Achieving Convergence during Humanitarian Assistance and Disaster Relief Operations in the World's Largest Urban Areas

Proceedings of the

"Current and Future Operations in Megacities" Conference, Tokyo, Japan

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The views and opinions expressed in this document are those of the authors and do not necessarily reflect the official policy or position of the United States Army, Japan Self-Defense Force, Australian Army, U.S. government, or any other organization.

Preface

Five partners recognized the importance of better understanding the challenges of humanitarian assistance/disaster relief (HADR) operations in the world's largest and most influential urban areas. U.S. Army Pacific (USARPAC), U.S. Army Training and Doctrine Command (TRADOC), the Australian Army, and U.S. Army Japan (USARJ) worked with the Japan Ground Self-Defense Force (JGSDF) in planning and conducting the "Current and Future Operations in Megacities" at the last organization's Ichigaya headquarters in Tokyo. Speakers and audience spanned organizations representing a comprehensive approach to contingencies, i.e., military, government civilian, nongovernmental, intergovernmental, industry, and others with talents and capabilities relevant to HADR undertakings in urban environments. This document summarizes speaker presentations, presents audience insights, and provides select additional material regarding these endeavors. Latter chapters include pertinent observations and related recommendations.

These proceedings, a standalone executive summary of same, the conference briefing slides, and audiovisual recordings of presentations and panel sessions are accessible at https://community.apan.org/wg/tradoc-g2/mad-scientist/p/mc2019.

Those materials will be of interest to individuals with professional, academic, or personal interest in urban operations, HADR, and improving the effectiveness of cooperative ventures during and in the aftermath of disasters.

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Summary

> Urban areas around the world [are] becoming not just the dominant form of habitat for humankind, but also the engine-rooms of human development as a whole.[1]

> United Nations-Habitat

Note: This document, a standalone executive summary that expands on the summary provided here, presenter slides, and audiovisual recordings of most speaker remarks and panel question and answer periods are available online at https://community.apan.org/wg/tradoc-g2/mad-scientist/p/mc2019.

Five partners joined to convene the "Current and Future Operations in Megacities" conference, held in Tokyo from July 16-19, 2019. U.S. Army Pacific and its subordinate command – U.S. Army Japan – joined the Japan Ground Self-Defense Force, Australian Army, and U.S. Army Training and Doctrine Command for the second megacities-oriented event in two years (the first being "Multi-Domain Battle in Megacities" conducted in New York City, April 3-4, 2018). As in New York, the focus was the operational and strategic levels of operations. Three primary objectives drove speaker presentations and audience participation:

- Identify best practices for humanitarian assistance and disaster relief (HADR) undertakings in megacities during and in the aftermath of both natural and manmade catastrophes.
- Determine how historical urban HADR and security events more generally can inform JGSDF support of the 2019 Rugby World Cup and 2020 Olympics in Tokyo.

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[1] United Nations Habitat, *State of the World's Cities 2012/2013: Prosperity of Cities*, World Urban Forum edition, Nairobi, Kenya, 2012, https://sustainabledevelopment.un.org/content/documents/745habitat.pdf (accessed September 3, 2019), v.

- Consider how artificial intelligence capabilities can be accelerated to augment U.S. and partner forces' operations in the world's largest urban areas.

Two supporting objectives complemented the above:

- Increase overall awareness and understanding among conference partners and other key stakeholders regarding the application of Multi-Domain Operations and similar partner concepts to HADR during contingencies in megacities.

- Increase partner understanding of existing bilateral and multi-lateral training opportunities, in particular those needed to enhance understanding of multi-domain contingencies.

The conference's first day provided a virtual terrain walk of Japan's capital city, a more practical way of familiarizing attendees with the megacity given Tokyo's high temperatures and humidity in mid-summer, traffic, and in excess of one hundred audience members attending day 1. (See the event agenda and speaker biographies at Appendices A and B, respectively.) This original session had two components. The first provided a general overview via five flow types (power, water, people, goods and services, and waste) from the perspective of flows into the city, within Tokyo, and out of the urban area. The afternoon session then analyzed the impact of a notional 7.3 scale earthquake on Tokyo during the 2020 Summer Olympics. Days' 2 and 3 format was more typical of traditional conferences. Senior military and civilian experts presented for thirty minutes and thereafter participated in a panel question and answer session. Each day consisted of two sessions after the keynote presentation provided by former head of the Japan Self-Defense Force, General Ryoichi Oriki at the beginning of day 2. These sessions were:

1. "Megacities and Humanitarian Assistance/Disaster Relief (HADR) Operations: Context and History's Lessons" during which a general overview of megacities as a phenomenon – to include the definition of "megacity" carried through from the New York City conference – was provided in addition to discussions of the 1995 sarin nerve agent attack on Tokyo's subway and the implications of the 2011 earthquake, tsunami, and Fukushima Daiichi nuclear reactor failures.

2. "The Complexity of Megacity Operations" saw three speakers respectively address (1) major urban areas' implications for the U.S. armed forces' Multi-Domain Operations or similar partner nations' concepts, (2) Japan Ground Self-Defense Force (JGSDF) perspectives on megacity HADR, and (3) future opportunities via the maturation of artificial intelligence.

3. "Orchestrating Megacity Security Operations during World Class Events" was a theme specifically requested by JGSDF leaders given the pending autumn 2019 Rugby World Cup and 2020 Olympics, both of which are centered on Tokyo. Presenters featured reviews of historical experiences and insights gained from the 2000 Sydney, 2008 Beijing, and 2016 Rio de Janeiro Olympics and other key world events in the world's largest urban areas, the final briefing being a consideration of the JGSDF's role in securing Tokyo during similar events.

4. "Building Governmental-Nongovernmental Teams during Megacity Operations" concluded the two-days of traditional conference format. Three individuals with considerable experience in synchronizing the efforts of disparate parties during HADR offered their insights. Analysis included prioritization of recovery objectives, efforts in that regard during what the Japanese refer to as "3/11" (the earthquake, tsunami,

Fukushima reactor disaster initiated on March 11, 2011), and noncombatant evacuation during 2016-2017 fighting in Mosul, Iraq.

A fourth day was not part of the conference proper but rather a limited gathering of partner representatives with three goals: (1) validate key conference takeaways, (2) discuss the desirability and viability of a third conference and prospective objectives should such prove worthy of further consideration, and (3) identify possible locations should a third conference be undertaken. A summary of results in this regard can be found in the complete proceedings document's concluding chapter 4.

The remainder of this overview offers but a small sampling of the observations and recommendations taken from days 1-3 as forwarded by speakers, audience members, or extrapolated from those remarks and written materials pertinent to the considerations at hand. Complete presentations of observations and recommendations with discussion of each appear in chapters 2 and 3, respectively. A listing of observations and recommendations without supporting discussion can be found at Appendices D and E. Presentations of observations appear in the PMESII-PT (Political, Military, Economic, Social, Information, Infrastructure-Physical Environment, Time) format while recommendations are in a DOTMLPF-P (Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities-Policy) structure.

Observations and recommendations

Speakers emphasized the need to **better promote collaboration between those bringing capabilities to bear during and after a megacity disaster**. The emphasis was less on getting more of what is needed than better preparing prospective participants via including them in pre-

event planning, training, and exercises and then orchestrating those assets once catastrophe strikes. As is notably well done in Tokyo, this preparation and participation should incorporate members of the public. Victims recovered by community members after an earthquake survive 80% of the time versus 50% survival for others needing assistance by first responders.[2] **The goal should be more than cooperation or coordination of partner capabilities, seeking instead orchestration of these assets. Preparing individual partner organizations and promoting collective capacity requires improvements in virtual and constructive training capabilities given the impractical costs inherent in relying exclusively, or even primarily, on live training. Replicating Tokyo preparations for disaster (e.g., disaster preparedness map requirements, design features such as standby emergency toilets and cooking stoves in public parks) is worthy of consideration, particularly (but not exclusively) for megacities exposed to high risk of natural catastrophe.**

Military forces – those of the nation suffering disaster or others partnering during HADR operations – will be particularly challenged. First, **there can be no lessening of armed forces' primary mission to guarantee the security of its citizens**, a duty tested in the aftermath of 3/11 when aircraft of two regional countries tested Japanese airspace. Additionally, there will be **demands not only for capabilities traditionally expected of soldiers, but others as well**. The Japan Self-Defense Force found itself assuming tasks normally handled by police, fire, or other civilian authorities when those assets were overwhelmed or rendered inoperable due to the devastation of March 11, 2011.

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[2] Some sources state that the portion of those rescued by community members is as high as 95%.

As with the demand for unflagging military diligence during times of disaster, responsibilities of civil authorities regarding public security do not take a rest. **The same social problems found in an urban area on a daily basis will be found in displaced persons facilities.** In addition, criminals will capitalize on the close proximity in those facilities and dense living quarters, further burdening security with 24/7 policing requirements. **Including women's perspectives in planning and design of displaced persons policies and facilities is essential.**

Humanitarian assistance/disaster relief is too often considered merely as the sum of separate parts rather than a synergistic whole. **Preparation and funding of HADR would better serve if undertaken from a systems rather than piecemeal perspective**. This more coherent approach would have multiple payoffs, to include **establishment of standards for communications hardware and procedures promoting better military-civilian and civilian-civilian exchanges**.

Disasters make extraordinary demands on security infrastructure, both that physical and social. **Laws, regulations, and policies require review and, as necessary, updating to keep pace with changing conditions and improvements in response capabilities.** Restrictions on what procedures emergency medical technicians (EMTs) are allowed to perform provide a case in point. While those permitted should not exceed an individual's level of training, **reconsidering what skills EMTs, paramedics, police, fire, and other personnel should have as part of their core training may require review.** In addition, **consideration should be given to temporarily expanding the palette of procedures allowed by select personnel under conditions such as those that will exist in times of extreme adversity.**

All three countries' militaries partnering during the conference have maturing operational concepts. **Multi-Domain Operations (U.S.), Cross-Domain Operations (Japan), and**

Accelerated Warfare (Australia) have much to offer during HADR, a potential as of yet underappreciated**. In turn, these concepts would benefit from in-depth consideration of how operations in megacities would challenge each. Concept development and future doctrine need to better incorporate recognition of what benefits a comprehensive approach offers to operational effectiveness** (a comprehensive approach being one incorporating not only state military and other government actors but also nongovernmental, inter-governmental, and faith-based organizations, and industry representatives as appropriate to the objectives sought). Doing so will require security officials to **determine information and intelligence sharing procedures prior to HADR operations** given differences in vetting procedures by the heterogeneous members in this expanded concept of what comprises a coalition.

Conducting thorough expert reviews of megacity readiness to withstand natural or man-caused disaster would assist in reducing post-disaster suffering and recovery costs. Common sense actions such as moving backup generators, control panels, and fuel sources to less exposed locations is an example, one that should bring to mind the need to reconsider current standards in that regard given rising sea levels.

Acknowledgements

The number of individuals underlying the success of the "Current and Future Operations in Megacities" conference is vast. Attempting to recognize all is all but a guaranteed path to failure. Nevertheless, in no particular order, and with apologies to those not appearing:

United States Army Pacific (USARPAC): First and foremost, the conference would have been impossible without the continued support and promotion of the event by USARPAC's commanding general, General (GEN) Robert B. Brown. A close second in that regard is COL Thomas Scott, the command's liaison officer to the JGSDF, whose role as primary interface between U.S. and Japanese partners was constant and essential. Others key to success include Lieutenant Colonel (LTC) Matthew Schlosser and MAJ Christopher Lee

Australian Army: As was the case with USARPAC, the Australian Army continued its charter membership status as a conference partner for this second gathering. Lieutenant General Rick Burr (speaker at the first conference in New York City) ensured his service was again represented by a top-of-the-line speaker, in this case Brigadier (BRIG) Ian Langford. Others assisting during the run-up to Tokyo and lending their insights during day 4 were Dr. Albert Palazzo, Major Joshua Nelder, and Lieutenant Colonel Nathan Pierpoint.

United States Army Training and Doctrine Command (TRADOC): TRADOC's man on the ground, LTC Kent Justice (liaison officer to the JGSDF equivalent of TRADOC, Training, Evaluation, Research and Development Command, TERCOM) regularly went the extra mile and then some to assist our partners from other commands. At Fort Eustis, TRADOC headquarters, those providing crucial support during the weeks prior to and after the conference include the command's G-2, Thomas Greco and a number on his staff: Fred Batchelor, Ian Kersey, April Rudolph, Ellyn Witt, and Renikka Woodberry. Also in support was the Public Affairs Office's Megan Reed and MAJ Rick Luce, the command's liaison officer to USARPAC. Fundamental to the success of the day 1 virtual terrain walk were the three presenters – MAJ Caleb Dexter, Captain (CPT) Jesse Geyer, and CPT Jheaniell Moncrieffe – whose research, reconnaissance, and audiovisual magic was widely acclaimed by those fortunate enough to attend their

presentations. These individuals' leaders were also notable for support of the lengthy preparation process; thanks in that regard are due LTC Anthony Kurz, LTC Brian Fisher, and Command Sergeant Major Douglas Schultz. Key to coordinating attendance and speaking by TRADOC's senior representative – MG Gary M. Brito – were CPTs Brian Choi and Joshua McChrystal.

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A special thanks to Ms. Etsuko Hashimoto who handled the numerous and seemingly ever-changing attendee reservations at the United States Navy's New Sanno property. She is graciousness personified.

We express our appreciation for those audience members and speakers who provided insights during and after the conference event, many of which are incorporated in the pages that follow.

Abbreviations

(R)	retired
3D	three-dimensional
AAR	after action review
ADF	Australian Defence Force
ADP	(U.S.) Army Doctrine Publication
AFP	Armed Forces of the Philippines
AI	artificial intelligence
ANSF	Afghanistan National Security Forces
APHP	*Assistance Publique-Hôpitaux de Paris*
ARCIC	U.S. Army Capabilities Center
AUS	Australia
AWG	Asymmetric Warfare Group
BCAT	Bilateral Coordination Action Team
BG	brigadier general
BRIG	brigadier
C2	command and control
C-5	plans section on a combined command staff
CA	civil affairs or California (depending on context)
CBRN	chemical, biological, radiological, nuclear
CBRNE	chemical, biological, nuclear, radiological, nuclear, explosives
CFC	Combined Forces Command
CG	commanding general
CINC	commander-in-chief
CJCSI	Chairman of the Joint Chiefs of Staff Instruction
COL	colonel

CPG	commander's planning group
CPT	captain
DOD or DoD	Department of Defense
DOTMLPF-P	Doctrine, Organization, Training, Materiel, Leadership and Education, Physical Environment, Facilities - Policy
DUT	dense urban terrain
EMT	emergency medical technician
EOC	emergency operations center
ERDC	Engineer Research and Development Center
FAO	foreign affairs officer
FBI	Federal Bureau of Investigation
FBO	faith-based organization
FDNY	Fire Department of New York (City)
FIFA	*Fédération Internationale de Football Association*
FMS	foreign military sales
G-2	intelligence section in a general officer command service staff
G-3	operations section in a general officer command service staff
G-3/5/7	operations, plans, and training section in a general officer command service staff
GCC	ground component command
GDP	gross domestic product
GEJE	Great East Japan Earthquake
GEN	general
GRDC	Ground Research and Development Command
GSDF	Ground Self-Defense Force
GSO	Ground Staff Office
HADR	humanitarian assistance/disaster relief

HQ	headquarters
IDP	internally displaced person
IGO	inter-governmental organization
INDOPACOM	Indo-Pacific Command
IPCC	International Political Cooperation Center
ISAF	International Security Assistance Force (Afghanistan)
ISF	Iraqi Security Forces
ISIS	Islamic State of Iraq and Syria
IV	intravenous (referring to a line to introduce medications directly into a vein)
J7	Joint Force Development Directorate (U.S. Joint Chiefs of Staff)
J8	Joint Analysis Directorate (U.S. Joint Chiefs of Staff)
JASDF	Japan Air Self-Defense Force
JAWS	Joint Advanced Warfighting School
JCoS	Joint Chiefs of Staff
JGSDF	Japan Ground Self-Defense Force
JOC	joint operations center
JP	joint publication
JRTC	Joint Readiness Training Center
JSDF	Japan Self-Defense Force
JTF-TH	Joint Task Force-Tohuku
LNO	liaison officer
LOE	line of effort
LOO	line of operations
LRSD	long range surveillance detachment
LTC	lieutenant colonel
LTG	lieutenant general
MA	master of arts

MBD	Multi-Domain Battle
MD	medical doctor
MDAO	Mutual Defense Assistance Office
MDB	Multi-Domain Battle
MDO	Multi-Domain Operations
MG	major general
MinDef	Ministry of Defense
MIT	Massachusetts Institute of Technology
MNF	multinational forces
MOD	Ministry of Defense
MS	master of science
NATO	North Atlantic Treaty Organization
NBA	National Basketball Association
NDAJ	National Defense Academy of Japan
NGO	nongovernmental organization
NIDS	National Institute for Defense Studies (Japan)
nK	North Korea
NSS	National Security Secretariat (Japan)
NTC	National Training Center
NY	New York
NYC	New York City
NYPD	New York (City) Police Department
OCHA	Office for the Coordination of Humanitarian Affairs
OSAC	Overseas Security Advisory Council
PESI Rio 2016	*Plano Estratégico de Seguranéa Integrada para os Josos Olimpicos e Parlimpicos Rio 2016* (Strategic Integrated Security Plan for the Rio 2016 Olympic and Paralympic Games)
PGA	Professional Golf Association

PGIP	Post Graduate Intelligence Program
PhD	doctor of philosophy
PMESII-PT	Political, Military, Economic, Social, Information, Infrastructure - Physical Environment and Time
R&D	research and development
RAPID	Ready Armor Protection for Instant Deployment or Rapid Response Approach to Disasters in Asia-Pacific (depending on context)
ret.	retired
ROK	Republic of Korea
RSO	regional security officer
S&T	science and technology
S3	operations section on a field grade command staff
SAIS	School of Advanced International Studies
SAMS	School of Advanced Military Studies
SAR	search and rescue
SDF	Self-Defense Force
STE	Synthetic Training Environment
TEPCO	Tokyo Electric Power Company
TERCOM	Training, Evaluation, Research and Development Command (JGSDF)
TRADOC	U.S. Army Training and Doctrine Command
UAV	unmanned aerial vehicle
UGV	unmanned ground vehicle
UN	United Nations
UNC-MAC	United Nations Command Military Armistice Commissions
UNDP	United Nations Development Program
US	United States

USACE	United States Army Corps of Engineers
USAREUR	United States Army Europe
USARJ	United States Army Japan
USARPAC	United States Army Pacific
VA	Virginia
VLCC	Very Large Crude Carrier (ship)
VTW	virtual terrain walk

Chapter 1: Overview[3]

A disaster in a megacity could be a black swan.[4]

General (U.S. Army) Robert B. Brown

Black swan: "First, it is an outlier, as it lies outside the realm of regular expectations, because nothing in the past can convincingly point to its possibility. Second, it carries an extreme 'impact.' Third, in spite of its outlier status, human nature makes us concoct explanations for its occurrence after the fact, making it explainable and predictable."[5]

Nassim Nicholas Taleb,

The Black Swan: The Impact of the Highly Improbable

The pages below demonstrate the truth of General (GEN) Brown's observation. His choice of the word "could" is telling. The conference during which it was made reflects that such a disaster should be neither a black swan nor a black elephant, at least not for the countries participating in the "Current and Future Operations in Megacities" conference or others partaking of this and other resources hopefully serving their efforts to better prepare for such events.[6] The possibility of a major disaster in a megacity being a black elephant is somewhat less when cities are in

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[3] For an executive summary of this conference proceedings, see Russell W. Glenn, et al., *Executive Summary: Achieving Convergence during Humanitarian Assistance and Disaster Relief Operations in the World's Largest Urban Areas - Proceedings of the "Current and Future Operations in Megacities" Conference, Tokyo, Japan, July 16-18, 2019*, Fort Eustis, Virginia: U.S. Army Training and Doctrine Command, September 25, 2019, https://community.apan.org/wg/tradoc-g2/mad-scientist/p/mc2019 (accessed September 26, 2019).

[4] Unless otherwise cited, direct quotes attributed to a conference speaker should be assumed to have come either during the speaker's presentation or his/her panel session. Titles and other details of each presentation/panel can be found in Appendix A: Agenda.

[5] Nassim Nicholas Taleb, *The Black Swan: The Impact of the Highly Improbable*, NY: Random House, 2010, xxii.

[6] What is a black elephant? "It is a cross between a black swan and the elephant in the room. The black elephant is a problem that is actually visible to everyone – the proverbial elephant in the room – but no one wants to deal with it, and so they pretend it is not there. It is seen to be an improbable event when actually it is not. When the problem blows up, everyone feigns surprise and shock, behaving as if it were a black swan." Peter Ho, "Strategic studies in practice: A South-East Asian perspective," in *New Directions in Strategic Thinking 2.0: ANU Strategic & Defence Studies Centre's Golden Anniversary Conference Proceedings*, ed. Russell W. Glenn, Canberra: Australian National University Press, 2018, 117-132, 122. One black elephant example offered is the UK vote favoring Brexit.

developed world countries. The likelihood is higher in those for which metropolitan and national governments are too politically, economically, or socially challenged to prepare. That is a point to keep in mind for any perusing the rest of these proceedings. Although Tokyo was often the focus during the above conference, many observations made by speakers and audience members were meant to apply to any of the planet's megacities – and others of less size and influence – regardless of whether the cause of catastrophe is nature or man.

