Megacities
– Assessment Factors

by Gus Otto and AJ Besik

Looking around without seeing anyone; asking without being in earshot of someone; and walking in any direction without having to watch out for someone may indicate you are in a megacity. So what is a megacity? No one really knows, and that is a problem. The UN arbitrarily defines a megacity as something larger than 10 million people. John Wilmouth, Director of the UN's Department of Economic and Social Affairs Population Division rightly states, "Managing urban areas has become one of the most important development challenges of the 21st century. Our success or failure in building sustainable cities will be a major factor in the success of the post-2015 UN development agenda." The literature suggests there is no single analytic, comprehensive tool for analyzing this new phenomenon.

During the rigorous year-long courses at the Combined Arms Center, Fort Leavenworth, Kansas, students work on solutions for the future, by asking hard questions now. For example, will the Army deploy to a foreign location to fight in a megacity? If so, how does it prepare its Soldiers to do so? What equipment will it need? How will operating in a megacity affect its fighting style and doctrine? How will it support civil authority and humanitarian assistance? How does it engage in peaceful activities despite its regular and aggressive wartime training? In each of these scenarios, how might it cooperate with other local and national authorities and members of the international community? These are great questions, with long-lasting implications and consequences; however, without an assessment system for considering, measuring, weighing, or prioritizing issues germane to megacities, these questions are premature.

The purpose of this article is to outline several ways to think holistically about analyzing a megacity. Two trends shaping the growth of megacities are the draw of urbanization and the increase

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in globalization. They are complementary, not exclusive, and they are not the only reasons for their growth.

Megacities are organized into three broad categories—hard, soft, and intervention environments. The hard category considers all the physical issues relating to the city itself. It is the x, y, and z axis, it is the infrastructure, and it is the sustainment and logistical aspects. It is the focus of city and urban planners and engineers on a daily basis. It is its own system of systems, as many components are interconnected, and interdependent. The soft category consists of how humans engage with one another—what the Army calls the human domain. The final category—intervention environments—is of particular interest to the military, first responders, nation-builders, and development specialists. This category considers how a group might provide aid and relief to a segment of or the entire megacity and issues relevant to limited combat operations.

Hard Category Considerations

Scale and Density

The issue of scale is paramount. There are issues unique to megacities not present or simply non-issues for smaller cities. Down-scaling may offer new and creative ways to address issues not explored previously in smaller-scaled settings. For example, various means for transportation, communication, or even hygiene in a regular city may instantly be overwhelmed in up-scaled megacity environs. The density of a population in a megacity is an important early factor to consider when discussing scale.

When thinking of population density, visualize a column of sand. Wet, packed sand can support itself in a tall column. Dry, loose sand flows into a heap more readily. The stability of the sand column is not as important as the behavior of the density. Consider *Demographia's World Urban Centers* latest report:

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By necessity, average data masks significant variations within urban areas. For example, the population density of the Phoenix urban area is more than half-again higher than that of the Boston urban area. Yet, the highest population densities of the Boston core are at least five times that of the highest density areas in Phoenix. Moreover, Boston has a far larger commercial core ("central business district" or "downtown").[1]

The difference is that Phoenix suburbs are denser than Boston suburbs, which highlights the importance of at least recognizing the role density may play in assessing a megacity. How hard aspects of a megacity are addressed will depend on the density of the location. Density often will affect the vertical component of the megacity, meaning there may be more people living in a square kilometer because they are stacked upon each other in multi-story buildings or even below ground.

There is a growing appreciation for five dimensions of a megacity: width, depth, breadth, time (as real and perceived culturally), and awareness (as knowledge, belief, and perception). The first three are clearly within the hard, geospatial world. Further, there can also be a negative vertical component. For example, in several of the more developed megacities, there are subterranean aspects for travel, communication, and living and storage spaces. These subterranean components drive use of space considerations, access, and measurement challenges and are important considerations during man-made disasters (terrorism, subway breakdowns, or pipe bursts) and natural ones (earthquakes, cave-ins, or floods).

Water, Food, Sanitation, and Energy

Water must be available to the population. Water is not just used for hydration, but also for sanitation, cooling, transit, and production. Conflict points quickly rise where water scarcity exists. Long lines for water in Sarajevo and Tuzla brought civilians to the few precious water sources in those towns, despite the threat of snipers, checkpoints, and mortar attacks. In Sudan, people walked all day in hopes of filling their water jugs, and in Syria, parents risk life and limb to get their children enough water to survive. Consider the historic water agreement between Jordan and Israel.[2] Density shortens the period available to provide water. While traditional piped water is ideal, it is not omnipresent, except in the most advanced cities. Even in advanced cities, water is susceptible to short-term outages and catastrophic interruptions. The longest an average member of a megacity can last without water is far more limited because his or her access to water is also limited.

