteristics. They are *sustained* in duration, *orchestrated* in the sense of bringing all necessary capabilities to bear, *layered* in approach and *early* in application, which makes for a nice acronym should one be sought: SOLE.

From lessons to plans

> One of the devastating consequences of Sandy was its impact on research. The storm … drowned thousands of animals stacked in basement cages; the power outage … ruined precious cell lines and specimens stored in laboratory freezers. [We] 'lost some of our archives—samples obtained from villages and patients all over the world … They were irreplaceable' … Some of the samples were hazardous if not properly contained … Criticism also came from those who had suffered similar losses in the past. In 2001, Hurricane Allison drowned tens of thousands of caged mice at the Baylor and University of Texas medical research facilities in Houston, along with dozens of monkeys, rabbits, and dogs. Five years later, Katrina killed thousands more living underground at LSU [Louisiana State University] and Tulane. As a result, all four universities had taken steps to prevent a recurrence. 'We will never place animals or critical equipment in the basement again,' UT's [University of Texas] president declared.[136]
>
> —David Oshinsky, *Bellevue*

Every disaster and exercise potentially offers lessons—examples or insights—of value during disaster planning, lessons that might well preclude repeating mistakes made elsewhere, as was the case with the research losses consequent of Hurricane Sandy in New York. To provide but a few additional samples:

133 ibid., 79.
134 Markel et al., 'Nonpharmaceutical interventions implemented by US cities during the 1918–1919 influenza pandemic', 651.
135 ibid., 651.
136 Oshinsky, *Bellevue*, 308–10.

- As every disaster offers lessons, planning, exercises and gaming of possible responses should not only draw on similar historical events but also adapt those from others. The effective response of Paris's medical system to the city's 2015 terrorist attacks and problems identified after Tokyo's 1995 sarin experience hold multiple disaster management insights despite their very different forms of threat.
- Disaster responders need to prepare for urban contingencies in our increasingly urbanised world. Pehr Lodhammar's explosives-clearing in Mosul confronted his experts with never-before-seen challenges. Their previous experiences were limited to less urbanised environments. The example provides a warning of just how different urban conditions can be. Many NGOs and IGOs have rarely conducted operations in a major urban area.
- Urban hospitals have learned a tremendous amount during the Covid-19 pandemic. One-on-one and many-on-many exchanges of lessons are hopefully forthcoming. Likewise, articles such as those written by Dr Tetsu Okamura after the 1995 sarin attacks on Tokyo's subway and that by Martin Hirsch describing the response to the 2015 Paris terrorist event are invaluable for advising the catastrophe planning and preparations of other urban areas. Such articles and books on the medical challenges associated with urban disasters can be a starting point for plans or exercise design. Among the many other lessons relevant to medical responses:
  - Design plans and standards for the long haul. New Orleans after Hurricane Katrina and New York after Sandy both saw power outages that lasted for days. Account for such possibilities even if standards dictated by others do not. Machines are not the only resource inadequately studied. Staff of Bellevue Hospital in New York City 'knew instinctively how to click into emergency mode. Before Covid, that might last thirty or forty minutes—say, with a patient who has a heart attack. If there is a bus wreck or a mass casualty event, emergency mode could last all day. But with Covid, it was day after day for weeks on end.'[137]
  - The military calls it 'cross-training'—being able to perform duties not normally one's own. In New York City, nurses had twice as many intensive care unit (ICU) patients to care for during crisis periods in 2020. 'Some departments, like emergency, were

137 Wright, *The Plague Year*, 113.

constantly on the verge of being swamped; others were looking for a role to play. Ophthalmologists were helping in the ICU; general surgeons treated non-COVID patients; and orthopaedic surgeons began devoting their entire shifts to turning patients—"proning"—to facilitate breathing.'[138]