A bit of background

This conference was the second of two events regarding megacities in which TRADOC partnered with other organizations. The first was held in April 2018 New York City (NYC) and entitled "Multi-Domain Battle Operations in Megacities." Speakers included GEN Stephen J. Townsend [Commanding General (CG), United States Army Training and Doctrine Command (TRADOC) at the time]; United States Army Pacific Command's GEN Robert B. Brown; Deputy Chief of the Australian Army (now Chief of Army) Major General (MG) Rick Burr, and the heads of the New York Police Department (NYPD) and Fire Department of New York (FDNY). GEN Townsend chose to transition the moniker Multi-Domain Battle (MDB) to Multi-Domain Operations (MDO) two weeks after the event in part due to recognition that future operations would more often than not include extensive civil support and other mission types both during and post-combat. TRADOC's co-partners in New York were United States Army Pacific and the Australian Army. As was the case in NYC, the July 16-18, 2019 "Current and Future Operations in Megacities" focused on the operational and strategic levels. The primary emphasis for the 2019 event was humanitarian assistance/disaster relieve operations (HADR). The Japan Ground Self-Defense Force (JGSDF) and United States Army Japan (USARJ) joined the original three NYC partners in supporting the Tokyo conference.

It might be argued that this second conference in part addressed the army's over-focus on armed conflict in its current description of MDO, that in TRADOC Pamphlet 525-3-1, *The U.S. Army in Multi-Domain Operations 2028*. (The definition of MDO can be found in the footnote below and Appendix C).[7] Not neglecting the essentiality of preparing for combat, the "Current and Future Operations in Megacities" event nevertheless sought to give attention to the currently somewhat neglected "competition" and "return to competition" components of MDO.

The Tokyo conference's primary objectives were:

- Identify best practices for humanitarian assistance and disaster relief (HADR) undertakings in megacities during and in the aftermath of both natural and manmade disasters.

- Determine how historical urban HADR and security events more generally can inform JGSDF support of the 2019 Rugby World Cup and 2020 Olympics in Tokyo.

- Consider how artificial intelligence capabilities can be accelerated to augment U.S. and partner forces' operations in the world's largest urban areas.

Two supporting objectives complemented the above:

- Increase overall awareness and understanding among conference partners and other key stakeholders regarding the application of Multi-Domain Operations and similar partner concepts to HADR during contingencies in megacities.

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[7] Multi-Domain Operations: "Operations conducted across multiple domains and contested spaces to overcome an adversary's (or enemy's) strengths by presenting them with several operational and/or tactical dilemmas through the combined application of calibrated force posture; employment of multi-domain formations; and convergence of capabilities across domains, environments, and functions in time and spaces to achieve operational and tactical objectives." *The U.S. Army in Multi-Domain Operations 2028*, Fort Eustis, VA: United States Army Training and Doctrine Command, December 6, 2018, GL-7.

- Increase partner understanding of existing bilateral and multi-lateral training opportunities, in particular those needed to enhance understanding of multi-domain and similar operations.

Conference description

> Align decision making authority with expertise and awareness. This challenges command and control understandings but is essential.
>
> Charles "Sid" Heal

This conference spanned four days as shown in the agenda (Appendix A). The first day consisted of a virtual terrain walk (VTW) conducted by three U.S. Army Asymmetric Warfare Group (AWG) officers and moderated by Dr. Russell W. Glenn. [An actual terrain walk of key Tokyo sites was initially envisioned but rejected as impractical given the size of the audience (up to 200 representatives from Japan, the United States, Australia, Singapore, Republic of Korea, and Italy), summer temperatures and humidity in the city, and unpredictability of Tokyo traffic.] The VTW consisted of two primary components: an initial session providing an overview in terms of flows into, within, and out of the megacity and a second session analyzing the consequences of a notional 7.3 scale earthquake in Tokyo during the 2020 Summer Olympics. The presenters selected five exemplary flows, each of which was considered in terms of those inflows, within flows, and outflows: power, water, people, goods and services (supplies), and waste. The objective of the first day was to familiarize those unfamiliar with Tokyo and then provide some understanding of the challenges inherent in a major megacity disaster during a world-class event. It was understood that the five types of flows employed in the example are not exhaustive. Depending on the nature of a disaster, foci for an audience or exercise, and other factors,

alternative approaches could be employed, e.g., viewing a megacity in terms of economic flows and the consequences both for the megacity concerned and its local environs, country, immediate international region, and the world as a whole. A limited sample of specific flows that might be of interest in terms of a megacity's security could include commuters, labor, public transportation vehicles, food, waste, flood waters (60% of Tokyo is in a flood hazard plain), and information.

While there are obvious reasons these or other flows would be of interest to those seeking to guarantee an urban area's security, a look "beneath the covers" tells us that good planning and preparation will not be satisfied with merely addressing the obvious. The volume of virtually any megacity flow offers potential concealment for a potential evil-doer. Taken together, the many flows constitute a "level of vibration" that is the daily hum of an urban area's ambient activities. A terrorist, criminal, or other antipathetic group or individual is less likely to be detected if it operates within this vibration of activity. As we shall see when looking at the 1995 nerve agent attack in greater detail, the five perpetrators all managed to escape detection. They were "concealed" within the commuter flow on that otherwise typical 1995 Tokyo morning.

The second session on day 1 first reviewed Tokyo authorities' response to the 1995 sarin nerve agent attack on its subway system (about which more in the pages to follow). Motivated by the Japan Ground Self-Defense Force's interest in megacity preparedness during world events, the implications of the above-noted notional earthquake first received attention via a snapshot look at four major Olympic sports venues. (Tokyo will host the 2019 Rugby World Cup in addition to the Summer Olympics the following year.) Tokyo's urban authorities are required to execute studies and prepare "disaster preparedness maps" that show users what areas are vulnerable to such hazards as building collapse, fire, tsunamis, and landslides. (See Figure 1 for an example.)

Figure 1: Minato City special ward liquefaction disaster preparedness map[8]

The VTW viewed the location of the four sample venues in light of their direct exposure to such

risks and the implications of an earthquake for addressing casualties suffered at those venues.

This was done by overlaying data from the relevant disaster preparedness map onto terrain in the

vicinity of each of the four Olympic sites. Results showed that while the sites themselves were

relatively safe, individuals moving to and from these locations (audience or emergency service

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[8] "Minato City Liquefaction Map (Earthquake in the Northern part of Tokyo Bay – Tokyo Inland Earthquake),"
Minato City Development Support Department Construction Guidance Section, October 2013. Legend:
- Red: High liquefaction potential   Red circle: Welfare resident evacuation site
- Amber: Medium liquefaction potential   Blue circle: Evacuation site
- Green: Low liquefaction potential   Green running figure: Wide-area evacuation area
- White circle, red border: City office   Yellow circle with "X": Police station
- Blue circle with "Y": Fire station/branch

providers, for example) could be exposed to one or more of the above hazards. Analysis provided by AWG representatives considered the implications of earthquake consequences in greater detail, noting for example that several million commuters would be stranded in the aftermath of an earthquake occurring during a workday; residents would be deprived of ready access to safe water and – in a matter of days –food supplies; and Tokyo, the country of Japan, and a much wider segment of the world economy would be severely impacted given the quake's repercussions on the capital. These results reinforced the value of further discussing HADR considerations over the following two days of presentations and question and answer sessions.

Days 2 and 3 of the conference followed the day 1 virtual terrain walk. These two days each consisted of a pair of sessions during which a speaker addressed the audience for thirty minutes before participating in a session question and answer period (this in addition to former Chief of the Japan Self-Defense Force General Ryoichi Oriki providing the keynote to open day 2).

- Session 1: "Megacities and Humanitarian Assistance/Disaster Relief (HADR) Operations: Context and History's Lessons" This session featured four speakers. Dr. Russell W. Glenn provided overarching context regarding megacities both in the Indo-Pacific region and worldwide. He was followed by three colleagues who drew on their personal experiences while considering two of Tokyo's most prominent recent security challenges. Dr. Tetsu Okumura reviewed inter-organizational coordination challenges during the 1995 sarin nerve agent attack while LTG Shigeru Kobayashi and COL Stephen Browne considered the 2011 earthquake/tsunami/nuclear reactor disaster and its consequences for megacities.
- Session 2: "The Complexity of Megacity Operations" Session 2 began with USARPAC commanding general (CG) General Robert Brown viewing undertakings in the world's

largest and most influential urban areas through the lens of Multi-Domain Operations (MDO), the U.S. military's maturing operational concept. He was followed by the CG of the JGSDF's Ground Component Command, Lieutenant General (LTG) Kazuaki Sumida who in turn provided a view of HADR security issues from his force's viewpoint. The session concluded with CG, U.S. Army Maneuver Center of Excellence Major General (MG) Gary Brito contemplating the potential value of artificial intelligence (AI) in terms of both future megacity operations and MDO.

- Session 3: "Orchestrating Megacity Security Operations during World Class Events" Lessons from previous high-profile megacity events were of notable interest to JGSDF leaders given the approach of Tokyo's hosting both the 2019 Rugby World Cup and 2020 Summer Olympics. The Australian Army's Brigadier (BRIG) Ian Langford highlighted insights from a number of his service's recent contingencies to include those pertaining to support during the 2000 Sydney and 2008 Beijing Summer Olympics. Reinforcing a major focus of speakers from sessions 1 and 2, he strongly emphasized the essentiality of orchestrating all relevant organizations' capabilities in support of security objectives. (This focus would be emphasized throughout the conference.) Charles Heal drew on his nearly 33 years as a law enforcement officer with the Los Angeles County Sheriff's Office in reinforcing a number of BRIG Langford's observations while expanding on them to observe the importance of considering megacity security from all relevant perspectives, an additional benefit of incorporating the full scope of applicable parties during planning, exercises, rehearsals, and execution. Peter Ford presented a detailed synopsis of security considerations during the 2016 Rio de Janeiro Summer Olympics

while LTG Ryuji Takemoto outlined the responsibilities inherent in his JGSDF 1st Division's role in securing Japan's capital during the coming world cup and Olympics.

- Session 4: "Building Governmental-Nongovernmental Teams during Megacity Operations" The final group of speakers served as very effective reinforcement of the above focus-cum-theme for the conference, that of the need to move beyond mere cooperation or coordination to substantively orchestrate the actions (and, thereby, capabilities) of relevant parties during operations in a megacity. LTG Chun In-Bum drew on his extensive experiences as an officer in the Republic of Korea's army to identify what he considers the three primary components of success during such contingencies: communications, power, and water. LTG (JGSDF, ret.) Noboru Yamaguchi brought many of the issues previously identified with respect to 3/11 – that coincidence of earthquake, tsunami, and nuclear disaster on March 11, 2011 – to consider them in terms of what lessons the incident offers for leaders during future contingencies with participants from multiple heterogeneous organizations. Lise Grande, currently the United Nations' Humanitarian Coordinator in Yemen, harkened back to her responsibilities as the individual overseeing noncombatant evacuation of Mosul during recent Iraqi Security Forces (ISF) fighting with the Islamic State of Iraq and Syria (ISIS).

What is a megacity?

Using the standard definition of a megacity (an urban area with ten million or more in population), there were 38 such entities worldwide at the time of the Tokyo conference. Twenty-two of those are in the Indo-Pacific region as shown in Figure 2. If one chooses to look east along the Pacific Ocean's rim, we can add another two: Los Angeles with its 15.4 million residents and Lima, Peru (population 11.5 million).

Figure 2: Indo-Pacific megacities as of 2019[9]

But how valuable is ten million as a basis for definition when it comes to those planning and preparing for operations in an urban area?[10] Differences between a city of nine million and another of ten, eleven, or fifteen million will be significant, but it is very likely that those differences have less to do with the size of the population than other factors such as geographic spread, density of inhabitants, connections and interdependencies with other parts of the country or world, and the influence the urban area has in arenas such as economics or transportation. For example, there are some urban areas of over ten million in China that have limited impact on countries outside of the nation of which they are a part. On the other hand, some cities of well under the ten million mark dramatically influence countries thousands of miles distant.

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[9] Image from Dr. Russell W. Glenn, "Megacities in the Indo-Pacific Region" briefing during "Current and Future Operations in Megacities" conference, Tokyo, July 17, 2019.

[10] This issue was also touched on during the first of the two megacity conferences. See Russell W. Glenn, et al., *Where none have gone before: Operational and Strategic Perspectives on Multi-Domain Operations in Megacities - Proceedings of the "Multi-Domain Battle in Megacities" Conference, April 3-4, 2018*, Fort Hamilton, New York, Fort Eustis, VA: U.S. Army Training and Doctrine Command, 2018, 9-10, https://community.apan.org/wg/tradoc-g2/mad-scientist/m/multi-domain-battle-mdb-in-megacities/244661 (accessed September 26, 2019).

Singapore, with its population of approximately 5.6 million – that including nearby urban areas in Malaysia and Indonesia – falls well under the standard ten million mark. Yet this urban area is the world's top oil bunkering (ship fueling) port by volume, its second largest shipping container port, and monitor of the Singapore and Malacca Straits (via the country's Maritime and Port Authority's Port Operations Control Centre), that in addition to its significant economic status.[11] Its global interconnectedness and influence means that minimizing the "down time" of key transportation and economic functions would be a priority for both Singapore and many of the parties that would offer to assist should the city suffer catastrophe.

An alternative to the standard "ten million or more" definition is therefore in order. The following is offered:

Megacity: "An urban area of extraordinary population size, geographic spread, physical and social complexity, interconnectedness, and similarly exceptional characteristics, to include influence with at least broader regional scope."[12]

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[11] Material regarding Singapore from "Demographia World Urban Areas,15th Annual Edition," *Demographia*, April 2019, http://www.demographia.com/db-worldua.pdf (accessed August 6, 2019); "Facts and Data," Maritime and Port Authority of Singapore, undated, https://www.mpa.gov.sg/web/portal/home/maritime-singapore/introduction-to-maritime-singapore/facts-and-trivia (accessed January18, 2018); "6 Countries are Responsible for Almost 60% of All Bunker Sales," *Ship & Bunker*, January 5, 2016, https://shipandbunker.com/news/world/608701-6-countries-are-responsible-for-almost-60-of-all-bunker-sales (accessed January 18, 2018); World Shipping Council, "About the Industry," 2018, http://www.worldshipping.org/about-the-industry/global-trade/top-50-world-container-ports (accessed January 18, 2018); and *"Malacca and S'pore Straits traffic hits new high in 2016, VLCCs fastest growing segment," Seatrade Maritime News*, undated (but data as of 2016), http://www.seatrade-maritime.com/news/asia/malacca-and-s-pore-strait-traffic-hits-new-high-in-2016-vlccs-fastest-growing-segment.html (accessed January 18, 2018).
[12] Definition from: Russell W. Glenn, "Ten Million is Not Enough: Coming to Grips with Megacities' Challenges and Opportunities," *Small Wars Journal* (January 25, 2017), http://smallwarsjournal.com/jrnl/art/ten-million-is-not-enough-coming-to-grips-with-megacities%E2%80%99-challenges-and-opportunities (accessed January 18, 2018).

Figure 3: Overview of Tokyo looking toward Mount Fuji[13]

A common understanding of "urban area" is similarly necessary to further assist understanding of our megacity definition. Looking for consistency among individual countries is unhelpful as various authorities use anything from 200 to 50,000 in population in their definitions. The United Nations (UN) is equally of little value in this regard as it simply adopts the definition used by the country under consideration.[14] Just as our definition of "megacity" seeks to serve the planner, pragmatist, and practitioner, so too should our description of urban area:

Urban area: "A continuously built up land mass of urban development [that] contains no rural land. [It] is best thought of as the 'urban footprint' – the lighted area that can be observed from an airplane (or satellite) on a clear night."[15]

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[13] Photograph by members of U.S. Army Asymmetric Warfare Group as appears in Virtual Terrain Walk briefing during "Current and Future Operations in Megacities" conference, Tokyo, July 16, 2019.
[14] Chandan Deuskar, "What does 'urban' mean?" The World Bank, Sustainable Cities blog, February 6, 2015, http://blogs.worldbank.org/sustainablecities/what-does-urban-mean (accessed August 2, 2019).
[15] Adapted from "Demographia World Urban Areas," 12th annual edition, April 2016, accessed February 21, 2017, http://www.demographia.com/db-worldua.pdf (accessed August 29, 2019).

It is no secret that urbanization is perhaps the definitive trend in human development since the mid-20th century. The majority of the planet's people became urban dwellers over a decade ago. The trend continues furiously in some parts of the world, particularly developing countries. Speaker BRIG Ian Langford noted that Africa, a continent of increasing interest to world powers and competition between them, had 492 million urban residents in 2015. Projections for 2050 see that number increasing threefold to 1489 million. That is a swelling of urban areas by just short of a billion people – three times the current population of the United States – in just over thirty years' from the time of this writing. While the raw number is impressive, the rate of urbanization is nothing short of dramatic. Langford foresees Africa modernizing "at a pace and a rate that will exceed China in the next 35 years." Put differently, while the West incorporated gradually increasing urbanization, industrialization, and information advances over centuries, much of the developing world and Africa in particular has or will be doing so in a few tens of years. That slower pace of urban growth in developed nations gave developed world leaders a chance to observe, contemplate, and adapt as cities grew (though admittedly that adaptation was sometimes found wanting). Many in developing world urban areas, and particular those in the largest of urban areas, find that their adaptations are outpaced by the pace of growth. You might recall instances in which your own community failed to plan appropriately for growth, the result being transportation, energy, or other components of infrastructure showing the consequences. We can more recently add upturns in immigration to those challenges. LTG Chun noted that the Republic of Korea had limited concerns regarding domestic threats for many years, North Korea dominating the country's security arena. Recent immigration of 100,000 from nations suffering internal turmoil has altered the picture, that given concerns that some ten percent of those arrivals are thought to be radicals.

Why Tokyo?

> The peace and prosperity of all of Japan depends on the proper functioning of Tokyo as
>
> it is the country's capital city. Relief to Tokyo after a disaster and maintaining
>
> continuity of its civic operations…are therefore a matter of national security.

General (Japan Ground Self-Defense Force, retired) Ryoichi Oriki

The size of megacities in terms of both population and geographic spread are unquestionably impressive. But it is their extraordinary influence – locally, nationally, and internationally – that truly sets them apart. Few are the cities that wield global influence to the extent of Tokyo.

Figure 4: View of Tokyo at night[16]

That influence stems from a number of factors. The megacity city of Tokyo has the largest population of any urban area in the world (38,505,000 in 2019). This reflects an exceptional

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[16] Image from General (U.S. Army) Robert B. Brown, "Multi-Domain Operations during Megacity HADR" briefing during "Current and Future Operations in Megacities" conference, Tokyo, July 17, 2019.

coalescing of skills, wealth, and productivity.[17] No city has a greater gross domestic product

(GDP); Tokyo's accounts for 34.7% of Japan's and is the 17th largest in the world, falling as it

does between that of the Netherlands and Turkey. On a national basis, Tokyo's population

represents just under 30% of the country's at large. Over a third of all Japan's commercial sales

take place within its confines. Over three-quarters of the nation's foreign companies are based

there, no small feat when one considers that Japan has three megacities (one more than the

United States): Tokyo, Osaka-Kobe-Kyoto, and Nagoya. To put some of these statistics in

context, the megacity of Tokyo's population is just short of the entire country of Iraq's and four

million greater than that of Afghanistan. The area covered by its expanse is five times that of the

Hawaiian island of Oahu (though thanks to its system of elevated and subterranean high-speed

roadways, Tokyo's rush hour traffic is in many locations far less dense than Honolulu's.)

Why Tokyo as our second conference's location, that in addition to the above? As we will see

from our various speakers' remarks, it sits uniquely as a megacity in having experienced a

significant chemical agent attack, major earthquake, and radiation threat within the past two and

a half decades. It is also hosting the above-mentioned pair of major world sports events in

coming months. Should these reasons be deemed insufficient, Tokyo is arguably the megacity

most exposed to risk of natural disaster. Reinsurance company Swiss Re found during its 2013

"Mind the Risk" study that in terms of people potentially affected, Tokyo ranked first in

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[17] Statistics here and immediately below are from:
Tokyo population and geographic area: *Demographia World Urban* Areas, 13th edition, April 2017, 18,
http://www.demographia.com/db-worldua.pdf (accessed February 9, 2018).
Number of foreign countries companies statistic: David W. Smith, "Cities in Pacific Asia," in *Handbook of Urban Studies*, edited by Ronan Paddison, Thousand Oaks, CA: Sage, 2001, p. 433.
Tokyo 2008 GDP ($1,520M) from "Top 10 Wealthiest Cities of the World by GDP," *We are top 10*, undated
https://wearetop10.com/wealthiest-cities-of-the-world-by-gdp/ (accessed February 9, 2018). Japan 2008 GDP
($4,383.08B) from "Japan GDP 1960-2018," *Trading Economics*, undated, https://tradingeconomics.com/japan/gdp
(accessed February 9, 2018).
Other: Tokyo Metropolitan Government, "About Our City,"
http://www.metro.Tokyo.jp/English/about/appendix/appendix02.htm (accessed February 9, 2019).

exposure to earthquakes while also vulnerable to storms (#2 in the world), flooding (#6), storm surge (#4), and tsunami (#1).[18] That the urban area therefore has much to offer any interested in megacity security from both a historical and future challenges perspective added to its allure as conference venue.

Why humanitarian relief/disaster assistance (HADR)?

> Anything you can do that assists people works in your favor.
>
> Sid Heal

The September 11, 2001 attacks on America expanded our ability to conceive of catastrophes of an almost unimaginable scale. They also provide us a greater capacity to anticipate and adapt.