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Water's importance cannot be overstated. History is replete with examples of wars over water, water rights, water ways, access to commercial value of harbors and ports, and so on. In the future, especially in a megacity, water becomes even more complex. Consider, for example, megacities that must desalinate, recapture, or purify their water supplies or have a pressure or piping challenge. Water distribution points become fragile spots where interruption compounds demand. Megacities present a unique water supply vulnerability.

Food is another base-level factor relevant to a megacity. In a megacity, there is a greater demand for quantity, but for quality and variety as well. Further, perishable food stuffs create a greater concern due to the difficulty to transport, store, refrigerate, and prepare them. Wasting, spoiling, and rotting are issues that undermine food security and also create rippling burdens on waste disposal, transportation, and commerce. Contamination due to tainting, accidental contamination, or exposure to disease is another significant concern. Consider food-borne illnesses, such as E. coli, Salmonella, or Hepatitis A running rampant through a population-dense megacity; then consider the strain this scenario would place on hospitals, transportation, sanitation, and businesses. Because the second and third order effects of its frailty are compounded, foods plays a major role in a megacity.

The importance of sanitation in a population-dense megacity, where a build-up of filth, excrement, and garbage can close streets and shut down sections of a city is undeniable. Even the presence of giardia and other microscopic parasites or sources of dysentery threaten the health and wellness of a megacity, and stand to cripple it if sanitation is not a constant consideration. Recognizing the need to rid a megacity of its various waste is critical to avoiding infection, the development of rodent infestation, and the real risk of increased contamination of food, water, air, and habitation.

Water, food, and sanitation all rely heavily on some kind of energy; therefore, energy is critical to a megacity's success and longevity. Energy is required for transportation, communication, and production. Energy can take the form of classic fossil fuels or new forms of alternative energy. Energy disruption can devastate a megacity. For example, the July 2012 blackout in India disrupted power from New Delhi to Calcutta and affected roughly 620 million people.[3] Fortunately these cities are not accustomed to 100 percent power availability, and the power was restored within a few days. The 2003 blackout affected over 55 million

people and included the major metropolitan areas such as New York, Cleveland, and Baltimore in the U.S., as well as Toronto, Canada. Traffic over land, rail, and air was halted, and commerce screeched to a halt.

Infrastructure

Physical infrastructure, such as roads, rails, busses and trams, and waterways, allow residents of megacities to access water and food, and pipes and sewer lines allow waste to exit the megacity safely. Physical infrastructure considers paths that allow for a minimum of movement by planned conveyance. If a rail track is attacked or stalls, the entire system is interrupted. The 1995 terrorist attack in Tokyo, Japan, by Aum Shinrikyo highlights a man-made disaster that crippled a train-reliant city for days. The 2015 double winter blizzard in the northeast U.S. shut down air, road, and much rail traffic from Washington to Boston and beyond.

Prolonged outages of these hard infrastructures, will affect multiple other systems and essential sources to life in a megacity. The classic development of infrastructure in a megacity drives provisions to the population and ships out the waste. They are critical services. Without them, entire swaths of populations in a megacity could become fragile, risking starvation, thirst, and disease.

Communication and Data

Communications and data are increasingly important to governance, awareness, and human interaction. Information flows over copper wires, the airwaves, and fiber-optics. Data drives trains, planes, and automobiles. Communication with the population within a megacity is critical. Data flows over cell phones, emails, cable, satellite television, radio, and newspapers. An informed populace is able to make choices about where to go and what to do in the event of an emergency. A mother chooses to take her children out; an employee decides which train to take; all these decisions are made based on information available. Criticality of information increases during disruptions. During normal times, communication drives human endeavor. During crises, communication becomes a critical enabler that provides emergency information to the local population. It also enables outside organizations to conduct operations support functions in the event of a disruption.[4] Finally, the importance of both reach and redundancy is critical to communications infrastructures in preparing for eventual disruptions or emergencies.

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Topographic, Geographic, Terrestrial, and Geospatial

As we go about our lives, we think of land, water, buildings, and events in a two-dimensional plane (X, Y axis). However, we need to think about X, Y and Z axis with an appreciation that hard systems extend below the ground and well above the ground. These systems can include underground pipes, subways, and telecommunications. It can also include above-ground skyscrapers, wires, and communication towers. These hard structures may all play a role in transmitting light and radio frequencies. Have you ever been somewhere and your cell phone had poor reception? In suburban and rural areas, it is because signals are not strong enough or the terrain blocks them. This even happens in the heart of a megacity, despite the proliferation of cellular towers, because the city itself, especially large buildings, absorb, disrupt, and block the signals.