- We will find that the Paris medical system managed patient loads well during the megacity's 2015 terrorist attack. Tokyo in 1995 and New York in 2020 did so less effectively. Efficacy is not a matter of management alone. Compatible communications—reporting a hospital's status in terms of not only bed availability but also specialists, general staff, equipment, supplies, human remains storage, power generation, overpressure capacity and other variables—all during periods when power or routine means of communication are limited—requires extensive pre-event planning and practise.
- Personal protective equipment works, yet Tokyo's medical facilities in 1995 and those in New York in 2020 lacked the requisite numbers and types needed.
- As is to be expected during not only pandemics, but also biological, chemical or radiological terrorist attacks, patients will have to be isolated from their families. Procedures for linking families with those receiving care should not be ad hoc as was frequently the case in 2020 when nurses and other staff shared their personal phones for video conferences so family members could say goodbye as death loomed.[139]
- Expect assistance from outside sources. Thirty thousand personnel responded when New York called for help in dealing with Covid-19.[140] How to integrate these individuals into staff rotations, house and feed them and otherwise ease the process of incorporation when billeting is limited and domestic staff are already overburdened is best planned before the need arises.
- Seemingly dissimilar facilities might hold lessons of immediate importance. The spread of Covid-19 in prisons and assisted-living facilities made them potential laboratories for studying the virus's spread and other characteristics.

138 ibid., 114.
139 ibid., 113.
140 ibid., 116.

  - Cancelling all elective surgical procedures, centralising supply chain operations, implementing or revising phone hotline and telehealth operations, level-loading patients within as well as between facilities, developing alternative care locations (such as ICU capacity)—all will have application to multiple types of urban disaster response.[141]
  - As with any disaster plan and response, keep an eye on near and more distant-term post-calamity demands. Hospitals immediately cancelled elective surgeries as crises in Tokyo, Paris and New York became apparent. Patients with life-threatening conditions put themselves at additional risk by not coming to hospitals as they sought to avoid exposing themselves to Covid-19. Addressing resultant backlogs in such cases might be eased by informed decisions made before and during a disaster. Most backlogs, though unavoidable, can be mitigated. Alternative procedures and the use of pharmaceuticals in lieu of immediate surgery require pre-event study and dissemination to practitioners and policymakers.
  - Contemplate the challenges in even the seemingly routine. Patient evacuation, including prioritisation, movement during power outages, sustainment of essential care (for example, breathing assistance), transport down stairwells, handling of grossly obese, mentally ill or incarcerated individuals—these and other procedures proved extremely challenging in the aftermath of both Hurricane Katrina and Hurricane Sandy.
- 'Make the training harder than the game.' Bring in outsiders to challenge organisations' assumptions, including politicians' decisions. Judgements made during non-stressful exercises when doughnuts and coffee are on the table are unlikely to withstand reality when rulings carry job-threatening potential. Devil's advocates should include the play of corruption, criminality and favouritism in their inputs during planning and exercises, as the case of funds distribution in post–Hurricane Sandy New York City made clear: Langone Hospital 'had already received $1.2 billion from the Federal Emergency Management Agency … Bellevue, meanwhile, had received only $117 million from FEMA … The report sparked more anger than surprise. Who didn't expect a well-connected private hospital to get preferential treatment?'[142]

141 Madad et al., 'NYC Health + Hospitals' rapid responses to COVID-19'.
142 Oshinsky, *Bellevue*, 312–13.

Good plans and exercises can save millions of dollars in addition to lives. Federal stimulus cheques and the Paycheck Protection Program were hastily implemented and inefficient. While some of the deserving benefited, many others were not in need of the programs' help. The latter is thought to have cost taxpayers about $375,000 for every job saved in part because cheques went to companies that were not planning to lay off many workers. Off-the-shelf, preplanned and rehearsed programs developed by urban leaders could do much to preserve fiscal resources. They would also provide guidance for difficult decisions that will have to be made during a disaster. Hospitals will face triage decisions when it is impossible to provide the necessary care to all patients; standards should be in place before those decisions become necessary. Similar guidance should be available in support of economic triage. One estimate expects that perhaps one-third of New York City's small businesses will never recover from Covid-19 closures.[143]

Preparing now saves lives later, lends organisation to what will otherwise be chaos and both speeds recovery and reduces its costs. It won't be easy. Planning, rehearsing, otherwise practising responses, stockpiling essential stores and equipment, designing and conducting training and putting in place the many other components of preparations are demanding and expensive. They also are not one-shot events; repetition and updating are key to avoid backsliding.