As was made evident during the April 2018 New York City "Multi-Domain Battle in Megacities" conference:

> Between 1970 and 2014, natural disasters accounted for more than 2 million deaths in the Asia-Pacific, 57 percent of the global total. [Former PACOM 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."[19]

Despite the tragedies of war and those due to terrorism, natural disasters prove the more costly in terms of lives ended, those rendered less full due to injury, and damage to infrastructure.

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[18] Lukas Sundermann, Oliver Schelske, and Peter Hausmann, "Mind the risk: A global ranking of cities under threat from natural disasters," Swiss Re report, September 18, 2013, http://www.swissre.com/library/expertise-publication/Mind_the_risk_a_global_ranking_of_cities_under_threat_from_natural_disasters.html (accessed November 24, 2018), 28-30.

[19] Timothy McGeehan, "A War Plan Orange For Climate Change" *Proceedings* 143 (October 2017): 48-53, https://www.usni.org/magazines/proceedings/2017/october/war-plan-orange-climate-change (accessed September 26, 2019).

Flooding in Dhaka, Jakarta, and Manila and earthquakes in Los Angeles and Tokyo are only a handful of examples involving recurring megacities troubles attributable to nature's vagaries. Many require assistance rendered by both domestic and international military forces.

More frequent these disasters might be, but we must remember that humankind also inflicts the necessity of HADR on its own. The 9/11 attacks, 1995 sarin attack in Tokyo, and tragedies suffered due to combat in Iraq and Syria tell us that any responsible consideration of urban HADR must include the effects of mankind's malevolence or mistakes as well as suffering wrought by nature. If there is any good news in this, it is that the lessons and policies for disaster recovery from one type of event will inevitably inform those with roots in others. Let us therefore consider a sample of what nature, man, and – in the case of 3/11, both combined – have brought to bear on what is today the most populous city in the world.

Figure 5: Damage after the 1923 Great Kanto earthquake[20]

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[20] LTG (Japan Ground Self-Defense Force, retired) Shigeru Kobayashi, "Planning Humanitarian Assistance/Disaster Relief Operations: Insights from 2011" briefing during "Current and Future Operations in Megacities" conference, Tokyo, July 17, 2019.

Both literature and speakers tell us that Tokyo's next "big one" has a 70% probability of occurring by 2044. Three events lend hints as to what Japan's capital can expect in that regard while also providing insights of value to planners and responders. The Great Kanto earthquake of September 1923 is the first. Striking at an unfortunate time of day (the lunch period when many were preparing meals over fire) and during adverse weather conditions (local wind speeds exceeded fifteen kilometers per hour), tremors and fire killed over 140,000 and left one million homeless in a city with population of between 2.6 and 4 million at the time.[21] The importance of reducing structures' flammability and incorporating firebreaks into urban design were obvious in its aftermath. The 1995 Great Hanshin-Awaji earthquake struck the Osaka-Kobe-Kyoto megacity area at 5:46 AM, killing 6,400, nearly 90% of those due to crush injuries. Neighbors played a significant part in the immediate aftermath. LTG Kobayashi related that after the earthquake, neighbors were the ones who came to the aid of 77% of those rescued (27,000) with 80% of those surviving while only 50% recovered by traditional first responders and the Japan Self-Defense Force (JSDF) did so, the arrival of the latter with their specialized equipment and skills being delayed in part by blocked roadways. Old "truths" guided prioritization of recovery and missions. The rule of 3-3-3 – an individual can live up to three minutes without air, three days without water, or three weeks without food – motivated first responders (the rule being 4-4-4 for some in the United States, though in both cases the standards appear to be anecdotal. They would of course also depend on the status of the victim at the time.)[22] Planners and managers gained valuable insights into who and what capabilities are more valuable when arriving from distant

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[21] Conference remarks by LTGs Sumida and Kobayashi; and Fumiaki Fujibe, "Localized strong winds associated with extensive fires in central Tokyo: Cases of the Great Kanto Earthquake (1923) and an air attack in World War II (1945)," *Journal of Wind Engineering & Industrial Aerodynamics* 181 (October 2018): 80.
[22] Anthony G. Macintyre, Joseph A. Barbera, and Edward R. Smith," "Surviving Collapsed Structure Entrapment after Earthquakes: A 'Time to Rescue' Analysis," *Prehospital and Disaster Medicine* 21, no. 1 (2006): 8.

locations. From a planning perspective, search and rescue was thought to be complete after 72

hours barring exceptional cases, the next phase of response being recovery of remains.

(Exceptional cases have included some individuals living beyond ten or more days while trapped

beneath debris. These tended to involve instances in which a source of water and/or food was in

the immediate vicinity of the victim.) However, a study of multiple earthquakes has led some

experts to instead conclude that, "the many rescues accomplished, particularly up to five days

post-impact, suggest that the intense rescue phase should continue at least through this time

milestone."[23] Priority was given to shelters and other victim support in the third post-event phase

with operations transitioning to recovery after a month's time. While the activities in these

phases obviously overlap, the message for those requesting or offering support from afar is clear.

Search and rescue of survivors beneath the rubble will very likely be complete prior to more

distant capabilities being able to coordinate and complete travel, integrate themselves with local

authorities, and begin support operations.

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[23] Anthony G. Macintyre, Joseph A. Barbera, and Edward R. Smith," "Surviving Collapsed Structure Entrapment after Earthquakes: A 'Time to Rescue" Analysis," *Prehospital and Disaster Medicine* 21, no. 1 (2006): 8.

Figure 6: JGSDF soldiers aid post-3/11 recovery[24]

March 11, 2011 marked the greatest disaster in Japan's recent history. A 9.0 magnitude

earthquake off the country's east coast created a tsunami that washed inland along the coast

north of Tokyo, causing a nuclear meltdown at the six-reactor Fukushima-Daiichi power facility.

Upper five magnitude tremors shook the capital's buildings, sending higher floors swaying and

causing panic among workers used to occasional lesser vibrations. Subways and trains stopped as

programmed when shaking exceeded predesignated standards. Thousands of commuters were

stranded as a result. Both air and water in Tokyo were contaminated by radiation, though the

extent was limited. The capital was fortunate in comparison with communities to its north, those

in the vicinity of the nuclear power plant where waves measured in tens of feet washed hundreds

of meters inland, killing thousands and scraping the land raw of nature's and mankind's cover.

The Japan Ground Self-Defense Force mobilized over 100,000 personnel, the largest such

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[24] LTG (Japan Ground Self-Defense Force, retired) Shigeru Kobayashi, "Planning Humanitarian Assistance/Disaster Relief Operations: Insights from 2011" briefing during "Current and Future Operations in Megacities" conference, Tokyo, July 17, 2019.

operation since the end of World War II. The United States, Australia, Republic of Korea, and Thailand were among the thirty-one countries sending personnel to aid recovery, the number of relief teams from those nations and five other organizations reaching 1,200.[25] Though Tokyo escaped the worst of the tragedy, the disaster offers many lessons relevant to preparing for catastrophe in a megacity.

Former head of the Japan Self-Defense Force, General Ryoichi Oriki, related how a response of such magnitude challenged responsible organizations. He also passed on lessons learned with application to future major contingencies. LTG Kobayashi similarly offered insights. The essentiality of all government ministries working together during recovery was but one such lesson. Both speakers pointed out how Japan's procedures for bringing government capabilities to bear differ from those of the United States. Any military support must be requested by local leaders. Deployment comes only after the prime minister's approval. Communication and coordination of Japan Self-Defense Force, other government, partner nation, nongovernmental, and other organizations' activities proved difficult and in need of revision. This was especially true in those areas most devastated and where virtually all forms of communication were rendered inoperable. The JSDF stepped in to establish communications networks, an initiative that benefited from prior reconnaissance of key terrain. As commercial systems again began to come online, the challenges of linking military with company capabilities made itself known. The need for pre-event coordination, agreements, and practice involving commercial and government parties was another lesson learned. A third was less a lesson learned than confirmation of a given: two foreign powers tested JSDF defense of Japan's sovereign territory

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[25] Material regarding the events of March 2011 are from the GEN Oriki, LTG Sumida, LTG Kobayashi, and COL Browne presentations.

in the days following the earthquake. National defense readiness cannot pause even in the immediate wake of catastrophe.

Though the 9.0 earthquake that triggered the Fukushima Daiichi disaster has caused Japan's officials to reconsider what was previously thought to be a reasonable maximum threat in that regard, some idea of a major quake's consequences for Tokyo can be gained from the results of the city's 2014 exercise using a notional 7.3 scale tremor (that expected with a 70% probability prior to 2044). Fatality estimates number 9,700 with 5,400 of those in collapsed buildings. Additional injured would run to 147,600. Some 300,000 buildings could be completely destroyed, 200,000 due to fire. Stranded commuter estimates exceed five million; the expected number of evacuees would be over three million.[26] (LTG Kobayashi noted that Tokyo's approximately 15M daily commuters comprise more than 10% of Japan's population, a flow of people into and out of the city that LTG Takemoto described as the capital's "breathing." See Figure 7.) Global warming and its accompanying sea level rise will exacerbate future natural disasters in some megacities, further promoting the need to consider responses to megacity crises.

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[26] Statistics from Kobayashi briefing and Daniel Hurst, "This is not a 'what if' story: Tokyo braces for the earthquake of a century," *The Guardian*, (June 11, 2019), https://www.theguardian.com/cities/2019/jun/12/this-is-not-a-what-if-story-tokyo-braces-for-the-earthquake-of-a-century, (accessed July 4, 2019).

Figure 7: Tokyo "breathing": Flow of people into, within, and out of Tokyo during a typical workday[27]

Fukushima was one of two recent Tokyo disasters highlighted by several speakers during the conference. The other was the release of sarin nerve agent in Tokyo's subway in March 1995, only two months after the tragedy of the January Great Hanshin-Awaji earthquake struck the Osaka megacity area. Five members of the Aum Shinrikyo cult penetrated the liquid-filled membranes they brought into the system during morning rush hour, a period during which the city's subways can run at up to 200% design capacity. Delays in recognizing the nature of the threat meant some trains continued to run for over an hour after the attack. Fifteen stations would eventually be contaminated. Over 5,500 patients would be seen in conjunction with the event, twelve of whom would die. The dead included police and maintenance personnel who unwittingly exposed themselves either to the vapor from the liquid or, in the case of those

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[27] Screenshots taken from LTG (JGSDF) Ryuji Takemoto, "The JGSDF Role in Megacity Security Operations," briefing during "Current and Future Operations in Megacities" conference, Tokyo, July 18, 2019.

cleaning up the spills, when they mopped up the liquid without protecting either skin or airways. Dr. Tetsu Okumura, on staff at St. Luke's International Hospital – the facility that treated the largest number of patients – detailed the collective response by medical, fire, police, medical technician, military, and other personnel.[28] Communications and responder capabilities were quickly overwhelmed. Delays in identifying the agent not only resulted in deaths but contributed to contamination of 10% of additional medical and other personnel. On-site treatment was limited and too often inadequate. Tokyo policy did not include moving physicians to disaster sites. Emergency medical technicians were not allowed to intubate patients, nor were they equipped with auto-injectors, decontamination lotion, or other medications for dealing with chemical exposure.

Surprisingly, perhaps, in excess of two-thirds seeking medical attention did not reach hospitals via typical emergency means of transportation. Over a third (34.9%) walked. Another third-plus (37.6%) came by either taxi or thanks to Good Samaritan private vehicle owners. Only 7% arrived by ambulance with fire and police lending transport support in lesser percentages. (The numbers do not total 100%, presumably as how some patients reached the hospital remains unknown.) Lack of knowledge regarding the nature of the contaminant (the first report stated the casualties were the result of an explosion) not only meant medical personnel did not don protective equipment (which was in any case not available); neither patients nor hospital staff were initially decontaminated (for which no specialized equipment was on hand). Further, ventilation in many of the areas used to treat patients – to include the St. Luke's chapel given the volume of patients – was insufficient. General communications between medical, police, fire,

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[28] Those wanting more detail on the response to this attack should access Dr. Okumura's excellent article: Tetsu Okumura, et al., "The Tokyo Subway Sarin Attack: Disaster management, Part 1: Community Emergency Response," *Academic Emergency Medicine* 5 (June 1998): 613-17.

and other officials was poor; police and fire representatives sent to hospitals merely sought information rather than acting as liaisons. Central management was lacking both due to communications issues (responsibility for allocating patients to hospitals to match numbers with capabilities was the fire department's) and no policy regarding overarching coordination of assets. Further complicating effective response: between 70% and 80% of those seeking medical attention were sympathetic casualties, "worried well," who had not been exposed to sarin but believed they were victims of contamination. Triage at hospitals attempted to separate these from those contaminated, but delays in identifying the substance and cases of worsening symptoms among individuals actually exposed made that effort further difficult.

Such was the case twenty-four years prior to the "Current and Future Operations in Megacities" conference. Dr. Okumura reported that steps have subsequently been taken to address some identified shortfalls. Hospitals have been provided protective gear, albeit in insufficient numbers. Decontamination equipment and procedures are more readily available, to include development of Japanese-developed "wind decontamination" chambers that are more effective and resource (to include time) efficient than wet (water) decontamination procedures. (Notably, wind decontamination is effective for only non-persistent agents.) While two poison information centers existed prior to the March 1995 attack, there was none for chemical agents. The Japanese Poison Information Center has since been designated national coordinator for information regarding chemical disaster management. The center has created a model for incident information flow and coordination of response assets. Japan's government has compiled a list of chemical agent-knowledgeable personnel who meet regularly and are linked by mailing lists and other means. Critical information is also exchanged via non-governmental mailing lists for clinical toxicologists.

Adjustments have likewise been made subsequent to the 2011 Fukushima episode. An Alliance Coordination Mechanism created in 2015 provides structures to support Japan-U.S. defense cooperation. The agreement will serve as a guide regardless of a contingency's underlying cause should the two countries' armed forces find themselves assisting each other in the future.

Thanks to the United Nations' Ms. Lise Grande making the long trip from Yemen to Tokyo, the conference concluded with a presentation considering HADR implications when the disaster is resultant of force-on-force combat. Her remarks thereby provided the audience a third major cause of potential megacity catastrophe to complement previous discussions of those natural (though man's misjudgment played no small role in the Fukushima event, as at least one author has pointed out) or rooted in terrorism.

Ms. Grande chose to focus on events during her service as United Nations Deputy Special Representative of the Secretary-General and UN Resident and Humanitarian Coordinator for Iraq during Oct 16, 2016 – July 20, 2017 fighting in Mosul. Her responsibilities included coordinating noncombatant evacuation from the city and providing humanitarian services to resulting internally displaced persons (IDPs). Noting that Mosul was the largest urban battle since WWII, she observed that "protection of civilians in Mosul was the central strategic aim for the Iraqi security forces. Civilian infrastructure was second. Destruction of the enemy was third." An estimated 118,000 noncombatants remained in the Old City as of June 9, 2017, nearly 531,000 having been displaced since commencement of the offensive in October the year before.[29] Moving this over half a million individuals to safety and shelter constituted only part of aid providers' efforts. Additional challenges included screening of young children for

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[29] "Iraq – Complex Emergency," United States Agency for International Development Fact Sheet #4, fiscal year 2017, June 9, 2017, 1.

malnutrition, conducting a polio vaccination campaign, providing safe drinking water, and responding to protection violations (e.g., forced evictions, arbitrary detention, collective punishment, and restricted freedom of movement both in IDP camps and elsewhere).[30] Responding to a question regarding how the activities of the various parties providing HADR were coordinated, Ms. Grande stated that some 270 NGOs were active in Iraq at the time, their activities being coordinated by Ms. Grande and her staff in conjunction with the United Nations Office for the Coordination of Humanitarian Affairs (OCHA). Most NGO personnel worked in IDP camps somewhat distant from the fighting. Willingness to cooperate varied considerably. Médecins Sans Frontières (MSF, also known as Doctors Without Borders) was among the organizations that refused to assist in trauma centers on the front lines because they would have had to rely on military transport or otherwise work with armed forces assets. Other individuals and organizations fortunately recognized that the military assets in theater were insufficient to address IDP needs on such a massive basis and understood the value of military-civil cooperation in the service of noncombatants. (Such conditions will of course also exist during and in the aftermath of a megacity mass casualty event). Medical personnel from New York City hospitals were notable for their service at Mosul's front lines. Ms. Grande further reflected that most such medical personnel willing to serve at the front lines where the need was greatest were not from traditional or legacy NGOs.

Though far from a megacity in terms of our definition, Mosul's 1,905,000 population was nearly twice that confronted by the U.S. and its allies in either 1945 Manila (1.0 million) or 1950 Seoul (1.1 million).[31] The challenges related to HADR during combat operations in Mosul therefore

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[30] "Iraq – Complex Emergency," United States Agency for International Development Fact Sheet #4, fiscal year 2017, June 9, 2017, 3-4.

[31] Mosul population taken from "Demographia World Urban Areas, 15th Annual Edition," *Demographia*, April 2019, http://www.demographia.com/db-worldua.pdf (accessed August 6, 2019), 27. Not surprisingly given recent

provide some degree of understanding regarding what they might be were the urban area in question a megacity.

Much as has been seen in other recent urban undertakings, orchestrating the activities of aid providers is complicated during combat operations by the additional need to coordinate movement of NGOs, IGO representatives, and other groups or individuals with combatant force operations.[32] Combatants in Mosul included Iraqi Security Forces (military, police, other) and various coalition partners. Ms. Grande expressed her belief that the extent of coordination conducted had never been previously achieved by the United Nations. Activities accomplished as a result included construction of nineteen emergency camps on the outskirts of the city and establishment and maintenance of lines of communications between both these camps and ISF forces assisting with evacuations. Notably, ISF coordinated the tempo of their battle to prevent overwhelming camp capacity. The distance these features were from front lines meant those wounded would exceed the "golden hour" threshold deemed vital to timely treatment. Civilian-manned trauma stabilization/triage points were therefore established closer to the fighting to provide interim care. These moved forward as necessary to maintain sufficient proximity to advancing friendly forces.

Camps themselves were more than merely places at which IDPs could find refuge, shelter, medical care, and sustenance. Services provided included preventative health care as previously

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and ongoing security challenges in Iraq, estimates of Mosul's population vary considerably with numbers spanning just above 1.6 to in excess of two million.

[32] Some idea of the challenges involved can be drawn from aid organization efforts to ensure protection of their personnel operating in Gaza during Israel Defense Force operations. See, e.g., Russell W. Glenn, *Short War in a Perpetual Conflict: Implications of Israel's 2014 Operation Protective Edge for the Australian Army,* Canberra, Australia: Australian Army, 2016, https://www.army.gov.au/sites/g/files/net1846/f/arp9_glen_short_war_in_a_perpetual_conflict.pdf (accessed September 26, 2019).

noted, education, and – for some – jobs. UN teams monitored these activities as part of their overarching coordination effort.

Ms. Grande highlighted three particularly noteworthy factors underlying coordination success. First, United Nations civil-military officials were directly embedded in Iraqi Security Force civil affairs staff cells and additionally worked closely with ISF planners and operations representatives to ensure combatant and aid provider efforts were synchronized. These initiatives were facilitated by early establishment and maintenance of personal connections with ISF and other relevant personnel. Additionally, a single concept of operations guided military and civilian humanitarian operations, an exceptional state of affairs that demonstrates the extent to which the various parties sought to cooperate in the service of HADR. No less true of HADR than combat operations, no plan survives contact with reality. Plans and personnel from all organizations therefore understood the need for and maintained the flexibility necessary to adapt to changing conditions.

Summary of initial observations

> We can't turn a blind eye to operations in megacities. We've got to get after this or shame on us. The more we talk, the more we share, then the more we learn…. If we continue to ignore the complexities of operating in megacities we are only putting our soldiers and citizens in extreme danger.

> General Robert B. Brown

The unqualified need for more than mere coordination or cooperation came through loud and clear during the "Current and Future Operations in Megacities" conference. The below make clear the differences between coordination (weakest relationship of the three presented with the

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definitions below), cooperation, and orchestration (the strongest and most difficult to accomplish) in the absence of current U.S. joint doctrinal definitions for any of the three:

> Coordination (Australian Army doctrinal definition): "An arrangement where parties operating in the theater communicate their intended actions to one another and will self-synchronise their activities but will not negotiate the manner of their actions."[33]

> Coordination (U.S. Army doctrinal definition in 2004): "The action necessary to ensure adequately integrated relationships between separate organizations located in the same area."[34]

> Cooperation (Australian Army doctrinal 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."[35]

> Synchronization (U.S. joint doctrinal definition): The arrangement of military actions in time, space, and purpose to produce maximum relative combat power at a decisive place and time.[36]

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[33] "ADF Concept for Command and Control of the Future Force," version 1.0, Australian Defence Force, May 13, 2019, 46

[34] *Terms and Military Symbols*, ADP 1-02, Washington, D.C.: Headquarters, Department of the Army, August 2018, 1-94. Current U.S. Army and joint doctrine have no definition for coordination.

[35] "ADF Concept for Command and Control of the Future Force," version 1.0, Australian Defence Force, May 13, 2019, 46

[36] *DOD Dictionary of Military and Associated Terms*, Joint Publication 1-02, Washington, D.C.: Joint Chiefs of Staff, July 2019, 210.

Orchestration (proposed): The arrangement of alliance, coalition, partner member, or other organizations' actions in time, space, and purpose to produce maximum effects in the service of mission or objective accomplishment.