Another consideration for a megacity is the shape of the landscape and the makeup of the ground. For example, a megacity may be forced to build on top of a landfill or a sandy base. The

explosion of Dubai and Abu Dhabi highlight the importance of the makeup of the ground. The pylons used to ground high-rises are sometimes driven over 100 meters into the ground, and there may be 20–30 of them in a single high-rise. Building on previously uninhabited locations, such as a landfill or a dumping site can lead to building sickness—chronic illnesses in local inhabitants or tenants of the space. Physical deterioration of the foundation may risk collapse of the building, and the location becomes more susceptible to natural and man-made disasters.

Spatial thinking is critical. According to the 2006 National Research Council,

"Spatial thinking…finds meaning in the shape, size, orientation, location, direction or trajectory of objects, processes, or phenomena, or the relative positions in space of multiple objects, processes or phenomena."[5] Spatial thinking applies to how fixed and moving objects interact with each other and affect the environment of a megacity. Consider the growing desire for drones. Consumer and government demand for the services these systems could provide will change delivery options, but also risk airspace and radio frequency bands administration. It may also drive increased concern over safety and privacy. Experimentation in conflict zones such

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as during the civil war in Syria has suggested aid can be delivered with drones. The growing discussion about large global companies delivering packages to your door also enjoy increased potential. In a megacity, how a single or several airborne objects are utilized will have an impact on the fixed locations and the mobile population who live there.

Another consideration within the geospatial domain is how phenomena and movement occur between fixed and mobile activities. Consider the explosion of coffee consumption. A popular coffee shop might influence rush-hour traffic patterns, congestion, spaces needed for parking, traffic flow, and even how stop lights are timed. Consider the tragedy of 9/11 in New York City. Think about the importance of having sufficient, clear, escape routes not only from the World Trade Center, but from all of lower Manhattan. This flow was stymied by over-water lines of communication, but also by outside aid agencies trying to get into the area to provide additional support. Each of these different viewpoints illustrates the importance of developing a complex geospatial understanding of a megacity.

As we consider the physical and tangible aspects of a megacity, we begin to appreciate the incredible complexity it presents to those working there. Local governments, intergovernmental and nongovernmental institutions, commerce and the corporate world, and especially civil society play a profound role. None of these can successfully shape outcomes in this interconnected domain. However, each has impact, some planned, some not. The importance of deliberate and methodic decision making by those with stakes in a megacity is paramount.

Soft Category Considerations

Human Dimension

Among the most important considerations when discussing a megacity is the human dimension. Cities exist to house, employ, and even contain human beings. The movement of people; their backgrounds, sociologies, education, ethnicity, gender and race; the culture(s) of the people living there; how these people choose to associate governance and politics; the work and social patterns of these people; the resultant rules and laws that are applied; how those rules and laws are upheld (or not); the services required for the people;

and finally the tensions that exist must all be considered. Unfortunately, there is little, perhaps no homogeneity or uniformity in these layers. It is important to stress the way these layers interact across and with each other. For the purposes of this article, each will be considered topically, but should not be considered as existing in a vacuum.

The Organization for Security and Co-operation in Europe Office for Democratic Institutions and Human Rights has two books dedicated to the importance of the human dimension. The U.S. Army is running with the term "human dimension" or "human domain," as it shapes the importance of the humans in its ranks. While focused on a small cohort of people, the concept can be applied broadly to people around the world and especially in a megacity. In a *Small Wars Journal* (SWJ) article in June 2013 regarding a discussion about the future of the Army, the authors consider the cognitive, physical, and social components of a Soldier:

> The Army concepts offers a comprehensive portfolio approach to the various components (Cognitive, Physical and Social) of the Soldier, leader, family and civilian development and performance essentials to raise, prepare, and employ forces for full spectrum operations in today's dynamic operating environment. **Cognitive:** This includes Learning capabilities, Cognitive training and education, and Psychological, Character, and Morale factors. **Physical:** Improve fitness through comprehensive wellness programs that build aerobic/mental capacity, strength, endurance, agility, and resilience; focused nutrition; stress and sleep deprivation management. **Social:** This component is comprised of the Army ethic, Faith, Moral/ethical foundation, Esprit de corps, Cohesion, Trust, Sociocultural awareness, and Adaptability.[6]

Clearly, some of these issues apply just to military fighting personnel, but many of the considerations offer a universal application to the population living, working, visiting, and transiting a megacity. As we consider the people living in a megacity, we can re-form the above descriptions and expand them. The cognitive component of the human deals with learning and must also consider the literacy, education levels, type of education, and primary and secondary communications venues. For example, consider driving your car in New York City, Tokyo, or New Delhi. Many of the symbols might be similar. A stop sign is a stop sign. But the "no parking" signs are different. Further, residents, in part due to culture and in part due to enforcement and education, heed the "no parking" signs differently. While double parking in New York

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City may be illegal, in most cases, it is a common practice. In Tokyo, it is not tolerated. Public service announcements in Tokyo are attentively consumed, whereas in New Delhi, they barely rise above the din of their surroundings, when and if they are provided at all. In New Delhi, the preponderance of paper advertisements is easily recognized; whereas in Tokyo, the role of interactive media rules; and in New York City, it is a hybrid. All three enjoy mixed success in providing additional information. How the people of a megacity use, transmit, and receive information is driven in part by the infrastructure available, while simultaneously driving new modems for the same. One need only consider the explosive growth rate of cellular phones and smart phones to appreciate their interaction with the human domain.