Yet, there is good news. Science is already stepping forward in ways that combine forecasting with political awareness and the power of data to decrease if not prevent disaster's effects. Providing money to Bangladeshis who are at risk of flooding has proven valuable when the funds are specified for use in moving out of harm's way.[144] Virginia health officials in the state's populous south-east have demonstrated they can detect Covid-19 in human wastewater even before individuals have symptoms, thus presenting the possibility of early identification and institution of preventative measures before a virus spreads its suffering. Similar approaches have been successful in tracking polio, opioid use and leaking sewage that could contaminate local waterways and spread disease.[145] Another study using sewage testing found reasonable association with

143 Wright, *The Plague Year*, 144, 235.
144 'Missions impossible: Global firefighting', *The Economist*, [London], 20 June 2020, Special report pages 6–9, at 8.
145 Marie Albiges, 'Wastewater could be indicator of where virus will strike: Surges noticed in water prior to spike in cases', *The Virginia Gazette*, [Williamsburg, VA], 12 August 2020, 2A.

Australian census data. Caffeine consumption correlated positively with education levels (especially when coffee is five bucks a pop, presumably). Amphetamine use (unsurprisingly) did likewise with crime. Other associations addressed social life, housing status and income.[146] It does not take a lot of imagination to realise that such information could help in planning for the allocation of resources post disaster. For example, if a megacity's poor are known to suffer specific medical challenges, as is the case in parts of New York's Brooklyn, specialists and medications addressing those could be prepositioned to facilitate treatment even before misfortune visits.

Preparation efforts will have little chance of success unless they build on what was learned (or should have been learned) from previous events. Better-run megacities recognise that their interconnectedness can serve residents' security if they share in drawing on past experiences. We noted that New York City maintains direct connections with other major world cities and routinely shares lessons learned from terrorist and other events. They will surely do the same given their misfortune in being the United States' first major Covid-19 epicentre. Members of the Japan Ground Self-Defense Force readying to support the 2020 Summer Olympic Games benefited from interactions with representatives drawing on experiences with the Los Angeles, Sydney and Rio de Janeiro Olympics and other major sports and security events. Recalling the importance of the citizen as *first* first responder, we remind ourselves that obtaining critical information may be as straightforward as ensuring residents know: 1) what information will help megacity authorities act most effectively, 2) who to contact with that information, and 3) how to do so (including when normally available communications are not available). A fourth step, providing feedback to residents who provide information—notably, publicly praising the action—is also crucial as it encourages them to do so again while prompting others to do the same.[147]

The dramatic expansion of social media and those platforms' capabilities are ripe for innovative ways of sharing information in times of disaster. Plotting locations on app maps or providing photos of victims and sites to aid responders dispatching resources means authorities can facilitate getting the right stuff to the right place, helping to avoid the

146 'Class acts: The socioeconomics of sewage', *The Economist*, [London], 18 July 2020, 65–66.
147 Brian Jenkins provided a brief on these four elements during a session attended by the author. While the context at the time was counterterrorism, the quartet applies equally to other situations.

squandering of always limited government, NGO and other resources. Urban catastrophes are also rich in crowdsourcing opportunities, but the payoff will be far less if they are not planned for before a crisis. Identifying these opportunities and including them in rehearsals will reveal shortfalls and ways to make the good even better. Testing new capabilities means less chance of making the mistake Japanese authorities discovered too late when they relied on the internet to notify older victims of the Fukushima nuclear reactor failure who were not internet users. More robust rehearsals that test capabilities such as the sharing of photographs, video, map locations, victim status and location and other information provide insights lost in less bold exercises. A simple example: running an exercise based on a two-dimensional map could fall short of revealing the importance of the third dimension that provides rescuers with crucial information—whether a victim is at ground level, below ground or on an upper floor.[148]

No amount of preparation will ready a megacity for all possible situations. Murphy's Law tells us that preparing for 100 contingencies means fate will pitch number 101; but readying for that 100 makes residents and officials alike better able to adapt to the unexpected, unexperienced and unforeseen so that the actions required are not too distant from the familiar.

148 Glenn et al., *Achieving Convergence during Humanitarian Assistance and Disaster Relief Operations*.

This text is taken from *Come Hell or High Fever: Readying the World's Megacities for Disaster*, by Russell W. Glenn, published 2023 by ANU Press, The Australian National University, Canberra, Australia.

doi.org/10.22459/CHHF.2023.06