The definitions of "coordination," "cooperation," and that proposed for "orchestration" benefit in their being applicable to the full range of military and broader organization operations (though the no longer doctrinal U.S. Army definition for coordination unfortunately limits its application by restricting it to a shared location). They thus have application to operational challenges as recognized by 21st-century leaders, i.e., they are not limited to military actions alone but rather encompass others critical to ultimate operational and strategic success. The definition for "synchronization" fails in this regard.

Attainment of any of the three (coordination, cooperation, or orchestration) is beneficial to achieving desired ends. Coordination is the least demanding and therefore the easiest to accomplish (recognizing that "easiest" need not imply "easy"). It implies not only informing other alliance, coalition, or partnership members but also taking steps to insure one organization's actions do not impede those of another. Cooperation takes coordination one step further but still falls far short of planning, preparing, and executing in such a manner as to achieve maximum effectiveness and efficiency via the combined output of all participants. Coordination and cooperation are generally achievable to a considerable extent though each will tend to fall short of ideal due to conflicting organizational objectives and other factors insufficiently addressed to moderate the worst of their effects. Orchestration is rarely attempted and seldom achieved even at the lowest tactical echelons. When this end is attained it tends to involve only a very limited number of parties and be based on personal rather than institutional

relationships. Orchestration is best viewed as a mark on the wall, one for which leaders and their organizations should strive with the understanding that full realization will be elusive.

Figure 8 below helps us to envision what each of these three states can bring to an operation. Each rope represents the interrelationship between lines of effort (LOE) or lines of operation (LOO) represented by the four braids. The number of braids and what they represent will depend on the undertaking represented. The size of a braid corresponds to the priority given the respective LOE or LOO at a given point in time. Time on the horizontal axis denotes progression of the activity, operation, or campaign. Time on the vertical axis represents the duration of the activity, operation, or campaign. Priorities and even the LOE/LOO may change as actions progress (horizontal time).

The weight at the bottom of each rope symbolizes the shared ends, mission, or objectives that promote participant collaboration. The "tightness" of a rope's braids shows the extent to which participants work together toward those ends. It therefore represents the degree of synergy the alliance, coalition, or partnership attains: the extent to which the rope's strength is greater than the sum of four unbound braids. The horizontal lines represent the relative value of coordination, cooperation, and orchestration in reaching the desired maximum strength (shown at a random time early in an operation). Each of these lines can be moved downward to some extent if participants plan, train, and rehearse prior to actual disaster response. Such preliminary activities

promote early identification of roles, authorities, and responsibilities, further strengthening inter-organizational bonds.

Figure 8: Strength of an alliance, coalition, partner, or other organizational relationship given the degree of collaboration shown

Those conducting their activities in a stovepipe can cooperate with others without addressing such issues as inefficiencies in redundant logistics, overtasking of limited-capacity transportation nodes, and drawbacks when multiple organizations individually deal with local officials. Coordination may help, but it too will fall short of maximum effectiveness for many of these same reasons. To provide but one notional example, officials coordinating separate delivery flights abets safety and reduces frictions, but it cannot match improvements in effectiveness gained when those organizations arrange to avoid redundant goods delivered or have deliveries consolidated at a more remote air node to reduce flight numbers to others already overburdened.

Orchestration, not mere cooperation or coordination, is far better. Orchestration spawns the additional benefits of promoting inter-organizational communication and understanding of cultures that inherently enhance operational effectiveness. Working to maximize the positive impact of 270 NGOs and other organizations Lise Grande and the UN had to deal with in Iraq when overseeing the noncombatant evacuation of Mosul was undoubtedly challenging. That even orchestration will leave some instruments out of tune is apparent in her remarks regarding the NGOs that refused to fully cooperate due to internal policies. It little stresses the imagination to envision how much greater those challenges would be given the literally thousands of parties – federal, city, community, NGO, IGO, faith-based, domestic, international, military, police, fire, medical, and more – that a major megacity disaster will involve. Such disasters are not too distant in time; recall the estimated 70% probability of a major quake striking Tokyo within the next thirty years.

A quick sampling of the challenges confronted during the planning and execution of security operations for a non-disaster event – the conduct of the 2016 Rio de Janeiro Summer Olympics – allow us to peek into this future. Mr. Peter Ford served as the U.S. Olympic Security Coordinator during those games. Those challenges were considerable, to put it mildly. Brazil volunteered for and was awarded the 2016 games when its economy was strong, a situation no longer holding in the months leading up to the event itself. The obvious strains on preparations aside, the higher order effects of that downturn meant select segments of Rio's population would view the influx of foreigners and resultant disruption less favorably due to the money committed to the games vice other initiatives or, potentially, as a potential means of redressing perceived inequities. These negatives could potentially be magnified in a city with extraordinary numbers living in slums, many of which were well organized – and well-armed – gang members.

Writing for *Military Review*, Alessandro Visacro described the situation:

> Approximately eleven thousand athletes from more than two hundred countries brought
> roughly half a million tourists to the city of Rio de Janeiro during the games. Twenty-
> five thousand accredited journalists from around the world reached an estimated one
> billion spectators with their continuous broadcasts. The athletic events took place in
> thirty-two venues…. At the opening ceremony alone, 5 August 2016, there were
> approximately eighty thousand people in Maracanã Stadium, as well as forty foreign
> leaders…. The threats to the security of the games had distinct nuances, starting with a
> troublesome domestic situation. A severe economic crisis and a scenario of internal
> recession precipitated a turbulent political process that has continued to test the
> soundness of Brazil's democratic institutions. Against this backdrop, popular
> demonstrations and civil disturbances became a legitimate concern for government
> authorities. It is worth noting that during the 2013 FIFA (*Fédération Internationale de
> Football Association*) Confederations Cup, and, less intensely, during the 2014 FIFA
> (Soccer) World Cup, street demonstrations mobilized thousands of protesters
> throughout the country…. The uncontrolled spread of tropical endemic diseases caused
> by the government's failure to eradicate the mosquito that transmits the dengue,
> chikungunya, and Zika viruses also placed the success of the Olympics at risk,
> discouraging athletes and tourists from traveling to Brazil. In addition to the economic,
> political, and health crises, an acute public security crisis plagued the city of Rio de
> Janeiro—the metropolis was thrown into turmoil by a fratricidal dispute among armed
> gangs linked to international arms and drug trafficking.[37]

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[37] Alessandro Visacro, "Brazilian Organization for Combating Terrorism during the Rio 2016 Olympic Games and Paralympic Games," *Military Review* (September-October 2017), https://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/September-October-2017/Visacro-Brazilian-Organization-for-Combating-Terrorism/ (accessed August 2, 2019).

The above only begins to address the challenges Peter Ford and his security colleagues faced. Economic issues meant there were construction delays and workers not receiving pay. These in turn raised concerns regarding maintenance of existing infrastructure and quality of construction as completed venues. A popular bike lane lining the ocean shore collapsed when a rogue wave washed beneath it. The structure had not been anchored to the ground. Crime was, in Mr. Ford's words, at a "critical" level. While those manning military and police ranks were very professional in their dealings with the many international security representatives, individuals in these ranks were not talking to each other to the extent needed (hindering coordination and cooperation much less supporting any semblance of orchestration). To this was added the turmoil due to the Zika virus and impeachment of Brazil's president between the end of the Olympics and the soon-to-follow Para Olympics.

There was reason for optimism regardless of these considerable challenges. Visacro noted the value gained in realizing the potential for lessons learned during previous major events as "for twenty months, the Joint Command for Preventing and Combating Terrorism conducted intensive and careful preparation, drawing primarily from its own experience with the other major events that preceded the Olympics."[38] Brazilian officials also visited international partner countries to share best practices. In the United States, these visits included the United Nations, New York City Joint Operations Center, offices of the National Football League, and United States Military Academy's Combatting Terrorism Center. Leaders responsible for weapons of mass destruction (WMD) contingencies and mass decontamination exercises complemented training with drones. Officials established a Joint Operations Center (JOC) with 24-hour

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[38] Alessandro Visacro, "Brazilian Organization for Combating Terrorism during the Rio 2016 Olympic Games and Paralympic Games," *Military Review* (September-October 2017), https://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/September-October-2017/Visacro-Brazilian-Organization-for-Combating-Terrorism/ (accessed August 2, 2019).

operations and an International Police Coordination Center provided forums for intelligence exchanges and integration of actions. In short, there was no "not invented here" syndrome to interfere with learning from both those previous events in Brazil and others international. It was, again in Mr. Ford's words, "all about information."

While no Olympics comes off without a hitch, Rio de Janeiro's worst incidents were not ones posing major security risks to spectators, athletes, or citizens. Well-advised precautions were helpful in this regard. Athletes were barred from visiting high-risk *favelas* (slums). Though some tourists unwittingly reserved bed and breakfasts to stay in those slums (the online descriptions having overlooked pointing out their being in such locations) and *favela* violence did on several occasions rear its ugly head, the cooperative efforts of security personnel precluded both major casualty events and embarrassment to the host megacity.

Chapter 2: PMESII-PT (Political, Military, Economic, Social, Information, Infrastructure - Physical Environment and Time) observations regarding HADR in megacities

> The international community is eager to demonstrate its solidarity…. This usually results in large flows of teams and supplies that do not necessarily match the needs of the affected country and, potentially, problems with the coordination of the relief activities.[39]
>
> Andrea Bartolucci, Darren Walter, and Tony Redmond,
>
> *Prehospital and Disaster Medicine*

Employing the military acronym of PMESII-PT (Political, Military, Economic, Social, Information, Infrastructure – Physical Environment and Time), this section presents observations imparted by speakers, audience members, or other relevant sources. The section following thereafter will employ another commonly used acronym, DOTLMPF-P (Doctrine, Organization, Training, Leadership and Education, Materiel, Physical Environment, Facilities - Policy) to provide the structure for providing related recommendations regarding future HADR operations in megacities.

Political

> In terms of maintaining a HADR narrative, you need to get there as quickly as you can and meet people's needs.
>
> Brigadier (Australian Army) Ian Langford

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[39] Andrea Bartolucci, Darren Walter, and Tony Redmond, "Comparative Review on the Cost-Effectiveness Analysis of Relief Teams' Deployment to Sudden-Onset Disasters," *Prehospital and Disaster Medicine* special report (2019): 1-2.

Political observation 1: Actual disaster responses provide excellent training opportunities. However, exercise caution if members of the public will be included.

Speakers agreed that there are opportunities for training during HADR events. However, Sid Heal recalled an incident that provides warning regarding in interface between such training and the risk of undermining public trust. Americans experienced a series of real and fake anthrax attacks not long after September 11th, 2001. Sid Heal explained:

During one such incident, receipt of a letter containing a powdery substance and accompanying threatening letter had resulted in the evacuation of about 400 business and clerical workers from the targeted office building. As the situation unfolded, my partner became convinced that this was another hoax. Weaponized anthrax is tan in color; that in the envelope was white. Likewise, weaponizing anthrax requires a highly sophisticated process usually requiring an advanced education in chemistry, biology, or related subjects. The threatening letter, however, had numerous misspellings; it also identified anthrax as a virus rather than a bacterium, something that is almost inconceivable to anyone with the knowledge needed to perform the weaponization process. We continued acting as if the threat was real even as my partner sought to convince the incident commander that the threat was a hoax. Unconvinced, the incident commander opted to decontaminate all the people being detained.

The decontamination process was not a pleasant one. We were using "Kwell lotion" (Lindane), which is sprayed on the naked bodies of inmates to kill lice, crabs, mites, and other parasites. It is often cold and has the viscosity and appearance of mucus. Trusting in our professionalism, these people suffered the indignity of taking their clothes off to be sprayed with this messy substance. They were then wrapped in blankets and filmed by the media as they were released. After discovering that the incident was a hoax and that the authorities could have recognized this prior

to the decontamination procedure, those suffering the decontamination were upset despite the explanation that the incident commander was erring on the side of their safety. The implications of the resultant lack of trust are not trivial. How much public cooperation do you think we can expect during future events? What if the next incident involves an actual threat and people refuse to cooperate because they believe we previously violated their trust? If you carry that to the logical conclusion, we could very well end up having to use force on victims!

Military

> [The Iraqi Security Forces] saw themselves as a liberation army…. They were there to liberate their people from ISIL [the Islamic State of Iraq and the Levant]. They developed a battle plan that took civilian protection very seriously. They became a national institution because of the trust they gained during that operation.
>
> Lise Grande, United Nations

Military observation 1: There will always be a threat seeking to take advantage of disaster. That an operation has a significant HADR component does not rule out other security requirements. LTG Sumida made this clear when he noted that two regional powers tested Japan's airspace during the 2011 Fukushima Daiichi disaster, obviously looking for weakness in the country's defenses when so much of its military was turned inward to assist its own population.

Military observation 2: HADR is the realm of nontraditional military missions. Organizational adaptability and flexibility in exercising command and control will be essential.

Keynote speaker GEN Oriki identified the overarching Japan Self-Defense Force mission as support to government, to include local governments. Actual tasks inherent in this support encompassed myriad elements for which the JSDF did not train and which were not considered traditional components of government support or military operations more generally. Transporting civilians, firefighting, law enforcement, handling and burying of civilian dead, identifying the needs of survivors and addressing those needs in keeping with local government dictates: these represent but a small sample of the expected and unexpected services provided by the JSDF's personnel. GEN Oriki reported that the Self-Defense Force rescued approximately 19,000 personnel, some 70% of the total. Other duties included assisting in the cooling of a failing nuclear reactor during which a JSDF central NBC defense unit employed JGSDF and Japan Air Self-Defense force (JASDF) firetrucks and helicopters. In addition, the JSDF found itself having to transport and deliver aid materials as stores in some areas affected by the 3/11 disaster were destroyed or rendered unusable. (The cooperation of citizens receiving aid eased the manpower burden of delivering these goods. Such will not always be the case. Gangs, thieves, and struggles to reach delivery trucks in 1990s Somalia meant additional military personnel were necessary to provide security during aid distribution.)

Economic

Economic observation 1: HADR preparation is a system funded without recognition of that fact. The 1995 sarin attack is only one example demonstrating this point. First responders had protective equipment. Hospitals did not. (In the aftermath of the attack, Dr. Okumura notes that

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while police and fire personnel have sufficient protective equipment, hospitals remain grossly underequipped.) Community members are key to post-earthquake recovery, yet in many locations little is spent on their education or neighborhood preparation in this regard. (Tokyo provides a significant exception given the preparation of disaster preparedness maps and open areas in which human waste receptacles are pre-positioned and benches can be transformed into cooking facilities.) In general, planning for and funding in support of megacity HADR planning would benefit from a systems rather than piecemeal approach.

Social

You can't thermobaric your way into a megacity.

Brigadier Ian Langford

Social observation 1: "The first report is always wrong" is as true during HADR contingencies as wartime operations. Hospitals during the 1995 sarin attack crisis were first told the disaster was caused by an explosion, causing them to expect and prepare for burn and carbon dioxide inhalation injuries rather than the vision and other problems found in many of the first patients to arrive. However, as some patients had breathing problems, were suffering from cardiac arrest, or demonstrated other symptoms that could be associated with an explosion, it is understandable that medical facilities receiving patients would not immediately discount the initial report. As more patients arrived, doctors at St. Luke's International Hospital concluded that the symptoms and laboratory results instead meant the injuries were due to organo-phosphates exposure and so informed Tokyo fire department personnel. (These chemicals are often found in agricultural pesticides and were also originally thought to have been the cause of

injuries and deaths when the cult perpetrating the Tokyo subway attack earlier used an aerosol version of sarin in the city of Matsumoto.)

Social observation 2: Mechanisms for sharing information and coordination must be established, published, and practiced before a disaster. Fire, police, and hospitals struggled to communicate in the immediate aftermath of the sarin attack. This hindered response coordination between organizations, undermined effective responses within organizations, and delayed identification of the agent involved. Procedures need to be developed for incidents in which normal communications capabilities are overwhelmed or lack of power renders them inoperable.

Social observation 3: The same social problems found in an urban area on a daily basis will be found in displaced persons facilities. Former Los Angeles County Sheriff's Department Commander Sid Heal observed, "If he has a drug problem at home, he has a drug problem in the refugee center. If he was a spouse abuser at home, he will be a spouse abuser in the refugee center." Those conducting HADR should be prepared to provide routine security, medical care, counseling, and other services in the aftermath of disasters no less than – and likely more frequently than – during routine operations.

Social observation 4: HADR responders must recognize that megacity populations – even those in the most ethnically homogeneous of countries – will include both permanent residents and visitors who are ethnically diverse and speak a broad range of languages. This will complicate relief operation collaboration. NYC residents speak nearly 800 languages; only 51% speak English as a first language at home. Los Angeles School District students speak 199 languages. Determining community needs and informing residents and visitors in the aftermath of a catastrophe will demand coordination with cultural experts and advisors. As asked by Commander Heal during his presentation, "How do you evacuate people

speaking 199 languages from Los Angeles International Airport in an emergency?" Better to have the answer prior to an actual disaster.

Social observation 5: Always keep in mind the need to maintain the public trust both in the immediate and more distant futures. The above-noted example regarding exposing members to an unnecessary and embarrassing decontamination process makes clear the tension between maximizing the on-the-job training value of operations in the field and maintaining public confidence. While erring on the side of caution is understandable, it will be wise to have a member of responding organizations assume the role of a "red team," in this case representing the perspective of various members of the public. (See Appendix F for more on red teaming.)

Social observation 6: As world populations age, knowing the locations of the infirm and the nature of elderly and others' medical and other support needs will become increasingly important. Maintaining the capacity to react effectively will put an additional burden on aid providers and introduce further complexity to information collection, database maintenance, and dissemination. To the extent possible, information relevant in this regard should be compiled prior to an event, regularly updated, and made readily accessible by all applicable parties once a disaster strikes.

Social observation 7: Urban residents and visitors should be advised of how to prepare for and react to a disaster prior to an event. Practical but not commonly known procedures can reduce the immediate burden on aid providers if megacity residents and visitors are informed of and act in accordance with advice regarding routine preparations. Mr. Junichi Hanawa's personal experience in the immediate aftermath of the September 5, 2018 Great Hokkaido earthquake caused him to observe that all individuals should constantly keep a reasonable quantity of cash on hand in case teller, credit card, and other machines are not operating after an event. Similarly,

advising hotel occupants, community residents, and others where essential sources of supplies will be available reduces post-disaster communications needs. In Mr. Hanawa's case, both the hotel at which he was staying and the local airport provided food and water free of charge to those in need.[40]

Social observation 8: Community members will be key to disaster recovery. Pre-event education and policies for coordinating their emergency response efforts will enhance the effectiveness of participation. Tokyo community leaders and citizenry are informed of what actions are appropriate should an earthquake or other episode strike. Citizens in other megacities have demonstrated a willingness to assist post-event. Given the value of these responses (recall the 80% recovery rate for those rescued by members of the public), plans and exercises should incorporate consideration of this resource while also recognizing that failing to plan for public assistance initiatives can undermine reaction effectiveness. Informing populations of in-place procedures regarding how to communicate requirements, injuries, and other information during a response and where to look for guidance and supplies will reduce confusion and interference with other recovery efforts. Initiatives to restore morale can also be encouraged, e.g., a co-owner of a shop in Tokyo put messages encouraging community cohesiveness on the store's windows after the 2011 earthquake and reactor failure. (See Figure 9.)

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[40] Junichi Hanawa discussion with Dr. Russell W. Glenn, Tokyo, Japan, July 16, 2019; and Junichi Hanawa email to Russell W. Glenn, subject: Personal AAR – Megacities, July 17, 2019.

Japanese text on fabric:
いっしょ（Always together）
きぼう（Hope）てをつなごう（Let's join hands）
ゆうき（Courage）
まけるな（Don't give up）みんなのちから（The power of everyone）
げんき（Energy）
だいじょうぶ（Let's go forward）がんばろう（It is alright）

BLuE & WHITE

Figure 9: Fabric displaying the messages posted on windows of the Blue & White store in 2011

Social observation 9: Understanding coalition member organizational cultures and those of the population receiving HADR is fundamental to success. COL Browne noted that the JGSDF approach to planning is to focus on the capabilities an organization can bring to an operation, then assign it missions and tasks appropriate to those assets. The U.S. approach is to assign a mission and then tailor resources to accomplish that mission. The fundamental differences inherent in these alternative approaches to requirements complicated responses. USARJ member Mr. Junichi Hanawa provided a second example, this more fundamental as it addressed the way many Japanese view day-to-day activities in contrast to that guiding American approaches. Mr. Hanawa described the cultural approach inherent in Japanese social norms as a "positive list" mentality by which he meant social intercourse is guided by rules that define what

members of society can do. This, he offered, is in contrast with Americans who view actions through the lens of a negative list that defines what they cannot do.[41]

Social observation 10: Megacity residents should not be overlooked as sources of information. Tokyo's approximately 38 million population means that there are 76 million eyes and ears able to collect information of value to those providing aid. Ensuring members of the population know (1) what information will assist those providers, (2) who to contact with that information, (3) and how to do so (even should communications that are normally available be unavailable) takes advantage of this invaluable resource. A fourth step – providing feedback – is also crucial as it encourages those already supporting the provision of information to continue to do so and prompts others who might otherwise not.[42] Security and aid personnel from the affected region are similarly helpful. Peter Ford highlighted the value of "situational awareness teams" during the 2016 Rio Olympics during which Brazilian police acted as team leads while other countries' security representatives accompanied them, thereby blending local expertise with insights provided by external parties. Such partnerships allow outsiders to more quickly grasp what constitutes "the absence of the normal or presence of the abnormal" in addition to otherwise enhancing information exchange. Sharing in Brazil was further promoted by the standup of an International Political Cooperation Center (IPCC) where teams could share insights and benefit from a broad spectrum of information and intelligence resources.