The physical component described in the SWJ excerpt offers fitness, holistic wellness, strength, endurance, agility, resilience, nutrition,

stress, and sleep, which apply to all of us as humans. However, they have a greater impact in a megacity, where entire swaths of a population are unfit, underfed or undernourished, or perpetually stressed or sleep deprived. Consider sleep deprivation in Seoul, Korea.[7] Sleep deprivation among a populace has a long term impact on the overall cognitive development, and mass productivity. The reasons range from the cultural desire for high achievement to long hours at school and work, and longer commute times as the city grows. As a result, there is a growing niche of grassroots efforts to create nap spaces, embrace the concept of siesta, and even mandate less time at work or at school in an effort to improve sleep among the people. Imagine a megacity in a less developed location where other physical elements are also added in. A sleepy, stressed out person who is under or malnourished will be less agile and less resilient. His or her ability to deal with a crisis is diminished. The physical needs then of the human population will not only include basic food stuff, water, and sanitation, but may insist on providing nutritional sustenance and counseling over time as a major crisis may afflict a megacity for a decade or more, especially in developing countries.

> **Understanding the social implications of the human dimension is a critical point within the soft portion of this framework.**

As the U.S. Army talks about its own human dimension, it can inform thinking about the human dimension in a megacity. The Army states the human dimension covers "Army ethic, Faith, Moral/ethical foundation, Esprit de corps, Cohesion, Trust, Sociocultural awareness, and Adaptability." It allows us to derive other important issues regarding the social

context. Moral and ethical philosophy, along with religion, spirituality and their outward expression will shape the environment people live in. For example, in a megacity a locally broadcasted, five-time a day call to prayer to some is a welcome opportunity to commune with their creator. Others within ear shot may go about their business. And yet a third group may be annoyed by the disruption. Or in another megacity, the prevalence of holy relics or animals to one group of people may serve as a divisive issue with members of a minority group who see those artifacts differently and ultimately as an obstacle to a more efficient lifestyle. In a perfect world, everyone might trust their neighbor and enjoy the sociocultural awareness to ensure peaceful coexistence. Realistically, these often become friction points, lying just below the surface of society, simmering. When a crisis breaks, these friction points can quickly become exasperated. Consider the LA riots of 1992. While a single event or judgment may have sparked the riots, the simmering undercurrents of economic and racial tension offered ample tinder for an incendiary situation. The riots wreaked havoc on a frail megacity and cost millions in damage and overtime for public workers and further divided an already stressed and mixed society. Understanding the social implications of the human dimension is a critical point within the soft portion of this framework. The human dimension, above all other factors in this article, will be the bedrock of all activities in a megacity. It is the start point for considering behavior and movement of individuals and groups in a megacity.

Movement

Now that we have a growing appreciation for what the human dimension considers, we realize they are in near-constant movement. People constantly seek more efficient means to accomplish tasks. Similarly, people work, they eat, they shop, they socialize, and they vacation.

Each of these functions drives where they go, when they do it, and the routes they take. As we considered many of the hard issues in the previous section, consider how humans shape the use, strain, and planning of these components. Among the heaviest strains on the plumbing, water, and sewage system at any single time in New York City is during the hours of 6–8 a.m. In August 2013, London made international news as a "fatberg" the size of a double-decker bus clogged main sewer lines under the Kingston. Consider the traffic in any megacity. In New Delhi, people leave two to three hours before they need to report to work in order to get there on time. These are all megacities where there are established norms and various laws, yet the burden on the hard systems is already a challenge. Consider the impact of a crisis where the humans living in a megacity decide to leave en masse. Consider how quickly a disease might spread. Think how much more quickly rumors, information, and panic spread. Now, consider managing this chaos in a megacity during one of those crises. The movement of people in normal situations is fairly predictable; however, predicting movement in an atypical situation is difficult at best. Even if it is considered, then predicted, the ability for a system to deal with or absorb a shock when millions of people are moving will prove complex in the very least.