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[41] Junichi Hanawa email to Dr. Russell W. Glenn, Subject: Personal AAR; Megacities, July 17, 2019.
[42] These four elements were briefed by Brian Jenkins during Dr. Russell Glenn's time with the RAND Corporation. While the context at the time was counterterrorism, the quartet applies equally to other situations.

Information

> In Minneapolis…an analysis of 323,000 calls to the police in 1986 found that a small
> number of hot spots produced most of the crime in the city. Only 3% of the places
> produced 50% of the calls to which the police were dispatched. This concentration was
> even greater for the predatory crimes of robbery, criminal sexual conduct, and auto
> theft: only 5% of the 115,000 street addresses and intersections in the city produced
> 100% of the calls for those.[43]
>
> Lawrence W. Sherman,
>
> "Hot Spots of Crime and Criminal Careers of Places"

Information observation 1: Data analysis conducted prior to a disaster will pay dividends during HADR. "Crime and violence generally concentrate in and around a small number high-risk places, people, and behaviors…. A robust body of rigorous evidence clearly establishes that when crime and violence are targeted, displacement to surrounding areas is minimal."[44] Put differently, knowing where outbreaks of crime or other disturbances are likely to occur in the aftermath of a disaster permits security representatives to put the right capabilities in the right location to prevent or minimize the effects of these threats to stability and safety. Similarly, and as noted above, knowing where those routinely in need are (the mobility challenged, those in need of medication, others located in high-risk areas such as locations particularly vulnerable to

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[43] Lawrence W. Sherman, "Hot Spots of Crime and Criminal Careers of Places," Lawrence W. Sherman, "Hot Spots of Crime and Criminal Careers of Places," 36. https://pdfs.semanticscholar.org/580e/0a9a216444faf0db9592df45076fac297d50.pdf (accessed July 31, 2019)
[44] Thomas P. Abt, "Towards a framework for preventing community violence among youth," *Psychology, Health & Medicine*, 22, supplement 1, 279.

fire/building collapse, or liquefaction) grants dispatch of assets a higher likelihood of success even when communications are down.

Information observation 2: Communications during HADR are arguably responders' most important capability. They will also be among the most fragile. Both LTG Chun and LTG Yamaguchi agreed: Communications are the primary requirement during disaster recovery. Hospital and fire communications were overwhelmed during the response to the 1995 sarin nerve agent attack on Tokyo's subway. Cellular capabilities failed under the deluge of users during 3/11. The challenges span both a megacity's physical and social infrastructure. The volume of demand will threaten capacity even should power remain intact. Lacking electricity, many systems immediately become inert while others' utility is measured by the duration of a single battery. Social challenges include the aforementioned need to communicate in tens if not hundreds of languages. Further challenging information sharing: Visitors – those less familiar with the urban area affected – will require more detailed guidance regarding not only where to go for aid but how to get there…and this group will be more likely to speak a tongue other than that indigenous to the disaster area. Communicating with maps, photographs, and other images can help overcome these hurdles if the intended audience has access to computers, tablets, or cell phones…and power. However, in the aftermath of the Fukushima Daiichi reactor failure, such efforts failed to reach older residents in areas around the plant as that demographic was less likely use these technologies. Rescue personnel will need to have information beyond what a two-dimensional grid coordinate can provide. Otherwise time will be lost in trying to determine where in a multi-story building individuals in need are located.

Information observation 3: The information and perspectives representatives from various organizations can offer are undervalued benefits of a comprehensive approach to

operations (one that brings all relevant parties together during HADR). Coalitions are frequently designed and viewed in light of participants' capabilities. Their value in terms of the scope and detail of information they can provide might be equally if not more important.

Information observation 4: Communications technologies are part of a system. Planners generally recognize that there are multiple ways to communicate with the public and each other (though they sometimes overlook which of those ways will reach a target audience most effectively). Television, radio, leaflets, loudspeakers, social media applications, cell phone calls: These provide only a sample of the ways security personnel might communicate with a population or other responders. (LTG Chun offers that satellite phones are the best bet for HADR operators, at least in a permissive environment.) Brigadier Langford recognized the power of cellular technology, stating that a cell phone "is effectively an attack vessel into your brain in both the emotional and intellectual spectrum." But planners and those executing HADR must constantly remember that megacities have multiple audiences, many requiring specific approaches during the design and actual communication of messages. As the example of the older demographic during 3/11 makes clear, *how* to communicate and *what* to communicate will differ depending on the intended recipient. Trying to pass information to 70-somethings via Facebook or Twitter guarantees a high miss rate. Writing letters or, increasingly, even emails risks not reaching Gen X'ers and Millennials. Using technologies to reach Orthodox Jews on the Sabbath or radio when a community includes hearing impaired suggests how significant knowing demographics will be to successful information campaigns.

Understanding the likely behaviors of various groups before a disaster can assist megacity authorities in successfully targeting individuals with information pertinent to their welfare. A

post-3/11 study, for example, found that over three million persons were stranded in Tokyo due to the precautionary stopping of rail services. The study reported:

> Some, unable to contact their families, felt uneasy and set out to return home on foot. Main roads were seriously congested with cars and people, and the use of emergency vehicles was also obstructed…. Men are more likely than women to attempt to return home. This is especially marked in men unable to learn the fate of family members; an overwhelming majority of men respond that they will attempt to reach home in spite of distance…. Very few young respondents express a desire to return home. They prefer to stay at their educational institutions…. Respondents in their forties, who are the most likely to have young children at home, express the strongest intention to return home…. Some people will also give up the attempt to return home if the sun sets before they get home, since a major power failure is presumed…. This model predicts a total of about 7.7 million people who will experience difficulty in returning home if a disaster occurs around 12 Noon.… A large number of workers employed in the center of Tokyo, an area itself safe from fire, may return home through areas of potential high risk for fire. The risk of blindly returning home, without any information about the disaster situation including the progress of large-scale city fires, must be considered…. Congested street networks would impede people from arriving at medical centers or emergency activities such as firefighting."[45]

That last point is particularly notable given that over a third of patients during the 1995 Aum Shinrikyo attack walked to the hospital.

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[45] Toshihiro Osaragi, "Modeling a spatiotemporal distribution of stranded people returning home on foot in the aftermath of a large-scale earthquake," *Natural Hazards* 68 (September 2013): 1385, 1389, 1396, and 1397.

How to communicate implies considering more than the technology means employed. LTG Chun remarked that setting the desired tone is likewise vital. Do the messages seek to promote urgency ("Evacuate now!")? Calm ("City managers are organizing relief efforts as we speak.")? Cooperation ("Please report known locations of collapsed buildings via the following means…")?

Linking other-than-communications technologies to communications will also be key to assessing post-catastrophe needs, e.g., Seoul's 250,000 video cameras offer a fast means of assessing damage (should power be maintained). Those images need to be readily accessible, analyzable, and communicable if they are to reach their potential as an asset.

Information observation 5: Information's primary purpose is sometimes…to inform.
Communications during a megacity disaster recovery effort will be fundamental to coordinating (or orchestrating) resources, providing direction to members of the population, soliciting information from those millions of eyes and ears to aid in organizing the response, and setting a tone appropriate to the situation at hand. The importance of simply keeping the population informed should not be overlooked. Post-disaster is a time of unknowns: Where is my family and how are they doing? How serious is the damage elsewhere than where I am? When do we expect the power to return/cellular service to be restored/water supply to be reinitiated? Should I drink the water/boil the water/let my children bathe in the water/use the water for cooking? Knowing what to communicate will be vital. Doing so accurately and consistently across authorities will be likewise. Accuracy and consistency pose greater challenges than might be thought. The sheer number of authorities and likelihood they are not communicating with each other all but guarantees contradictory messages. What is true in one community might not be in another (e.g., quality of water), but messages intended to reach one audience are likely to spill into others,

meaning information must include details regarding to whom (and over what time period) it applies. The extent of danger to Tokyo residents during the release of radiation from Fukushima was an obvious concern. That city, national, and industry representatives provided contradictory (or no) guidance did little to put residents at ease.

The level of pre-event trust in authorities will influence responses (as noted in Sid Heal's example regarding decontamination of possible anthrax victims). Media organizations had received considerable financial support from TEPCO (Tokyo Electric Power Company, owners of the nuclear power facility in question) via "press clubs" of which Japan's primary news organizations were members. Via these clubs, TEPCO and other major commercial enterprises in the country provided members with everything from "office space, including chairs and desks, to a fridge full of free beer and some gratis tickets to major sporting events." It should not surprise that post-event analyses accused this intimate relationship as undermining the quality and objectivity of reporting on the disaster…and very likely public faith in future TEPCO messages. Japan's Press Freedom Index dropped from 22nd to 53rd in the aftermath of 3/11.[46] The challenge will be greater still in countries where press freedom is more severely restricted. Bringing parties together before or in the immediate aftermath of a disaster and seeking to inform a population accurately and with consistent information will be a necessary condition to a successful information campaign and maintenance of governing authorities' legitimacy.

Information observation 6: Ninety-nine percent of a population in a city of 25 million willing to support a coalition means 250,000 are not willing to do so. This statement summarizes a point made by GEN Brown. He noted that megacity diversity complicates

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[46] Mark Willacy, *Fukushima: Japan's tsunami and the inside story of the nuclear meltdowns*, Sydney: Macmillan, 2013, 224 and 298. Also see David Lochbaum, et al., *Fukushima: The Story of a Nuclear Disaster*, NY: New Press, 2014, 110.

establishing relationships given both the number of key parties and differences in character, expectations, and relations between individuals within and between parties. Developing relationships will nevertheless be fundamental to effective operations. Successful approaches might include finding an individual highly respected by one or more groups whose messages will therefore have greater likelihood of success. General Brown recalled from his experiences in Iraq that a Kurd who had spent over twenty years in prison under Saddam Hussein held this status. MG Brito complemented this observation with a second, suggesting that empowering local leaders and putting a "local face" on efforts could further promote popular acceptance.

Information observation 7: Seek to stay "left of bang" (ahead of a problem) by establishing a reputation for providing the population correct information and doing so regularly both before an adversary sends misinformation and thereafter. General Brito highlighted the future potential of artificial intelligence (AI) to assist in designing culturally adroit messaging and possibly predicting and then disrupting adversary actions, to include disinformation efforts. Brigadier Langford raised two points drawn from Australia's assistance provided during the 2008 Beijing Olympic Games: (1) communications intended for the public should be in "non-military speak," and (2) it will generally be better to encourage than order.

Information observation 8: Take advantage of disasters as sources of lessons learned. As artificial intelligence matures, government authorities should employ it to capture and analyze evacuation patterns, record damage to utilities, and otherwise support improved planning and response during future events. This assistance could include prioritizing response and recovery tasks, orchestrating assets, and proposing solutions to traffic management, power distribution, and other challenges during periods of disaster-induced reduced capacity. LTG Sumida pointed out that AI can assist by rapidly sifting through social media

communications to determine where and what aid is needed during a disaster. GEN Brown expressed concern that the West has fallen behind in AI because we are so concerned that we will go overboard or permit misuse, this while potential adversaries forge ahead with broad AI development and use. GEN Brown queried, "If that tech can save lives, shouldn't we be able to use aspects of that technology to do so?"

Information observation 9: Creating a multinational security infrastructure will be key during major world events in megacities. As the attack on Israeli athletes during the 1972 Munich Olympics made clear, threats may seek to target visitors rather than a host city or its residents. Peter Ford reinforced this point, recalling that the emergency operations center in Rio de Janeiro during the 2016 Summer Olympics hosted security representatives from 33 countries, each providing its own intelligence capabilities. Police representatives from foreign countries totaled 250 at the event. Sharing of information and intelligence, and coordination of same, was vital not only among the visitors. Brazil's security force as planned included 41,000 military personnel, 18,500 state police officers, and additional police, firefighter, and other personnel altogether totaling some 88,000.[47]

Mr. Ford emphasized that some threats will be internal. Two boxers were accused of sexual assault during the Olympics period and theft of an Olympic medal and other goods (later recovered) was found to be perpetrated by cleaning personnel.

Information needs to be shared with all relevant parties. Precautions in light of resulting knowledge require similar dissemination

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[47] "Security in the Rio 2016 Olympic and Paralympic Games," Social Communication Secretariat – International Area Office of the president of Brazil, July 18, 2016.

Information observation 10: Pre-event data collection and analysis programs underpin effective local response in the aftermath of a catastrophe. Though she was unable to speak at the conference, United Nations representative Ms. Akiko Yoshida provided valuable insights regarding UN procedures preparatory to megacity disasters in notes provided the authors. She noted a 2017 initiative in which the Philippine Red Cross, International Federation of the Red Cross, private companies, United Nations Office for the Coordination of Humanitarian Affairs (OCHA), and other local and international NGOs undertook pre-crisis consultation with Manila communities most likely to be heavily affected should a 7.2-magnitude earthquake strike the megacity. Information collection determined what households think they will need as priority resources to sustain lives in the first 72-hours after disaster onset and during the days, weeks, and months thereafter. Participating organizations use such undertakings to define Key Immediate Needs, those are able to be addressed quickly that should have the greatest life-saving impact in the hours after the disaster. These organizations placed particular focus on vulnerable or marginalized members of the community such as women, children, and elderly with disabilities. Community feedback was sought on the conditions and challenges at evacuation centers and expectations regarding the government's support. The consultation also looked into community and government overall preparedness and response capacity, gaps in local resources, and how those might be filled, to include existing partnerships the communities had with external organizations. Key Immediate Needs also include protection requirements, those necessary to securing the safety of vulnerable members of the community. (The value in this communicating with communities was reinforced by LTG Kobayashi's observation that while it may be necessary for military forces to step in when local governments are unable to function in the aftermath of a disaster, the JGSDF found itself unfamiliar with people's needs after 3/11. An

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associated observation here is that pre-event data collection is no less important domestically than internationally.)

Three key questions guiding the UN's data collection effort in Manila:

- Who is in a position to procure and deliver requirements?

- What is the best method of delivery?

- What is the best coordination arrangement?

Infrastructure

A number of social problems tend to come bundled together at the neighbourhood level, including, but not limited to, crime, adolescent delinquency, social and physical disorder, low birthweight, infant mortality, school dropout, and child maltreatment.[48]

Thomas P. Abt,

"Towards a framework for preventing community violence among youth"

Infrastructure observation 1: Infrastructure is more than physical subsystems alone.
Infrastructure covers far more than the engineer's perspective of those systems we commonly think of as integral to supporting human functions: water distribution, road networks, waste disposal, and internet hardware for example. There are social elements of infrastructure, e.g., the doctors, nurses, and other staff of a hospital. Commercial banks, automatic teller machines, regulations and policies, and computers comprise only a small sample of the parts comprising a megacity's economic infrastructure. There is government infrastructure: mayors, councils,

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[48] Robert Sampson, "Neighbourhood and community: Collective efficacy and community safety," *New Economy* 11 (June 2004): 107.

police, fire, inspectors, emergency medical technicians and paramedics, motor vehicle offices, sanitation pickup, and myriad other elements that together form a megacity's infrastructure of authorities. Government subsystem elements that need to cooperate will often be at different echelons, complicating management and communications (e.g., police might be organized at prefecture level while firefighters are a city asset and military forces are federal resources).

Security infrastructure also includes procedures. Peter Ford described "soft checks" that provided layered security for Rio's transportation system. As every rider was required to have a subway ticket, security personnel posted themselves a key points in the system to ensure multiple checks prior to individuals embarking on trains. LTG Takemoto suggested current and future technologies can complement these human checks via use of voice and image recognition at entrances and exits with artificial intelligence scanning personnel and objects for potential threats.

Infrastructure observation 2: Command and control infrastructure is exceedingly complex during megacity HADR. The preferred post-disaster situation is for outside assets to coordinate with and be guided by the in-place government (presuming it is still functioning); those manning its positions are the people most familiar with the community at risk and thus are best to determine the what, where, who, when, and how of requirements to support response and recovery. Unfortunately, disasters show little regard for maintaining that preferred situation. Coalition forces in Baghdad, Kabul, and other cities found little in the way of functioning government during operations earlier in this century. Both Japanese and external organizations assisting in the aftermath of 3/11 found many local governments overwhelmed. Rather than receiving guidance and requests for assistance from a central government authority, oft times the military found itself dealing with those closer to the problems. Fittingly in light of JSDF Cross-

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Domain Operations and U.S. military efforts to mature its Multi-Domain Operations concept (in which services are to perform not only traditional functions but also those previously the exclusive realm of another branch of service), Self-Defense Force and partner leaders describing responses to 3/11 cited how their organizations found it necessary to assume responsibility for roles and functions historically falling to other government or commercial organizations. Ensuring their responses were effective was made more difficult given differences in organizational culture and management mechanisms within Tokyo much less nationwide or during interactions with multinational assistance partners. It was, in the words of one conference speaker, "a coordination nightmare." Responses to shortfalls in crisis management at the time (which LTG Yamaguchi proposed should be considered "crisis in management") included creation of Ground Component Command (GCC) by the JSDF and a National Security Secretariat (NSS). Among GCC responsibilities is oversight of international partners' assistance should such once again be necessary. The standup of the latter was further spurred by the 3/11 crisis after previous years of contemplating such a body. In short, the NSS facilitates top-down decision-making on national security issues; better strategic planning and crisis management integration and inter-agency coordination; and a more robust, political leader-driven intelligence cycle. The NSS is designed to be a cabinet-based "control tower" for national security decision making. It also serves longer-term efforts by Japan's leaders to expand and strengthen the "prime ministerial executive" at the expense of its historically powerful bureaucracy.[49]

Infrastructure observation 3: There is a need to review laws, policies, and regulations to ensure they support rather than hinder effective HADR response. Several speakers noted

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[49] Adam P. Liff, "Japan's National Security Council at five," *East Asia Forum* (December 4, 2018), https://www.eastasiaforum.org/2018/12/04/japans-national-security-council-at-five/ (accessed August 8, 2019).

this requirement for reconsidering standing laws, policies, and procedures in light of insights

provided by recent operations and evolutions in expectations of military assistance in times of

catastrophe. Supporting organizations' bureaucratic procedures can further complicate the

command and control challenges mentioned in the previous observation. That the JSDF had to

await formal requests from local officials and the prime minister's approval before responding

threatened response effectiveness. U.S. armed forces support similarly required United States

Agency of International Development (USAID) preapproval due to funding line requirements.

For a domestic example from the United States, one need only look back to Hurricane Sandy in

New York City during which active duty forces were only allowed to "clear" street debris so that

fire department vehicles could make their way to locations needing pump trucks to remove

water. National Guard units were allowed to "remove" debris from the area, the division of tasks

being inefficient (and counter to the logic of MDO).[50] Whether a matter of regulation, policy, or

simply a bad decision, such flawed logic should be addressed when identified.

Infrastructure observation 4: The rate of megacity infrastructure expansion makes it

difficult to maintain awareness of changes, particularly regarding subterranean features.

LTG Takemoto observed that responsibility for Tokyo's underground facilities is spread across

many organizations. There is thus no single database or map of these features. Audience member

Major Caleb Dexter noted that the New York City government is trying to put such a map

together but to date has been unable to complete the task, one made harder due to the various

formats, software, graphical approaches, and other issues associated with the multiplicity of

responsible authorities. Further, many of the maps available are two-dimensional rather than the

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[50] Mike Swezey (BG, New York Army National Guard), "Notes from a Dual Status Commander Joint Task Force – Sandy," November 25, 2012.

preferred three-dimensional. The Singapore Army has a regional coordination center that includes a computer to synchronize such variable-format data.

Physical Environment

Uncertainty is not evenly distributed.

Sid Heal

Figure 10: Tokyo flood control system

Physical environment observation 1: Conceiving of the urban environment in terms of density, flow, and tempo helps understanding of megacity environments. It is readily apparent that many security considerations exist in greater densities in urban areas than elsewhere. Physical densities in this regard include people, vehicles, and structures per unit space, each of which offers concealment – and often cover – to a threat (and volume rather than area is likely the more applicable measure of space). Temporal – time-related – densities are also greater. Consider the number of activities, major events, and decisions necessary per unit time. The density of activities is so great that urban areas maintain the aforementioned ambient "hum"

even during periods of relative calm…and this hum provides a form of concealment as long as a threat operates so as not to expose itself as exceptional in the routine of activities.[51] Megacity flows, highlighted during the April 2018 New York City "Multi-Domain Battle in Megacities" conference by GEN Townsend, similarly put the constant movement of people, goods, power (both in the sense of energy and influence), water, waste, and other movement into graspable context. Density and flow are related, of course. Rush hour flows spur a dynamic increase in human density in morning hours and a somewhat more gradual decrease over the characteristically longer evening departure. (Recall the discussion of Tokyo "breathing" on pages 23 and 24 above as commuters move into and out of the city.) Floods can be conceived of as the density of water inflows exceeding the capacity of drainage to handle the deluge. Over-demand on power during periods of peak usage – during exceptionally warm periods, for example – means the flow of electricity asked for exceeds the capacity to provide. The temporal element in these densities and flows is already evident in the above discussion: activities per unit time, rush hours, and peak demand periods.