Culture

There is a culture of the megacity, but there are also many cultures within it. The synergistic effect of the megacity is more than the additive. Consider New York City again. You may be from one of the five boroughs, you may also be from one of the culturally-integrated segments of the boroughs. For example, Little Haiti is the portion of Flatbush and Canarsie in Brooklyn where there is a high concentration of Haitians. Following the devastating earthquake in Haiti in 2010, this segment of society mobilized their neighborhoods and then the rest of New York to accomplish far-reaching fundraising support, not just across the Haitian diasporas, but around the U.S. and across racial, ethnic, and historically-defined lines. This example points to the complexity of assessing culture in a megacity. Over long periods of times, these smaller cultures mix and mingle with other cultures, and a megacity may acquire (often unconsciously) its own culture. This was no more apparent than following the tragedy of 9/11 when the residents of New York City pulled together to deal with and recover from the severe impacts suffered during the attack and collapse of the World Trade Center.

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In the Institute for Mobility Research book, *Megacity Mobility Culture: How Cities Move on in a Diverse World*, the introduction offers the following:

> …we understand mobility as the "ability to travel from one point to another" and "actual physical travel." Second the term "culture" can be defined as "the set of values, conventions or social practices associated with a particular field, activity, or societal characteristic." Combined, "mobility culture" then is the set of values, conventions or social practices associated with the ability to travel from one point to another, and with actual physical travel."[8]

The cultural approaches of the people will drive not only the movement of the population, but how they expect events to unfold, what work patterns are shaped, how they will be governed, and what services they demand. Among the many soft and human domain components, this may be one of the most important. An appreciation of the culture will drive how people

interact with each other, their governing bodies, and external people or organizations. In the event of a crisis, the culture will either hamper or aid in the facilitation of relief and the ultimate survival and resilience of the megacity. Culture should not be underestimated.

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To appreciate the importance of understanding the human domain in a megacity, how they live, and what governs their behavior, we must consider their social or interactive patterns. What kind of work do they do and where do they do it? We can assess where they live and where they work and what the normative hours of work are. From there, we can predict when large groups of people may be on the move. By observing these movements, we can then look at emerging social patterns. Social network analysis and social physics lend themselves to considering this movement. Particularly some of the new work conducted by Dr. Sandy Pentland allows researchers to consider the variables of commonality and difference, and then overlay those on social movement. As this is considered, the patterns allow for a degree of not only daily activity, but offer insights into vulnerable locations, chokepoints, and areas requiring more attention by city planners. Were a crisis to unfold, this social patterning allows interveners to consider ideal aid and distribution points. It may also allow for better and faster distribution and resilience in long-term recovery.

Rule of Law

The U.S. has a deep history in democratic rule of law. However, the rule of law practiced in the U.S. is unique. Due to population density and the natural frailty of some megacities, it is even more important to understand national-level rule of law and local interpretation of those laws in the megacity. Rule of law will drive expectations of the populace and create discord if not attended to consistently, fairly, and with transparency. The degree, familiarity, and enforcement of those laws will drive behaviors and expectations even more. Rule of law is what will enable or confuse people and their governing bodies. In a crisis, understanding the rule of law, its background, traditions, denotations, and connotations are critical to success for city managers and others supporting s megacity in a crisis.

At present, all the roughly 36 megacities considered have a governing and rule of law structure. There are formal and informal laws and, equally, mechanisms used to enforce them. The rule of law, law enforcement, and buy-in by the population all affect trade, commerce, movement, and every other aspect of daily life. In an August 2014 *Economist* article "Realigning Justice," the importance of rule of law and enforcement at the judicial level is helping attack systemic corruption across China. The case study considered Shanghai and its judges. Over time, judges were unwilling to make judgments because they did not want to offend power brokers in the Communist party, which led to exploitation of both the population and the system. It also allowed for unofficial consolidation of power in the hands of the few. Putting new judges on the bench with a different mindset—to stamp out corruption and follow laws more effectively to make judgments—is having a positive effect.[9] We can appreciate the importance of the enforcement of this rule of law even better as we consider other services governance is expected to provide.

In his book *Property & Peace: Insurgency, Strategy and the Statute of Frauds*, Geoffrey Demarest draws on the intersection of land rights, peace, stability, and rule of law. Consider places where titles to landownership are tenuous. Consider someone has a deed to a piece of

land, and they think it is theirs. They invest in building a home, a business, or maybe a farm on the property. Then they find out there were other deed holders who now contest the ownership of that land, and they lay claim to all the improvements on the property. Rule of law and the executive responsibility of government in this process are critical. If the paper the deed is written on can be contested, then there is no owner. If the rule of law is unclear or inconsistent, then the deed cannot be upheld. If the executive at the local, state, or national level cannot or will not uphold rulings on the deed and support an owner based on certain statutes, then there can be no development. If, in a megacity, a piece of property can exchange hands, be used, exploited, and developed, then it must be through a rule of law and supporting executive responsibility. Consider forced evictions by a state, militant, or criminal group. If they can displace people and steal their land, then stability suffers and security may be undermined. This is compounded in a megacity where a deed may be for a 2-bedroom condominium on the 65th floor of a 112 floor, mixed-use building. If this is undone or fragile across major sections or components of a megacity, the increase in that instability can be both fatal and contagious.