Density, flow, and tempo are inextricably intermingled. Sid Heal noted that disruptions such as a disaster create turmoil and introduce abnormal pressures on security personnel and their organizations. That a foe can take advantage by understanding the interrelationships between the three elements is a given; the two unfriendly countries testing Japan's security diligence in the aftermath of 3/11 validates such is the case. Yet opportunities present themselves as well. Controlling these elements in the aftermath of a disaster can aid those providing HADR. Lise Grande's coordinating with Iraqi Security Forces such that the tempo of the latter's operations

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[51] The following look at density and its influence on urban security operations might be of value for those interested in further reading on the topic: Russell W. Glenn, *Heavy Matter: Urban Operations Density of Challenges*, Santa Monica, CA: RAND, 2000, https://www.rand.org/pubs/monograph_reports/MR1239.html (accessed September 26, 2019).

did not outpace IGO and NGO capacity to deal with noncombatant casualties, shelter needs, and food demands was a matter of flow control and density management. During combat, a friendly force wanting to infiltrate reconnaissance teams promotes success by doing so within the ambient "hum" of an urban area's activity.

Physical environment observation 2: Plans should include designation of less exposed locations as alternate headquarters, supply distribution points, and other key nodes. Tokyo's exceptional analysis of its terrain and related publication of disaster preparedness maps means that plans for displacing or establishing post-event activities stand an excellent chance of surviving a catastrophe and thereby speeding responder actions. LTG Sumida highlighted designation of Eastern Army headquarters' Camp Asaka military installation as an alternate location for GSO given Ichigaya's greater vulnerability is a case in point.

Time

> The first rescue efforts are usually performed by survivors and by the local response assets; the majority of survivors are found and extricated quickly because they are usually 'lightly trapped,' while a significant number of earthquake victims remain 'heavily' trapped under rubble requiring heavy rescue response…. The majority of rescues…occur within the first 24 hours, with the last survivor rescue usually four days post-impact. A dramatic drop-off occurs during the first 24-48 hours post-earthquake.[52]
>
> Andrea Bartolucci, Darren Walter, and Tony Redmond,

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[52] Andrea Bartolucci, Darren Walter, and Tony Redmond, "Comparative Review on the Cost-Effectiveness Analysis of Relief Teams' Deployment to Sudden-Onset Disasters," *Prehospital and Disaster Medicine* special report (2019), 3.

"Comparative Review on the Cost-Effectiveness Analysis of Relief Teams'

Deployment to Sudden-Onset Disasters"

Figure 11: Citizens assisting in recovering those buried after earthquake[53]

Time observation 1: Community members are first first responders. People will not – more

often than not should not – await government representatives to save their neighbors. That they

will act can complicate first responder and other authorities' decision making. It will also save

lives as the earlier cited statistic of 80% survival among those recovered by community members

after an earthquake makes clear.

**Time observation 2: External assistance will likely provide little value-added to search and

rescue efforts.** A study done after the 1995 Kobe earthquake

found that approximately 77% of those who lost their lives died within an hour.

Furthermore, they found that 36% of injured victims who died between three and 12

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[53] LTG (Japan Ground Self-Defense Force, retired) Shigeru Kobayashi, "Planning Humanitarian Assistance/Disaster Relief Operations: Insights from 2011" briefing during "Current and Future Operations in Megacities" conference, Tokyo, July 17, 2019.

hours after the earthquake might have been saved if the appropriate initial emergency

response had been available…. The published literature suggests three days to be the

average time for an EMT to arrive and become operational into the affected country….

The team focusing on immediate trauma care will arrive too late and find that they are

caring for relatively minor injuries and for health problems not directly related to the

disaster.[54]

There are a number of implications inherent in this observation. Countries and organizations

arriving from locations distant from a disaster area are very likely to offer little in the way of

effective search and rescue capability. With the rare exception, those who will be saved have

been saved by the time these representatives stage, move, land, and orient themselves to the

situation at hand. Capabilities specializing in victim recovery and service provision to survivors

will be the more helpful.

Time observation 3: Policies dictating emergency medical technician (EMT) and other first

responder permissions require reevaluation. Dr. Tetsu Okumura noted that EMTs in 2019

Tokyo were still not authorized to intubate or perform some other lifesaving procedures during

mass casualty events barring oversight by a licensed doctor, this nearly a quarter-century after

the sarin attack (with exceptions granted for cardio-pulmonary arrest patients). Doctors are still

not actively involved in chemical reaction response (nor other major disaster types) outside of

hospitals. (Peter Ford noted that during the 2016 Rio Olympics doctors were pre-positioned to

critical locations in case there was an incident as traffic would have precluded timely evacuation

of patients to medical facilities.) Similar restrictions exist in many U.S. jurisdictions. For

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[54] Andrea Bartolucci, Darren Walter, and Tony Redmond, "Comparative Review on the Cost-Effectiveness Analysis of Relief Teams' Deployment to Sudden-Onset Disasters," *Prehospital and Disaster Medicine* special report (2019): 4 and 5.

example, while EMTs other than paramedics are allowed to intubate patients in many

jurisdictions, they are often proscribed from conducting tracheotomies or running IVs elsewhere.

Chapter 3: Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities, and Policy (DOTMLPF-P) recommendations regarding operations in megacities

> Chaos is not random. There are patterns in chaos.
>
> Sid Heal

Drawing on both the material above and comments by conference speakers and attendees, this chapter presents a series of recommendations for consideration by those responsible for the planning or conduct of humanitarian assistance/disaster relief operations. These recommendations are presented using the DOTMLPF-P format.

Doctrine

> We could not teach one thousand responses, so principles have to come before procedures.
>
> Sid Heal

> Mission command: The practice of assigning a subordinate commander a mission without specifying how the mission is to be achieved.
>
> Australian Army *Land Warfare Doctrine 1 – The Fundamentals of Land Power*

Doctrine recommendation 1: Clarify roles and responsibilities for organizations managing and supporting HADR. Include community members in this clarification.

Who will be in charge? Which organizations take on what tasks? When are transitions of authority expected to happen? These are among the many questions better addressed in plans, exercises, and rehearsals than after disaster strikes. Plans (and training) should incorporate

branches and sequels that account for the likelihood that plan tasks will need to be reallocated across organizations. We have noted above that in the aftermath of the 2011 Great East Japan Earthquake/Fukushima Daiichi nuclear disaster, the JSDF found itself assuming duties of civilian first responders as those organizations had been crippled by the extent of the damage and personnel evacuations. Transitions of authority will likely occur based on accomplishment of goals rather than a fixed time schedule. For example, the military may at times initially assume management of disaster response given its capacity to deploy relevant assets in sufficient quantities more quickly than other organization types. As local urban authorities regain the ability to communicate and function effectively, however, the military will assume its appropriate subordinate role.

Returning to the issue of community members serving a vital role in post-disaster response, volunteerism can be a significant boon to urban authorities. However, that it can also be a source of frustration when volunteers unwittingly impede formal response activities or those individuals are in locations less in need of help means pre-event education and organization of community members offers an opportunity to maximize the benefits of good intentions while reducing inadvertent downside behaviors.

Doctrine recommendation 2: Multi-Domain Operations (or its conceptual kin such as Cross-Domain Operations and Accelerated Warfare) and mission command both have much to offer during HADR. Capture lessons and train to capitalize on these benefits. Unquestionably, the message emphasized by conference speakers was the necessity of better incorporating all relevant organizations into HADR preparation and execution processes, organizations that included NGOs, IGOs, faith-based organizations, and industry. It is a message

widely promoted, consistently reinforced, and too frequently given little more than token recognition.

Fortunately the U.S., Japanese, Australian, and other partner militaries are in several cases maturing concepts that encourage greater orchestration of capabilities during any operation along the spectrum of possibilities. That orchestration includes breaking down traditional stovepipes such that missions or tasks once viewed primarily or exclusively as the realm of one service now should be viewed as common ground when conditions so dictate. Less fortunately, recent MDO development can be interpreted as having taken a step backward. What once appeared to be a concept applicable to all potential contingencies along its competition-armed conflict-return to competition spectrum has become primarily armed conflict focused despite this conceptual spectrum being core to MDO. The dominancy given armed conflict is accompanied by an effective neglect when it comes to identifying the benefits of, and procedures promoting, expanding the concept of coalitions to include less traditional participants. The same dominancy means missions inherent in HADR and those not involving significant combat receive less consideration than is desirable. This is particularly unfortunate in cases where the operation or mission type makes disproportionate demands on orchestration of non-traditional capabilities and organizations as do undertakings in megacities.

Mission command likewise has much to offer during operations in the world's largest urban areas. Whether HADR or force-on-force combat, counterinsurgency or counterterrorism, the heterogeneous nature of megacity environments ensures that critical decisions relying on quality situational awareness should fall to those leaders at lower echelons. In no other environment will clarity of mission, commander's intent, and effective execution of mission command in all its aspects be more important. Sid Heal's observations drawing on his thirty-three years on the force

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with the Los Angeles County Sheriff's Department and years of service with the United States Marine Corps reinforced the essentiality of applying mission command during HADR. "Having a common operational picture is not same as having situational awareness," he noted. "Situational awareness is contextual and local. To use the [1992] Los Angeles riots as an example, arms orders [i.e., rules of engagement] were given at headquarters, but units in different locations were dealing with different situations. There is a need to adapt orders based on a unit's situation."

Doctrine recommendation 3: Develop doctrine and procedures to promote effective unity of effort, unity of message, and intelligence

Recalling General Oriki and General Brown's concerns that laws, policies, and procedures regarding HADR generally – and operations in megacities specifically – should be updated in light of recent insights, multinational initiatives ought to encompass reviewing applicable guidance for integrating multinational support during or in the aftermath of disasters. This is especially important in the Indo-Pacific region where, historically, over two-thirds of natural disaster casualties occur. Partner exercises should include reviews of standing guidance regarding request procedures and management of both state and non-state organizations. Challenges to consider include expectations in terms of how requirements would be processed, narratives would be coordinated, and intelligence would be shared with organizations of varied trustworthiness, to include those multinational, governmental, nongovernmental, inter-governmental, commercial, and otherwise. In no case should the last deny some modicum of sharing altogether. Instead, identifying means of promoting the most effective use of all capabilities while preserving operational security should be the objective.

Doctrine recommendation 4: Create megacity HADR response plans – both generic and specific to high-risk urban areas – from which actions can be adapted during operations.

General Oriki proposed that restoration of airport and seaport capacity would be a priority in the immediate aftermath of a disaster given the need for importing goods and services. His proposal simultaneously gets at an additional challenge, that of understanding how best to manage search and rescue and recovery efforts given the complexity of megacities. Drafting priorities during creation of generic HADR megacity plans or those pertaining to a specific urban area would assist in managing missions amidst this complexity. Creation of such plans would ease adaptation to unpredictable requirements given that it is easier to modify an existing plan than to create a plan from scratch.

Such priorities need not be exclusively location-dependent. LTG Chun's suggestion that the "big three" of communications, power, and water will predominate recovery operations draws attention to the alternative (or complementary) approach of identifying priorities by function. Regardless of whether leaders employ these or other means of developing plans and priorities, it will be crucial to maintain a perspective that unfailingly incorporates megacities' status as both systems in and of themselves and components of larger systems.

This systems approach to plans and priorities aids in taming megacity complexity while also focusing preparations on those areas most in need of more detailed consideration. LTG Chun complemented his above observations with another, noting that seemingly mundane issues can quickly become roadblocks. For example, in terms of communications, he asked, "How do you know the phone number or organization chart of the people you want to call? How are you going to work through the lost in translation issues? You have to assess the challenges inherent

in working through a translator and make sure your translator is capable of conveying what you want him or her to convey."

Doctrine recommendation 5: Use plans and exercises to identify initial HADR missions and commanders' intents, thus accounting for communications failures in the immediate aftermath of a disaster. Second and higher-order damage effects need to be considered when addressing above-noted calls for reconsideration of current laws and policies. LTG Yamaguchi noted that Japan's Minister of Defense was stuck in traffic for five hours on 3/11, delaying critical decisions and slowing response. LTG Yamaguchi suggested that a helicopter should have been dispatched to pick up the minister in such a case. This incident serves as another example of the value of mission command and exercises requiring understanding of implied missions and commanders' intents, both of which will prepare subordinates to make critical decisions even when senior leaders are unavailable.

Doctrine recommendation 6: Create guidance to support comprehensive approach operations involving joint, multinational, whole-of-government, and other-than-government civilian organizations. Formally expand the doctrinal meaning of "coalition" to include all relevant partners during operations. While such doctrine cannot dictate to other than service or Department of Defense organizations, it could establish procedures promoting military understanding of comprehensive approach operational requirements valuable for planning, training, and field application. Mundane aspects of such guidance would encourage use of clear language to promote inter-organizational understanding while discouraging acronym use for the same purpose. This doctrine would additionally seek to inform military users regarding differences in decision-making approaches when working with non-traditional partners. Such guidance is necessary to inform behaviors at all three levels of operations and all echelons and

should include reconsideration of the current narrow definition of what is meant by "coalition," one that limits participants to government organizations.[55]

Current understanding of "coalition" fails to reflect what is needed to attain missions and objectives during 21st-century operations or campaigns. Coalition members should not be limited to nations, militaries, or government organizations alone. Understanding that all members of a coalition are not equal (e.g., in terms of intelligence sharing), the following nonetheless denote the difference between coalition as it is currently defined and as it needs to be defined.

As it is:

Coalition (Australian Army doctrine): "An informal agreement between two or more nations to undertake military action."[56]

Coalition (U.S. Army doctrine): "An ad hoc arrangement between two or more nations for common action."[57]

As proposed:

Coalition: "An ad hoc cooperative arrangement between two or more organizations in the interest of supporting a common action."[58]

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[55] One source offering an alternative to this narrow understanding is Russell W. Glenn, *Band of Brothers or Dysfunctional Family? A Military Perspective on Coalition and Alliance Challenges During Stability Operations*, Santa Monica, CA: RAND, 2011, https://www.rand.org/pubs/monographs/MG903.html (accessed September 26, 2019).

[56] "ADF Concept for Command and Control of the Future Force," version 1.0, Australian Defence Force, May 13, 2019, 46

[57] *Terms and Military Symbols*, ADP 1-02, Washington, D.C.: Headquarters, Department of the Army, August 2018, 1-18.

[58] Russell W. Glenn, *Band of Brothers or Dysfunctional Family? A Military Perspective on Coalition and Alliance Challenges During Stability Operations,* Santa Monica, CA: RAND, 2011, 41, https://www.rand.org/pubs/monographs/MG903.html (accessed September 26, 2019).

This broadened understanding of what constitutes a coalition allows incorporation of NGO, IGO, FBO, and industry resources in the service of sought-after ends. It also promotes including relevant partners during planning and preparation for megacity HADR as well as during execution, thereby accounting for challenges such as LTG Kobayashi's observation that there must be a means of overseeing/managing volunteers and addressing the regional imbalance of same as experienced in 2011.

Doctrine recommendation 7: HADR forces deploying from other than the immediate area affected should focus on post-search and rescue tasks. Both post-disaster statistics and observations by conference speakers support a conclusion that – other than the extreme exception – those who will be found alive will have been rescued after 3-5 days.

Doctrine recommendation 8: Seize on exercises and planning sessions to identify mutually acceptable ways of dealing with military and other organizations' various coordination styles, decision-making processes, and additional cultural characteristics that could impede effective HADR response. Several speakers noted the need to be culturally aware when planning and executing operations. They likewise emphasized the importance of working to overcome potential friction in this arena via both institutional solutions and maintenance of personal relationships. LTG Chun provided the example of no one wanting to be the bearer of bad news in virtually any culture, but the reticence of the messenger and willingness of the recipient to "forgive" will differ depending on nationality, organization, or leader personality.

These cultural differences apply to a broad range of issues. (See, e.g., Training recommendation 1 below.) They also influence interactions even when the parties are of similar nationality or vocation. For example, police, fire, or other representatives from different parts of the same country may have varying leadership, command, control, or other approaches despite their being

the same types of organizations. (This applies even within city governments where mayoral offices, city council, and other organizations can have different objectives, motives, and agendas.) These differences are best identified and accounted for before an event. Barring this, all parties should be aware of the potential for tensions arising from such differences and adapt accordingly.

Doctrine recommendation 9: Maintain a systems perspective throughout all components of megacity functions. LTG Yamaguchi, for example, stated that his first action when asked to assist after 3/11 was to secure the fuel needed to ensure Tokyo's electricity. Assuring availability of power links directly to LTG Chun's prioritization of communications as the primary focus in the hours and days immediately after disaster strikes.

Organization

> We can't be everywhere. We have to converge effects at right time and right place….
> The military can't do it alone. We would be foolish to try.
>
> General Robert B. Brown

Organization recommendation 1: Make future Bilateral Coordination Action Teams (BCAT) joint. COL Browne found that BCAT functions during Operation Tomodachi were hindered by lack of joint representation. He highlighted the value of having Department of State representation on BCATs but found that fewer foreign affairs officers and more military providers – to include engineers, logisticians, communicators, and public affairs personnel – would have been beneficial. In addition to slowing response of services not represented, the absence of other-service and appropriate function representatives meant BCAT leadership was

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left in the dark regarding assets that could have been brought to bear. BCATs would ideally include relevant other-than-military/other-than-government representation for the same reasons.

Organization recommendation 2: When possible, put one organization in overall charge of megacity operations. Given the many and different organizations involved in HADR, assignment of a single operational leader or headquarters will not necessarily result in unity of command. However, it will facilitate unity of effort and message. LTG Takemoto observed that "for the coming Olympics, there is no one organization overall in charge. We need to address that issue." This is particularly important given that 2020 Olympics venues are spread across seven prefectures in a region where the risk of significant natural disaster is ever-present. Establishing skeletal/standby or fully functional equivalents of civil-military operations centers (CMOCs) would put coordination mechanisms in place that could orchestrate response capabilities should such be necessary. These CMOC-like organizations could be established in the months ahead of the Olympics (or other major events) to act as host and pre-Olympics coordination nodes for international security organizations such as those supporting the 2016 Rio summer games.

Organization recommendation 3: Train and rehearse for HADR headquarters and other movements just as is done during combat exercises. LTG Sumida suggested that organizations could plan and practice for moving to less exposed or less damaged areas such as is the case with repositioning GSO from Ichigaya to Eastern Army Headquarters at Camp Asaka in the event of a major earthquake. Senior headquarters will face many of the same challenges confronting a tactical headquarters, yet they rarely (if ever) displace. The need to coordinate such a movement with other organizations during a crisis, the related requirement to maintain communications throughout such a move, and complications of displacing in a debris-strewn environment will

considerably complicate such actions and emphasize the need for pre-event planning and rehearsals. (An obvious alternative or supplementary option is to designate one or more subordinate command locations as permanent alternate command posts for the contingency that the primary headquarters is rendered completely inoperable. Temporary designation in this sense is likely to be part of headquarters relocation plans in any case.)

Organization recommendation 3: Determine information and intelligence sharing procedures prior to actual HADR operations. Brigadier Langford recalled previous operations in which sharing of vital information was undermined because processes had failed to account for sharing of classified or sensitive information with partners. Rapid screening and declassification procedures or other means of getting information to non-traditional partners during crises should be practiced and procedures honed prior to disaster operations. Additionally, it is important to avoid over-classification in the first place. Brigadier Langford noted the example of being unable to share terrorist-related information with partner organizations due to over-classification. It is notable that information sharing will not be a one-way phenomenon. LTG Yamaguchi cited the nongovernmental organization Peace in Japan that immediately after 3/11 was his "best source of information." Further, NGOs and other non-government civilian organizations may prove better able to respond to time-sensitive requirements given their being less bureaucratic and relatively free of constraints. A government may believe it must appear to be equitably distributing aid while a NGO can provide services where they are most needed.

Streamlining standard procedures is another way in which information can be shared in a timely manner. Peter Ford suggested that the best way to protect soft targets during major megacity events is through compressing timelines for sharing data and information. He cited the example of a beat cop communicating directly with a joint operations center (JOC) rather than having to

go through his/her chain of command as would be typical. Doing so allows the JOC to rapidly and widely disseminate the incoming material to all relevant users.

Organization recommendation 4: Form a partnership of megacities to exchange existing policies and lessons learned from disasters. Paris's Assistance Publique-Hôpitaux de Paris (APHP) is Europe's largest hospital trust. Its crisis unit is able to coordinate the responses of forty hospitals. Its director general activated its twenty-year old "White Plan" for the first time in the immediate aftermath of the November 13, 2015 terrorist attacks. The plan provided for the mobilizing of all participating hospitals to include recalling their staffs and releasing beds to increase capacity for incoming wounded. Two additional capacity "reservoirs" were also alerted – other hospitals in Paris not yet participating and select university hospitals farther from Paris – that were not incorporated in the initial response. (The original forty were never overwhelmed, but these additional facilities were prepared had the situation demanded). Though this was the first time the White Plan was brought to bear, response benefited from many of the medical personnel responding having participated in the previous attack on the *Charlie Hebdo* publication offices.

The Paris response included dispatch of mobile units consisting of a physician, nurse, and driver to victim locations where medical personnel conducted triage and allocated patients to the most appropriate of the forty medical facilities. (Note the previous observation by Dr. Okumura that Tokyo's doctors still do not routinely move to disaster sites, this 24 years after the 1995 sarin attack.) Forty-five such teams were dispatched with fifteen held in reserve given the possibility of additional attacks. These teams benefited from pre-event development of protocols for gunshot wound patients and three field exercises providing practice in pre-hospital mitigation

treatment. Hospitals also exchanged patients, e.g., when the expertise needed for treatment was not available at a facility.[59]

Emphasizing the value in megacity officials' creating a mechanism for exchanging lessons from disasters, APHP's pre-attack preparations had included study of bombings and other attacks in Israel, Boston, Spain, and the United Kingdom.