In another Chinese example past and future collide. During the latest run up to the Olympics that premiered in Beijing, the world witnessed massive growth. Fears of shoddy workmanship, forced labor, indentured servitude, and natural resource conservation were all touted. The most visible concern was the forceful, at times violent expulsion of inhabitants. Some of these people lived in well-constructed homes, others were shanties, and yet others were homeless and taking up residence in the area. All were wiped away or relocated in an effort to make way for both the physical (hard) development and the waves of people attending the games. As China prepares for the 2022 Winter Olympics, similar concerns return. In particular, as a semi-arid region, a great concern is growing about the water sources needed to create the ice and snow for a megacity, in addition to sanitation and hydration.

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Service Providers

Other services in a megacity are critically important. A brief discussion of law enforcement above offers only one of the players. Others players include medical providers (routine and emergency), firefighters, and social workers. Each of these plays a significant role in the safety and well-being of a megacity. This is easiest to see when there is a disaster. However, probably more important than many other factors offered in this article is the need for a well-established, well-trained set of professionals in each of these sets. Social workers, firefighters, police officers, and medical providers all must have an established relationship with the local population well in advance. Further, they must train and rehearse for natural and manmade disasters in concert with city planners. In a megacity, this requires more complex interactions and planning and more deliberate and intentional consideration of the intricacies. It also requires a level of trust and autonomy for each to operate when there is no hierarchical oversight and direction for lower-level elements providing support. To achieve this well, it also requires exercising these inevitabilities and practicing both physically and cognitively to iron out wrinkles in advance.

There are degrees of depth and breadth to the complexity in any megacity. Having an appreciation of where the hard and soft meet and the nuances shaping events is paramount. The old adage "Murphy's Law is anything that can

go wrong will" skyrockets towards chaotic when crisis hits a megacity. First responders, local and national governments, outside interveners, and the population itself must be prepared. Naturally, we cannot be prepared for every crisis, nor plan for every natural or manmade event. The issue is not a matter of **if**, but **when**. When the crisis hits a megacity, is the city prepared? Which soft and hard elements are strongest, which are weakest? Is there a tipping point known in advance? How does the megacity manage uncertainty? Does it have a formal risk management program? How does the megacity ask for help? Who do they ask? If they ask, will anyone come? These all get to the third category, which highlights the role the U.S. government may play at home or abroad regarding a megacity. As we depart from the hard and soft assessment factors of a megacity, we can and should think about times when host nations or outside nations might engage and interact with a megacity.

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Intervention Environment Considerations

The U.S. is a republic where there is a healthy but natural tension between the states and the federal government. The friction can be healthy in our republic, but during a crisis it can cause delays when there is precious little time. It may preclude or impair support provided by the U.S. government at the state level. The U.S. government's capacity to help in a domestic and international setting is amazing. However, when doing so within our borders, there is a precious and important

respect for state rights. Overseas, the U.S. government looks to partner with others in the pursuit of its democratic principles and national interests. Particularly during times of crisis, the U.S. offers a hand up to its neighbors around the globe. Therefore, there are two different environments to consider regarding U.S. government involvement in a megacity.

For the U.S. Department of Defense, in particular the military, a default, almost reflexive response is to force any megacity intervention into an existing planning and thinking paradigm. Simplistic tools of the U.S. government, such as DIME (diplomatic, information, military and economic) to more cumbersome tools, such as ASCOPE (areas, structure, capabilities, organizations, people and events) or PMESII (political, military, economic, social, infrastructure and information) can all help assess a complex, possibly chaotic, scenario. The point of this article, particularly in describing this third category is not to divorce these approaches to intervention, but rather to marry them to and enjoy complementary consideration regarding a megacity.

For example, in an operational planning environment, a group of skilled planners may initially define a problem or set of problems by cross-walking ASCOPE across PMESII, whereby the organizations in ASCOPE would be considered across each of the categories conceived in PMESII. Here the planner's fairly robust consideration of social organizations starts to emerge. This is valuable planning, yet it risks failing to fully define the problem set. The deliberate crawl through the issues is key; however, there are issues broader than a single or binary solution. Further, applying a strategic lens to these additional areas will help the operational planners prepare a more comprehensive engagement strategy for their organizations within a social construct.

Some of the rules, laws, and traditions

governing interactions in each environment will shift. Nonetheless, the concerns, capabilities, and limitations for a megacity will be fairly consistent. The first and most visible difference will probably be which agencies will provide the support. Within the U.S. is considered domestic affairs or domain for the U.S. government. This is driven by various authorities and funding streams that are very different based on the two environments. The second is how well the U.S. government understands an area, government, and people they are trying to help. This non-domestic or rest-of-the-world concept is easily described as international. For the purposes of this document no further distinction is required. The challenges presented below are topically universal. How to address them will not be.

In every society there are illicit activities. In a megacity, their existence cannot be denied and must be factored into any crisis. Broadly, there will be several degrees of illicit activity ranging from rioters who seek an outlet or voice, to run-of-the-mill criminals, to street gangs and organized crime and dark networks in a cyber domain. Each will play a destabilizing role in the societal fabric of a megacity. Following a crisis, they present both threat and opportunity. While in the normal state of affairs, they are generally negative, intervention may require cooperation with these elements where and when it was never considered. It may also require the active ignoring of these elements until order can be improved. Among the strategies to consider is mapping in advance who these elements are, what sectors they work in, and where they exert influence or power. For example, a street gang in a megacity may be used to move information to a segment of society distrustful of the local law enforcement. In some cases, having an ombudsman or advocate give voice and information to a rioting body of people can slowly establish calm and eventually trust if done correctly. Another may be reliance on existing criminal organizations to tap into less

conventional means of transportation. This does not condone their behavior, rather it encourages those thinking about megacities to consider the possible value these entities bring in a crisis.

> **Charitable organizations, religious groups, and support organizations should be a first stop for local, national, and intervention groups.**

Where there is evil, there is also good. Charitable organizations, religious groups, and support organizations should be a first stop for local, national, and intervention groups. The Red Cross and Salvation Army are credible institutions with a global presence. There is a growing network of charitable organizations who can be asked for help. Unfortunately, not all global groups are equally trustworthy. It is important to conduct some due diligence in advance of the crisis to determine which groups should be placed on a list of "first responders" both domestically and internationally. Finally, while there is a healthy distinction between church and state in the U.S., the value religious groups can have in providing aid and calming support is incredible. A growing number of religious leaders are talking about their role to bring calm to rioting and tense situations as part of their ministry. These interlocutors may be slow to partner in non-crisis periods. In crisis times, they may be superb partners.

This leads to the importance of issues the U.S. government must consider in sequence. As a long American history of internal and international strife informs us, the importance of stability and security in advance of reconstruction efforts is critical to success. From the founding of our nation, to the civil war, to the Marshall Plan, to endeavors in Afghanistan, there is a near-universality in first establishing security, then stability. The mistakes of the past

teach us the importance of doing so with an eye toward eventual recovery and reconstruction activities. Therefore, it is important to model rule of law, transparency, and accountability to help establish legitimacy from the very first foray into security. This is true in any environment. At the megacity level, it will require additional scale along with increased coordination. Considering the role of security personnel, local and visiting; the existing rules of law; the impact of cultures; and the need to establish rules of engagement (kinetic and non) is essential. Further, this is a process that will not allow for micromanagement at the strategic (megacity) level. Practiced and competent security and stability personnel must engage early and effectively. They must be given clear objectives and allowed the space to operate in their assigned niche with little supervision. Finally, there is a time when a crisis is so severe these personnel and their efforts may need to turn to containment or quarantine.

> **Practiced and competent security and stability personnel must engage early and effectively. They must be given clear objectives and allowed the space to operate...**

There are several factors that will further exacerbate a crisis in a megacity. Among the worst may seem to be those of weapons of mass destruction. Rather, than a catastrophic and near-complete annihilation of a megacity, its size suggests that even with a nuclear detonation, there will be survivors. While nuclear detonation is possible, it is less probable. This does not suggest planners should not consider a nuclear detonation, but rather focus more on higher probability events.

Some of those more probable events include a radiological disaster. In this case, consider a radiological event due to carelessness or direct action by a belligerent actor. In the first, it is hopeful self-reporting would limit exposure of megacity inhabitants. In the second, the intent would be to maximize the exposure to the megacity dwellers. In March 2011, the Fukushima, Japan tidal wave and subsequent nuclear accident demonstrated how a population-dense nation such as Japan handled multiple catastrophic events. Despite setbacks, containment of population bases was not required.[10] Other environments might require it. Another probable scenario might include biological agents or disease moving through a population quickly. Consider the 2010 cholera outbreak in Port Au Prince, Haiti. Though not quite a megacity, this sprawling and deeply-impoverished metropolis was overwhelmed first by a major earthquake and shortly thereafter by a cholera epidemic.[11] Actions by the Dominican Republic at times felt like containment, as they sought to stymie the flow of refugees across their border. This had more to do with the crushing economic effect it had on the Dominican Republic, especially near the border, which was compounded by the cholera scare. The last important note to make is the rarity of a single event remaining so. As noted in these two cases, no single disaster goes for long without being joined by related ones. Critical to successful planning is not a single impact, but multi-impact plan for recovery. The most drastic of these may be the need or believed need to contain or quarantine a megacity.