Organization recommendation 5: Consider assigning liaison teams to select urban areas of notable security importance or those likely to require HADR assistance due to their vulnerability. The U.S. Army rotates civil affairs personnel through a team in Dhaka, Bangladesh. Given the regular occurrence of flooding and other disasters in this highly and densely populated urban area, the expertise possessed by those serving in these billets might well serve significant dividends in the future. Similar to the role played by British experts with longtime experience in the North African desert before World War II and the expertise regarding the Falkland Islands' coast possessed by Ewen Southby-Tailyour during the 1982 conflict there, establishing expertise for select urban areas suggests itself as strategically wise.

Organization recommendation 6: Develop doctrine and relationships to achieve more than mere cooperation or coordination. The U.S. Army is appropriately adjusting to its nearly two decades of focus on counterinsurgency by re-honing skills dulled by lack of practice during repeated deployments to Iraq and Afghanistan. However, there is a tendency for bureaucracies to swing the pendulum too far in the other direction when addressing perceived deficiencies. Partnerships involving NGO, IGO, FBO, and commercial organizations are essential both during and after armed conflict no less than in counterinsurgency operations. Services and the joint

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[59] This paragraph draws heavily on Martin Hirsch, et al., "The medical response to multisite terrorist attacks in Paris," *The Lancet* 386 (December 19/26, 2015), 2535-2538.

community would benefit from recognizing this and adapting plans, doctrine, training, and organizations accordingly, to include incorporating a broader array of participants and reassessing such concepts as "coalition," "MDO," and "maneuver."

Organization recommendation 7: Compile and maintain lists of HADR-relevant experts with contact information. As has been done in Japan in the case of poisons (and chemical agents), creating a database of experts provides an immediate reference when the underlying cause of a disaster is unclear.

Training

> There have been literally hundreds of unexpected events – incidents that you would not encounter in your wildest dreams. That is when you fall back on training and adaptability.[60]
>
> Brigadier (Australian Army) Mick Slater, East Timor, 2006

Training recommendation 1: Develop adaptable, less confrontational ways of achieving "red teaming" objectives that are culturally acceptable yet effective when dealing with representatives of other nationalities or organization types (to include those from NGOs, IGOs, faith-based organizations, and industry). Effective red teaming would provide the challenges necessary to effective preparation, but those manning red teams must employ ways of questioning that build rather than undermine collaboration. Given the large number of diverse groups found in megacities, cultural differences, inter-organizational antipathies, and other factors may require that red teaming sessions be conducted separately with select participants

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[60] As quoted by Brigadier (Australian Army) Ian Langford, "Mission Command during Megacity HADR Operations," presentation at the "Current and Future Operations in Megacities" conference, Tokyo, Japan, July 18, 2019.

(rather than collectively) despite the potential for reduced effectiveness due to not being able to include all relevant parties in the same forum. Red teaming processes less confrontational than those routinely employed internally by U.S. military organizations will enhance the likelihood of broader and more effective participation by some partners. The benefit of recognizing and acting on this recommendation before an operation is evident in one speaker's observation that every plan is based on assumptions, intentional or otherwise, but that these typically go unchallenged. Effective red teaming would challenge them.

Red teaming with non-military partners offers the additional benefit of discovering innovations and perspectives that would otherwise remain undiscovered. GEN Brown observed that response times required during some disasters meant the traditional military planning approach of a staff developing three courses of action for a commander's consideration is too deliberate. He found that first responder approaches to crisis decision-making have proved valuable for armed forces exposed to them. For more on red teaming, see Appendix F.

Training recommendation 2: Integrate multiple non-traditional partners when both planning for and conducting exercises. Exercise organizers must create realistic scenarios so that non-traditional partners can see value in the exercise. Relying on the military alone during the exercise design will overlook opportunities and reduce the value of participation for organizations whose capabilities went unrecognized due to designer unfamiliarity.

Ideally, HADR exercises supporting preparations for world-class events in megacities will be advised by senior government officials' guidance. LTG Takemoto called for red teaming and demanding exercises that caused participants to fail so that the underlying causes allow all to understand and address shortcomings in readiness. He went on to note that designing and

conducting exercises in the absence of a single party having overall responsibility for Olympic security will interfere with effective preparatory training.

Training, to include exercises and rehearsals, should include substantive participation by military, other governmental, nongovernmental (NGO), inter-governmental (IGO), commercial, and other organizations as necessary to include operational and strategic level decision-makers.

Training recommendation 3: Improve virtual and constructive megacity training capabilities at all three levels of operations. Urban operations simulations are improving but still significantly lack robust replication of environmental conditions, especially those at the operational and strategic levels. While tactical echelon simulations show promise, these share shortfalls with the operational and strategic levels in that few competition or return to competition missions are well represented (if they are included at all). Just as we would not send a pilot out without hours in a simulator, we should not send a squad out without hours of constructive and/or virtual training. Fortunately, we can now do much in this arena in a way that was not possible before, but more remains to be done. The promise of the Synthetic Training Environment's (STE) capacity to complement or replace live training will be especially valuable given the high costs of both replicating large-scale urban physical environments and related costs and difficulty of representing large populations.

Training recommendation 4: Train for competition and return to competition missions – to include megacity HADR – just as is done for armed conflict operations. The Joint Command for Preventing and Combating Terrorism conducted extensive training as part of its readying for the 2016 Rio Olympics. The training included multiple relevant parties and drew heavily on

similar historical events.[61] Preparing for HADR at any of the three levels of operations requires no less effort than for armed conflict missions.

Materiel

> We need systems that can use sensors like the way people use their five senses.

> MG Gary M. Brito

Materiel recommendation 1: Ensure key technologies will function in urban areas. Given the exceptional environmental conditions these environments pose, be prepared to revert to low-tech/no-tech alternatives.

Major disasters effectively cast many technologies – many seemingly fundamental to security operations – out the window. Modern forms of communication may be inoperable. Water, power, and transportation can be offline for weeks if not months. The higher temperatures found in urban areas has rendered some UAVs unable to function during recent summer months. LTG Yamaguchi cited instances during recent post-earthquake operations in which Japan's military leaders devolved to using runners and mid-20th century means such as walkie-talkies when cellphones were down and other forms of partner communications were either likewise or incompatible with JGSDF systems. In the aftermath of the 2018 Great Hokkaido quake, soldiers used floppy disks transported by bicyclists to pass information.

Material recommendation 2: Do not rely on single technologies during urban operations.

Armed Forces of the Philippines (AFP) developed an effective, cheap, and quick means of

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[61] Alessandro Visacro, "Brazilian Organization for Combating Terrorism during the Rio 2016 Olympic Games and Paralympic Games," *Military Review* (September-October 2017), https://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/September-October-2017/Visacro-Brazilian-Organization-for-Combating-Terrorism/ (accessed August 2, 2019).

denying insurgents visibility of soldier street crossings. Confronted with snipers, units would have a member dash across a street trailing a long piece of fabric that he would then fasten to a building once across. Anchored at his starting point, the fabric hung down across the gap, denying enemy sharpshooters visibility of its friendly side with a permanency unavailable with smoke (which can be less effective in urban areas' swirling air currents environments).

Also seeking to provide safe passage across gaps, the U.S. Army Engineer Research and Development Center's (ERDC) Ready Armor Protection for Instant Deployment (RAPID) is a $20,000 each, four-plus ton extendable metal barrier that looks something like the supports used to hold up the banks of trenches during construction. While arguably beneficial where a protective barrier is needed for a considerable duration (and understanding that field initiative will find uses beyond crossing open areas, e.g., protection of static facilities), this less responsive means of providing protection would at best be a complement to field expedients such as that employed in Marawi.[62]

Materiel recommendation 3: Develop laws, regulations, and policies for leveraging current and emerging technologies for use during urban operations now. Megacity security during world events and day-to-day will benefit from sensors and other technologies. Shape, gait, facial, and other demographic recognition tools already assist in detecting weapons or other threats. Monitoring equipment assists in guaranteeing public safety by detecting anomalies in physical infrastructure. Integrating sensor and communications systems aids in locating those kidnapped

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[62] RAPID when deployed consists of two solid metal "walls" that have sufficient separation for personnel with combat equipment to pass between them while protected against projectiles up to 7.62mm or, with additional shielding added, .50 caliber. Delivery of the system requires a truck and means to move the item into place before extending it up to its 36-foot maximum length across an opening. Setup takes approximately thirty minutes. "Modular Protective System – RAPID," U.S. Army Corps of Engineer Research and Development Center (ERDC), information sheet, June 2019; and Dr. Russell W. Glenn discussion with Dr. Paul A. Sparks, Research Civil Engineer, Fort Hamilton, NY, July 24, 2019.

or lost. Concerns regarding privacy are legitimate, yet expanding advances will be crucial to early threat detection and rapid decision-making. Guidance regarding use of such sensors and other technologies and handling of resultant data too often lag behind both security requirements and privacy concerns. It is necessary to find a regulatory balance between preservation of privacy and saving lives.

Materiel recommendation 4: Develop means of communicating three-dimensional coordinates to all HADR partners. Urban environments' super-surface and sub-surface infrastructure makes the addition of a vertical component to location coordinates essential. LTG Sumida shared that during 3/11 there were many tweets requesting help from people trapped under rubble. Whether human-to-human, human-to-database, UAV/UGV-to-database, or some other communication, knowing where in the vertical dimension to find a trapped individual, toxic spill, or other item will be fundamental to effective and timely response. (On one of the floors of a partially collapsed building or on one of the levels in the shopping mall beneath it?) Such information cannot be limited to an individual organization's office computers, communications, or targeting systems; ideally, it will be immediately available to personnel from all relevant aid providers.

Materiel recommendation 5: Identify and address solutions to potential difficulties with prospective HADR partners before emergency situations. Power cables brought to the Fukushima nuclear reactor site were too short to reach backup generators. Plug connections for hoses were incompatible with those on-site at the nuclear facility. Just as is the case in many U.S. cities where fire hydrant and hose threads may be incompatible with those of departments from outside the city, responders should identify such potential shortfalls prior to deployment and take steps to address them before arrival.

LTG Chun reminded the audience that the normal might well be the abnormal in the aftermath of a disaster. He also made clear the possibility that the mundane can become decisive in terms of mission accomplishment, reinforcing the need for deploying organizations to ensure sufficient means are in place to support their operations without hindering local efforts. If not, they need to bring their own supplies and services, to include even basics like water. The same applies to the general's number one priority of communications. Knowing before arrival that communications (hardware, software, databases, radios, or other components) are incompatible with those of prospective government or other HADR partners means the savvy organization can increase its number of liaison personnel and communications systems accompanying them if compatibility fixes are not quickly forthcoming.

Materiel recommendation 6: Develop communications systems, databases, software, and other capabilities able to address both operational security and need-to-share requirements. The U.S. Department of Defense developed and owns an application called Android Team Awareness Kit that U.S. agencies use to coordinate with state and local authorities during disaster response and national special security events. Given the increasing recognition of the need to orchestrate both government and other-than-government organizations, similar technologies and capabilities should stand as examples reflecting future requirements.[63]

Leadership and education

> Legitimacy is the absolute necessity for maintaining the confidence of the lawfulness
> and morality of our actions.

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[63] Timothy Leong email to Russell W. Glenn, subject: Contact info, July 18, 2019.

Sid Heal

Leadership and education recommendation 1: Find the experts to lead or support megacity HADR operations rather than defaulting to the individual on duty or the leader of the unit prioritized for immediate deployment. Discussing leadership during disaster response, Sid Heal noted that having the wrong person in charge

> is entirely our own responsibility and one that we have failed at on more than one
> occasion. The most common method for selecting an incident commander during a
> crisis is not based on his or her experience, training, or education, but simply who was
> on duty at the time. This is hard to defend in the midst of acknowledged mistakes, but
> we frequently find ourselves on the defensive as a result. This is especially the case
> with the newly promoted and reassigned.

Leadership and education recommendation 2: Analyze the HADR megacity implications for mission command during MDO, Cross-Domain Operations (Japan Self-Defense Force), Accelerated Warfare (Australian Army), and other partner emerging operational concepts and the concepts themselves. While mission command is fairly well defined in doctrine, it is unevenly applied in the field. Its application across multiple domains in a megacity environment involving both military and other partners implies challenges heretofore little if at all addressed. Fortunately, several police, fire, and other non-military organizations already apply command approaches with sufficient similarity to mission command that adaptation for more broadly defined coalitions will not unduly task some members (and should facilitate adoption or understanding by others). Articulation of a clear mission and commander's intent takes on new complexity when the organizations involved are dissimilar. COL Browne's observation regarding the need for BCATs to be joint merely hints at these complexities: How can a

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commander unfamiliar with another service or civilian organization communicate an effective mission and intent? Joint manning will assist in addressing the challenge, but barring use of training to reduce that unfamiliarity, room for significant error and less trust that unfamiliar subordinates will respond appropriately is unavoidable. Similarly, MDO, Cross-Domain Operations, and Accelerated Warfare will be more complex in application, reflecting the greater complexity of urban environments.

Leadership and education recommendation 3: Design coalition exercises to address both the specific topic at hand and team building more generally. Pete Ford recalled the value of a chemical, biological, radiological, and nuclear (CBRN) exercise as key to assisting security representatives improve inter-organizational understanding. While certainly of value in terms of addressing CBRN risks, the topic was secondary to the exercise serving as a vehicle to promote participant insights into partner cultural expectations, perspectives, and procedures.

Leadership and education recommendation 4: Recognize that megacity HADR leadership can demand talents different from those that got a military officer or other authority promoted. GEN Brown reinforced the need for leaders in megacities to have a higher than average comfort level when dealing with ambiguity, an ability he compared to Carl von Clausewitz's *coup d'eoil*, the ability to discern the critical amidst chaos and uncertainty. Related to his observation regarding leader selection as noted in leaders and education recommendation 1 above, Sid Heal in turn identified the importance of a leader's ability to conduct "tactical triage" when dealing with uncertainty, an ability enhanced by expertise and astute powers of observation. The two viewpoints are complementary. Both also point to a conclusion that selecting the right man or woman to lead in times of megacity crisis will be a crucial decision with lasting consequences.

Leadership and education recommendation 5: Encourage coalition membership to all relevant parties, even those habitually unwilling to associate themselves with the military.

Lise Grande's achievements in orchestrating military, UN, NGO, and other organizations' assets in the service of Mosul's noncombatant population did not mean all members of that *de facto* coalition shared equally. She noted that there were a number of issues in the Iraqi Security Forces' headquarters that Iraqi planners did not want the UN to know about. Her organization respected that reticence. Particularly in the realm of intelligence, too much openness exposes one or more parties to security compromises even if the vast majority of recipients are trustworthy and "on side." Further, those providing the original intelligence may deny further sharing with the primary recipient if they find additional dissemination violates classification guidance. Ms. Grande rightly recognized that much in the way of critical information was attainable without violating these norms. "We needed to know when operations were going to start, where the mustering points were going to be," she observed. "We would receive that information in a delayed fashion because they wanted to protect the information and they didn't quite trust us, but by the end of the time we were there, we trusted the decisions of the Iraqi planners and we were involved in almost all real-time planning decisions."

Unfortunately the same level of trust will not always be attainable, but all parties will benefit from some extent of sharing. An organization that flatly avoids any contact with the military puts its own personnel – and its mission – at risk. The "fog of war" is ever present even when combat is not a part of an operation. A NGO or IGO that refuses even to share where its personnel are operating exposes them to inadvertent engagement with lethal systems due to mistaken identity, false or erroneous reporting of an adversary's position, or any one of many other reasons. Conversely, those in possession of sensitive information can mitigate the risk of such unfortunate

events by providing what might be called "conditional intelligence." A military force planning an attack might tell a less trustworthy party to use "Routes Blue or Green" while avoiding traverse of "Routes Black or White" for a specified duration. Doing so allows the recipient of that information to move to its aid location while avoiding exposing itself to military action elsewhere. (Note that for operational security reasons there may be no activity planned along Routes Black or White in some instances while in others there might be action planned in the vicinity of one or both.)

Leadership and education recommendation 6: Consider assigning experienced leaders from non-traditional sources to critical security positions. Tokyo has put retired members of the Self-Defense Force in charge of local municipal crisis management organizations. With experience born of participation in post-3/11 recovery and/or working with other components of local, prefecture, or national government, these individuals bring unique talents and background to their jobs. As former members of the JSDF, they also speak the same language, share planning approaches, and understand the value of extensive pre-event practice. The approach is in some ways similar to the Israel Defense Force reserve system in which industry personnel responsible for weapons or other systems in their civilian jobs are mobilized in times of conflict so that they can provide immediate response when one of their systems requires attention, thereafter communicating the fix to their commercial headquarters for broader sharing and potential preemptive action elsewhere. The Australian government has long understood the benefit of cross-organization assignment of even its most senior personnel. Nick Warner, currently the country's first Director-General of the Office of National Intelligence, has previously served as the Secretary of Defence, Department of Foreign Affairs and Trade Special Coordinator of the Regional Assistance Mission to Solomon Islands, and ambassador to Iran among other positions.

Personnel

Personnel recommendation 1: Designate alternate locations where emergency responders should report if their primary place of work is unreachable. Just as Tokyo has roads and waterways prioritized for emergency services use post-earthquake, organizations should plan for prioritizing where those with specific skills needed during a disaster should report if access to their normal worksite is denied. Medical, police, fire, engineer, and other personnel often do not live in the jurisdiction in which they are employed. Cooperative agreements between authorities would allow for these vital assets to report to predesignated alternative locations where they could employ their talents or obtain guidance as to where they are most needed when conditions preclude reaching their normal place of work. Should access to alternate locations likewise be unavailable, tertiary sites could be specified based on disaster preparedness maps or other resources identifying where aid is most likely to be needed.

Facilities

Facilities recommendation 1: Incorporate women's perspectives in the design and running of shelters, displaced person or refugee camps, and similar facilities. Both LTG Kobayashi and Brigadier Langford noted that previous operations by their militaries pointed to the need to incorporate female concerns in the design and management of disaster facilities.

Facilities recommendation 2: Plan and provide for transportation to disaster facilities. Include the capability to transport those with mobility issues and pets. Preliminary identification of those who will need assistance moving to facilities for displaced persons will speed reaction and allow prioritization of those with special needs. Include provisions for animal transport and maintenance in these facilities as previous events have shown some will not evacuate without their pets.

Facilities recommendation 3: Maintain 24-hour law enforcement presence at disaster facilities. Such presence acts both as a deterrent and recognizes that the same issues confronting communities during normal periods will be found in these facilities.

Facilities recommendation 4: Keep disaster facility residents informed. Keep displaced persons informed regarding post-disaster conditions. Additionally, provide for residents desiring to contact relatives or friends and those residents' requests regarding the status of others affected by the catastrophe. Take advantage of social networks and social media as means of communicating when they are available.

Policy

> The assumption that receiving a great number of relief items always results in a more effective response is false; humanitarian assistance should not be sent *a priori*, rather it should be the last option, only where the affected country does not have the capacity to absorb and recover itself."[64]
>
> Andrea Bartolucci, Darren Walter, and Tony Redmond,
>
> "Comparative Review on the Cost-Effectiveness Analysis of Relief Teams' Deployment to Sudden-Onset Disasters"

Policy recommendation 1: Review past HADR operations in urban areas and monitor similar future operations to identify regulations, policies, and laws in need of adaptation. Evolving political, technological, social, and other conditions mean once-appropriate guidelines for HADR response may be dated. Dr. Okumura's observation that EMTs in Tokyo still are not

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[64] Andrea Bartolucci, Darren Walter, and Tony Redmond, "Comparative Review on the Cost-Effectiveness Analysis of Relief Teams' Deployment to Sudden-Onset Disasters," *Prehospital and Disaster Medicine* special report (2019): 6.

allowed to execute airway clearance procedures and city doctors do not deploy to disaster locations in sufficient numbers are examples in this regard. While permitted procedures should not exceed an individual's level of training, reconsidering what skills EMTs, paramedics, police, fire, and other personnel should have as part of their core training may require review. In addition, consideration should be given to temporarily expanding the palette of procedures allowed under conditions such as those that may exist in times of extreme adversity.

Policy recommendation 2: Consider creating the equivalent of Tokyo's disaster preparedness maps and seek consistency in portraying information on maps and during public and private reporting. Tokyo's requirement for these maps assists in emergency planning, locating public structures, designing communities (e.g., locating parks that provide refuge and/or act as firebreaks), and offers many other services. Providing electronic media versions to complement hardcopies (but not replace due to likely post-disaster power outages) will enhance these uses given the ability to instantly link them to photographs or other relevant resources/data. Insights regarding the design and maintenance of these maps should be exchanged between international megacity authorities. For example, Tokyo is currently in the process of modifying its map formats to account for color blindness while simultaneously working to ensure that color and other coding for the maps is universal throughout Japan. Japanese authorities are also asking media to adopt procedures/uses of color consistent with government standards as different outlets have previously used their own representations, a potential source of confusion.[65]

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[65] Tomohiro Osaki, "Japan earthquake task force to redesign hazard maps to aid people with color vision deficiencies," *The Japan Times* (August 21, 2019), https://www.japantimes.co.jp/news/2019/08/21/national/quake-maps-color-vision-deficiency/ (accessed August 26, 2019).

Policy recommendation 3: Recognize that misuse of disaster relief resources can outweigh the benefits of their provision, requiring suspension of some aspects of HADR. Lise Grande told the conference audience that the UN had stopped food delivery to Houthi rebels in Yemen during June 2019, this after a year of the rebels ignoring demands to halt misrouting of the aid. Criminal and other groups will do the same in the aftermath of megacity disasters.