A crisis, manmade or natural, may be so devastating it requires a quarantine or containment. Cutting off a large population will have several negative effects. Consider the nightmare scenarios painted by classic movies such as *Escape from New York*, *I am Legend*, or *World War Z*. Each of these considers an environment where containment and or quarantine are deemed essential to prevent the spread of violence or biological contagion. There will be a crisis where parts of or an

entire megacity will need to be contained or quarantined. Notice this is not the same as cut off. As quickly as possible the containment or quarantine must be lifted. This may occur in timed or geographic phases. The longer the space is contained, the more likely it will be to erupt and overcome barriers. Basic human needs will still need to be met; supplies will need to be provided; energy, communication, food, water, and shelter will need to be sent in. To make the initial decision to contain or quarantine without the immediate succession plan to lift and restore is both foolish and inhumane. To ensure decent treatment of people in a megacity, it is important to understand them before and after a crisis occurs.

Among the important issues to consider is how to gather information. Information is hard to gain following a crisis, especially a rapid-onset event, as proved by many of the examples provided. Information is susceptible to manipulation by those who hope to exploit the situation or who simply misunderstand the realities based on their perspective. This reality drives a critical need for complementary information gathering through intelligence resources. This must be done cautiously. Intelligence gathered for political means during crisis is reprehensible. Instead, intelligence gathering to determine veracity of other information and to vet tidbits of leading data is crucial. The 2015 Boston blizzard highlighted the value of drones equipped with cameras. Drones were deployed to monitor structural integrity of buildings and to search for those stranded in the cold. In combat zones, drones can be used for point-to-point information delivery and can also provide essential medical needs to care providers. The importance of cyber intelligence activity can help identify bad actors who seek to take advantage of frail infrastructure or victims who are seeking aid. The importance of understanding the role, capabilities, and limitations of intelligence in a megacity is paramount to local authorities and interveners alike.

> **The importance of understanding the role, capabilities, and limitations of intelligence in a megacity is paramount to local authorities and interveners alike.**

Similarly, post crisis mapping of a megacity will continue to be a major driver for visualizing relief and recovery. The importance of mapping before the crisis is essential to planning, and post crisis mapping should build off this baseline. Population flows, local refugee collection points, safe zones, potable water locations, and aid distribution centers will be needed. This information should be mapped out not just for the official members of an aid team, but also provided with regular updates to the population in a variety of venues. It should take the form of handouts and flyers, be available through public broadcasts, and be shared over telecommunications networks where and when they are effective. The mapping can also serve to identify trends in movements, shortcomings, and possible friction points. Dynamic mapping and geospatial data is a growing trend and can be filtered and layered to provide more and more niche areas with visualization value.

Finally, there will be times when knowing who your aid providers are is critical. Further, there will be other times when knowing if a person is friendly or not is essential. U.S. defense language refers to this as identifying friends and foes. The passing discussion about belligerents is critical to local law enforcement as well as those who come in to help. In some cases, this will require a force to capture, detain, and occasionally engage with another force. There are times abroad where the U.S. military is providing or may be called to provide

peacemaking or peacekeeping forces. The importance of the population knowing who these forces are, how to recognize them, and whom to contact in case of emergency is very important. In a megacity, an organized crime syndicate may own several floors of a high-rise or several blocks of a tenement housing area. If the population knows the law providers are wearing a certain item or uniform, they will be able to differentiate them from the criminal elements. Where multinational forces are working in nearby areas to provide security and stability, the importance of knowing who is on whose team will determine success when engaging the population.

As suggested throughout this article, there is no formula to apply to a megacity. There is not even a template for "diagnosis, "if this is even a good word to use. A game theorist may argue with this. A game theorist might develop a model or series and set of algorithms allowing for some prediction of outcomes either man-made or natural. These models and algorithms may apply to some of the aforementioned aspects of megacities. However, the number of variables and interaction between those variables seems incalculable. A final factor, time was not discussed. As each megacity evolves, it creates an increasingly lively and dynamic event in time. To develop a formulaic approach would require such work that by the time it is implemented, it may already be an outdated snapshot of the city assessed. Rather than suggesting a formula for dealing with a megacity, the purpose of this framework offers several valuable lenses for considering, weighing, analyzing, and evaluating any megacity. Perhaps the synthesis of the myriad of items discussed above will drive better decisions and better engagement by any number of interlocutors or their interventions. The ultimate goal is enlightenment and furthering the dialogue on this growing and intricate issue of the "megacity." *IAJ*

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