Misuse of aid can extend the duration and scope of suffering. (There will be parties hoping to perpetuate disaster conditions as they profit from them.) Longer term effects include promotion of corruption. Though there will be pressure to continue aid provision even when it is abused, organizations must balance the benefits to be gained in maintaining relief and downside of doing so.

Policy recommendation 4: Incorporate community representatives in pre-disaster planning and preparations. LTG Yoshida cited Japan's Rapid Response Approach to Disasters in Asia-Pacific (RAPID) program. Rather than initiating preparations by asking who responders are and what capabilities they can bring to bear, with RAPID Japanese authorities start with communities and their needs and look at how best to address them, who is best placed to address them, and how best to coordinate the response (similar to the above-described UN-supported initiative in Manila). LTG Yoshida noted, "The approach focuses on the international community's added value in Asia-Pacific, namely on boosting the speed, volume, and quality of the response in augmentation to the government's lead."

Policy recommendation 5: Identify key megacity terrain prior to a disaster. LTG Yamaguchi remarked that though some JSDF disaster deployment plans are location agnostic, in other cases they include detailed information regarding specific locales. For example, the JGSDF's Northern Army had already determined which mountain tops offered optimum

locations for communications positions when they were directed to respond to 3/11. The same forethought and prior reconnaissance should apply to preparations for megacity operations.

Policy recommendation 6: Consider insights from other-than-military operations when developing urban operations guidance. Lise Grande provided a six-step procedure that proved successful in the orchestration of ISF, NGO, and IGO activities involving evacuation of noncombatants from Mosul:

1. Internally Displaced Persons (IDPs) are directed through the front line by ISF members.
2. IDPs gather at mustering site.
3. ISF members transport IDPs from mustering site to a screening site.
4. ISF members screen military-age males while family members wait.
5. Families are transported from screening to settlement sites.
6. Families are registered at the settlement site.

Other valuable insights provided by Ms. Grande included:

- The tempo of ISF operations was orchestrated with United Nations representatives so as not to overwhelm the capacity available to treat noncombatants and integrate them into one of the nineteen camps established outside the city. UN personnel sent hourly reports to ISF leaders to inform them of medical care and camp capacity status.

- Trauma stabilization points manned by forward-deployed medical personnel stabilized patients before onward movement to more robust care facilities proved effective in minimizing civilian deaths or worsening of medical conditions.

- UN civil-military teams – which often included military veterans – were embedded with ISF planners and could communicate directly with operations personnel, abetting the effectiveness of the above two procedures.

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Policy recommendation 7: Prioritize and assign post-disaster support of specific infirm and mobility-impaired residents to emergency providers or community volunteers. Drawing on social observation 6 ("As world populations age, knowing the locations of the infirm and the nature of elderly and others' medical and other support needs will become increasingly important"), officials should pre-coordinate actions to ensure these individuals are checked on and provided needed care in the aftermath of a crisis.

Policy recommendation 8: Locate key physical infrastructure where it is not likely to fail during a disaster. Both private and public facilities lost power during Hurricanes Katrina and Sandy due to backup generators or the power panels that controlled them being below flood waters. Backup generators at the Fukushima-Daiichi nuclear power facility were flooded by tsunami waters. Sid Heal recalled an earthquake exercise in the Los Angeles region during which managers for Morris Dam, that protecting a community from potentially catastrophic flooding, had its radio antennas on the structure itself (which failed during exercise play). The telephones providing a backup communications capability were in the neighborhoods that would be flooded should the dam fail. Mr. Heal used the photograph below to communicate the need to "always

have a plan B." In the case of the dam in question, obviously a plan C was called for after A (use

radio) and B (call on telephone) were rendered impractical.

Figure 12: Always have a plan B[66]

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[66] Image from Sid Heal, "Best Practices for Securing a Megacity during a Major World Event 1" presentation during the "Current and Future Operations in Megacities" conference, Tokyo, Japan, July 18, 2019. For those unfamiliar with military parachute technology, the primary chute opens when the static line – essentially a rope with a hook on the end that is anchored to a cable in the aircraft – pulls the parachute from the jumper's pack and then disconnects. In the case of the photograph here, that hook was never attached, meaning the primary parachute would not deploy. Plan B in this case: Military jumpers have reserve chutes.

Chapter 4: Conclusion

We cannot do this after the fact. It must begin now.

Colonel David Filer conference summary remarks

This second of two megacity-focused conferences is part of a broader initiative by the partner organizations to recognize, understand, and prepare for operations in the world's largest and most influential urban areas. The world continues to urbanize. Its megacities continue to grow, thereby exposing more people and expanding the consequences when disaster strikes. Whether there will be a third such conference is undetermined at the time of this writing. However, the below were proposed by conference partner representatives as potential objectives should another be undertaken. The topics also provide areas for research whether or not an additional conference is forthcoming:

- Megacity implications for further development of the Multi-Domain Operations, Cross-Domain Operations, or Accelerated Warfare concepts.

- The population as partner during megacity operations. Each megacity population is different. Those differences will dramatically affect the character of responses during and after a disaster. One would expect outbreaks of criminal activity would be more limited in some cities than others. Government ability to respond effectively will likewise vary with mobilization of the population being more or less well handled. The presence of large numbers of international representatives is the norm in megacities, but the swelling of those numbers during major events will have response implications.

- Better integrating non-traditional partners during planning, preparation, and execution of HADR. Who can handle what tasks? Who will do so under what conditions (e.g., Doctors Without Borders/Médecins Sans Frontières would not support military medical efforts at

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the front lines during 2016-2017 fighting for Mosul; commercial providers of mobile cellular capabilities would not go into the radiation-contaminated Fukushima-Daiichi area, causing the Japan Self-Defense Force to step in.) Preliminary efforts toward orchestration of all participants will assist in identifying such "red flags" prior to their adding to operational complexity. Other benefits include (1) better understanding of operating challenges in the world's largest urban areas, to include understanding how better to orchestrate the many military, civil government, and other organizations involved during recovery from a megacity disaster, and (2) the implications of this understanding for similar undertakings in developing world megacities, to include those involving combat operations.

- Determine a megacity's vulnerabilities to terrorist attack. What systems and connections between systems would magnify the impact of an attack on a megacity? Which targets are particularly vulnerable to cyberattack and what preventative/mitigating procedures can be put in place?

- Anti-guerrilla operations in a megacity.

- Managing the complexity of operations in a megacity, to include artificial intelligence augmentation of partner operations.[67]

Where might a third megacities conference be held? It was suggested that after New York and Tokyo, a developing world city would be appropriate. Counter-arguments proposing Seoul or Singapore were offered. Maintaining focus on the Indo-Asia region was popular with several members of the day 4 group while others suggested alternatives, Lagos, Nigeria being one. It was

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[67] A starter document that may be of value in this regard: Jamison Jo Medby and Russell W. Glenn, *Street Smart: Intelligence Preparation of the Battlefield for Urban Operations,* Santa Monica, CA: RAND, 2002.

agreed that continued support by senior leadership would be necessary both to convening a third event and in selecting its ultimate destination.

The insights offered in Tokyo provide rich ore for thought. Yet the discussion, observations, and recommendations above should be viewed as simply another step toward additional study, analysis, and preparation. Like the site of the 2018 conference, Tokyo is a developed world megacity. That study, analysis, and preparation must contemplate what these two events' discussion, observations, and recommendations tell us about megacity contingencies regardless of country and economic development status. Other major urban areas' populations may be more heterogeneous than is Tokyo's. (While some 34% of New York's population is foreign born, less than 3% of that in Tokyo is. The percentage is less yet in Seoul and Jakarta.) The character of both nature's and man's threats to an urban area's security will differ. Those and many other differences merit attention before disaster's arrival just as do the many points identified in the context of Tokyo above.

The MDO concept and its multinational brethren provide a framework for comprehensive orchestration to develop agile and innovative leaders and build experience for those leaders and their organizations. Through events like the "Current and Future Operations in Megacities" conference, we continue to evolve our understanding of these phenomenon and the challenges they hold for soldiers and their many partners in the future as they apply maneuver to gain advantage through more effective employment of all relevant resources and capabilities.

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Appendix A: Agenda

JAPAN GROUND SELF-DEFENSE FORCE-USARPAC-TRADOC-AUSTRALIAN ARMY-USARJ

"CURRENT AND FUTURE OPERATIONS IN MEGACITIES" CONFERENCE AGENDA

National Institute for Defense Studies, 5-1 Ichigayahonmuracho, Shinjuku-ku, Tokyo, 162-8808 Japan.

July 16-19, 2019

DAY 1

Tuesday, July 16, 2019

1030-1100   **Assembly and Registration for those not registering at hotel**

1100-1115   **Administration and Welcome** *Dr. Russell W. Glenn*

1115-1230   **Tokyo Virtual Terrain Walk, Part 1** *Dr. Russell W. Glenn/MAJ Caleb Dexter/CPT Jesse Geyer/CPT Jheaniell Moncrieffe*

1230-1330   **Lunch (purchase on site)**

1330-1600   **Tokyo Virtual Terrain Walk, Part 2** *Dr. Russell W. Glenn/MAJ Caleb Dexter/CPT Jesse Geyer/CPT Jheaniell Moncrieffe*

DAY 2

Wednesday, July 17, 2019

0815-0900   **Registration at conference venue (NIDS) for those not yet registered**

0900-0915   **Day 2 Welcome:** *Dr. Russell W. Glenn*

0915-0925   **Introduction of keynote speaker** *MG Gary M. Brito, CG, Maneuver Center of Excellence, U.S. Army*

0925-0955   **Keynote speaker:** *General (JGSDF, ret.) Ryoichi Oriki*

JAPAN GROUND SELF-DEFENSE FORCE-USARPAC-TRADOC-AUSTRALIAN ARMY-USARJ

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July 16-19, 2019

Megacities and Humanitarian Assistance/Disaster Relief (HADR) Operations: Context and History's Lessons

0955-1015   **Megacities in the Indo-Pacific Region** *Dr. Russell W. Glenn, G2 U.S. Army TRADOC*

1015-1045   **The Tokyo Subway Sarin Attack at a Frontline Hospital: Lessons Learnt** *Dr. Tetsu Okumura, Medical Director, Japan Poison Development Centre*

1045-1115   **Planning Humanitarian Assistance/Disaster Relief Operations: Insights from 2011** *Lieutenant General (JGSDF, ret) Shigeru Kobayashi, Director General for Crisis Management Tokyo Metropolitan Government*

1115-1145   **The Multinational Partner during Post-Disaster HADR – Insights from Operation Tomodachi** *Colonel Stephen C. Browne, U.S. Army War College Fellow, Texas A&M University*

1145-1245   **Lunch (purchase on site)**

1245-1320   **Panel 1: Megacities and HADR Operations: Context and History's Lessons**

         Dr. Russell W. Glenn, U.S. Army Training and Doctrine Command

         Dr. Tetsu Okumura, Japan Poison Development Centre

         LTG Shigeru Kobayashi, JGSDF (ret.)

         COL Stephen Browne, U.S. Army War College

The Complexity of Megacity Operations

1320-1350   **Multi-Domain Operations during Megacity HADR** *General Robert B. Brown, Commanding General, US Army Pacific*

1350-1420   **Megacity HADR Operations: The Japan Ground Self-Defense Force Perspective** *Lieutenant General Kazuaki Sumida, Commanding General, Ground Component Command, JGSDF*

JAPAN GROUND SELF-DEFENSE FORCE-USARPAC-TRADOC-AUSTRALIAN ARMY-USARJ

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National Institute for Defense Studies, 5-1 Ichigayahonmuracho, Shinjuku-ku, Tokyo, 162-8808 Japan.

July 16-19, 2019

1420-1450	**Accelerating the Application of Artificial Intelligence during Megacity and US Army Multi-Domain Operations** *Major General Gary M. Brito, Commanding General, Maneuver Center of Excellence, U.S. Army*
1450-1515	**Break**
1515-1555	**Panel 2: The Complexity of Megacity Operations**
	GEN Robert B. Brown, US Army Pacific
	LTG Kazuaki Sumida, JGSDF
	MG Gary M. Brito, US Army TRADOC
1555-1610	**Day 2 Wrap-up:** *COL David P. Filer*
1830-2030	**No-host Ice Breaker (New Sanno hotel Fair Winds Lounge)**

DAY 3

Thursday, July 18, 2019

0830-0900	**Registration at conference venue (NIDS) for those not yet registered**
0900-0910	**Day 3 Welcome:** *LTC Kent Justice*

Orchestrating Megacity Security Operations during World Class Events

0910-0940	**Mission Command during Megacity HADR Operations** *Brigadier Ian Langford, Australian Army*
0940-1010	**Best Practices for Securing a Megacity during a Major World Event 1:** *Charles Heal, former commander, Los Angeles County Sheriff's Department*

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JAPAN GROUND SELF-DEFENSE FORCE-USARPAC-TRADOC-AUSTRALIAN ARMY-USARJ

"CURRENT AND FUTURE OPERATIONS IN MEGACITIES" CONFERENCE AGENDA

National Institute for Defense Studies, 5-1 Ichigayahonmuracho, Shinjuku-ku, Tokyo, 162-8808 Japan.

July 16-19, 2019

1010-1040	**Best Practices for Securing a Megacity during a Major World Event 2: The 2016 Rio de Janeiro Summer Olympics** *Mr. Peter Ford, former Diplomatic Security Service Special Agent*
1040-1110	**The JGSDF Role in Megacity Security Operations** *Lieutenant General Ryuji Takemoto, Commanding General, 1ˢᵗ Division, Japan Ground Self-Defense Force*
1110-1140	**Break**
1140-1220	**Panel 3: Orchestrating Megacity Operations**
	BRIG Ian Langford, Australian Army
	Commander Charles Heal, LA County Sheriff's Department
	Mr. Peter Ford, G4S
	LTG Ryuji Takemoto, Japan Ground Self-Defense Force
1220-1320	**Lunch (purchase on site)**

Building Governmental-Nongovernmental Teams during Megacity Operations

1320-1350	**Orchestrating HADR Megacity** *Operations Lieutenant General (ROK Army, ret.) Chun In-Bum*
1350-1420	**Command; Control; and Joint, Interagency, Intergovernmental, and Multinational Coordination: Lessons from 2011** *Lieutenant General (JGSDF, ret.) Noboru Yamaguchi, Dean of International Relations at the International University of Japan*
1420-1450	**Humanitarian Assistance and Disaster Relief: Lessons from a Combat Zone** *Ms. Lise Grande, United Nations Resident and Humanitarian Coordinator, Yemen*
1450-1520	**Break**

JAPAN GROUND SELF-DEFENSE FORCE-USARPAC-TRADOC-AUSTRALIAN ARMY-USARJ

"CURRENT AND FUTURE OPERATIONS IN MEGACITIES" CONFERENCE AGENDA

National Institute for Defense Studies, 5-1 Ichigayahonmuracho, Shinjuku-ku, Tokyo, 162-8808 Japan.

July 16-19, 2019

1520-1600   **Panel 4: Building Governmental-Nongovernmental Teams during Megacity Operations**

                 LTG (ROKA, ret.) Chun In-Bum

                 LTG (JGSDF, ret.) Noboru Yamaguchi, University of Japan

                 Ms. Lise Grande, UN

1600-1615   **Day 3 Wrap-up:** *COL David P. Filer*

DAY 4

Friday, July 19, 2019

Location TBD

(Working group representatives only)

0900-1200   **Consolidation of Insights and Discussion of Way Ahead (to include discussion regarding desirability of 2020 conference in a developing world megacity**

Appendix B: Speaker biographies

General (U.S. Army) Robert B. Brown

Commanding General, U.S. Army Pacific (USARPAC)

General Robert B. Brown assumed command of the United States Army's largest service Component command, U.S. Army Pacific (USARPAC), April 30, 2016. The command is headquartered at Fort Shafter, Hawaii with portions of the command forward-deployed and based throughout the Indo-Asia Pacific. USARPAC's 106,000 Active, Reserve Soldiers and Department of the Army Civilians support the nation's strategic objectives and commitment to the region.

Prior to this assumption of command, General Brown most recently served as the Commanding General, U.S. Army Combined Arms Center at Fort Leavenworth, Kansas, where he led the synchronization of education; leader development; training support & development; and the development and integration of the doctrine the U.S. Army uses to fight and win our Nation's wars.

During various times during his service, General Brown has served twelve years with units focused on the Indo- Asia Pacific region, including Commanding General, I Corps and Joint Base Lewis-McChord; Deputy Commanding General of the 25th Infantry Division including a second deployment to Operation Iraqi Freedom; Training & Exercises Director J7, United States Pacific Command (USPACOM); Executive Assistant to the Pacific Command Commander; Plans Officer, United States Army Pacific (USARPAC); and Commander of the 1st Brigade Combat Team (Stryker), 25th Infantry Division including a deployment to Operation Iraqi Freedom.

General Brown was commissioned a second lieutenant of Infantry from the United States Military Academy in May 1981, and has served in many leadership positions from platoon to Corps, including as Platoon Leader and Company Commander in mechanized infantry units at Fort Carson, Colorado; Battalion Commander of 2-5 Cavalry, a mechanized infantry battalion at Fort Hood, Texas including a deployment to Bosnia-Herzegovina in support of OPERATION JOINT FORGE; and Commanding General of the Maneuver Center of Excellence (Infantry and Armor Forces) and Fort Benning, Georgia.

General Brown has also served in numerous staff positions including: Assistant Professor of Military Science and Deputy Director, Center of Enhanced Performance, United States Military Academy; Plans Officer at USARPAC; Operations Officer, Executive Officer and Chief, G-3 Training in the 25th Infantry Division including a deployment in support of OPERATION UPHOLD DEMOCRACY in Haiti; Personnel Assignment Officer in Human Resources Command; Aide-de-Camp/Assistant Executive Officer to the Vice Chief of Staff, Army; Plans Officer in the Department of the Army G-3/5/7; Program Analyst in the Dominant Maneuver Assessment Division, Joint Staff (J8); Executive Assistant to the U.S. Pacific Command

Commander and Director, J-7 (Training and Exercises) at USPACOM; and Chief of Staff United States Army Europe (USAREUR)/Deputy Commanding General U.S. Army NATO.

His decorations include the Distinguished Service Medal (two Oak Leaf Clusters), the Defense Superior Service Medal, Legion of Merit, Bronze Star Medal (Oak Leaf Cluster), Defense Meritorious Service Medal, Meritorious Service Medal (Oak Leaf Cluster), Joint Service Commendation Medal, Army Commendation Medal (three Oak Leaf Clusters) and the Army Achievement Medal. He has earned the Combat Infantryman Badge, Expert Infantryman Badge, Parachutist Badge, Air Assault Badge, Joint Chiefs of Staff Identification Badge, and the Army Staff Identification Badge.

General Brown holds a Bachelor of Science from the United States Military Academy, a Master of Education from the University of Virginia, and a Master of Science in National Security and Strategic Studies (Distinguished Graduate) from National Defense University.

Colonel (U.S. Army) Stephen Browne

Army War College Fellow, Texas A&M University

A native of Colorado, Colonel Stephen Browne received a commission as a 2nd Lieutenant in the Infantry upon graduation from Brigham Young University in April, 1997. After attending the Infantry Officer Basic Course and Ranger Course at Fort Benning, Georgia, he served as Rifle Platoon Leader in 3rd Battalion, 327th Infantry Regiment, later Company Executive Officer, and Operations Officer, Long Range Surveillance Detachment (LRSD), 101st Airborne Division (Air Assault), at Fort Campbell, Kentucky.

Upon completion of the Military Intelligence Transition and Captains Career Course at Ft. Huachuca, Arizona in 2002, Colonel Browne he served in the 1st Cavalry Division as the Battalion Intelligence Officer for 3rd Battalion, 8th U.S. Cavalry at Fort Hood, Texas. Upon deploying to Iraq in support of Operation Iraqi Freedom, Colonel Browne served as Brigade Intelligence Officer, 4th Brigade and commanded Headquarters and Headquarters Company, 312th Military Intelligence Battalion. Upon redeployment, he later commanded the Headquarters and Service Company, 1st Cavalry Division.

Following command in 2006, Colonel Browne attended the Post Graduate Intelligence Program (PGIP) earning a Master's Degree in Strategic Intelligence from the National Intelligence University, Washington D.C. Upon completion of graduate school, Colonel Browne served as the Military Intelligence Branch Senior Major's Assignment Officer at the Human Resources Command in Alexandria, VA from 2007-2010. Upon completion of this assignment, Colonel Browne was selected for branch transfer to the Foreign Area Officer (FAO) Corps and assigned as a Northeast Asia FAO.

In 2010, Colonel Browne moved to Sendai, Japan where he completed FAO In-Region Training (IRT). As a result of the Great East Japan Earthquake (GEJE) and Tsunami disaster In March of 2011, Colonel Browne, together with the Japanese Self-Defense (JSDF) established the first ever Bilateral Coordination Action Team (BCAT) in Sendai, Japan in support of Joint Task Force-

Tohuku (JTF-TH). He served as the liaison between the JSDF, JTF-TH and U.S. Forces in coordinating and planning disaster recovery and reconstruction operations as part of Operation TOMODACHI. Following this operation, Colonel Browne then served as the U.S. Army Japan (USARJ) liaison officer to the Japan Ground Self-Defense Force (JGSDF) Northeastern Army in Sendai, Japan until 2014.

In 2014, Colonel Browne moved to Tokyo, Japan and served as the Director for Policy and Plans, Mutual Defense Assistance Office (MDAO), U.S. Embassy, Japan where he coordinated foreign military sales (FMS) programs, U.S.-Japan S&T cooperative R&D projects, and helped the Japan Ministry of Defense work with INDOPACOM in joint security cooperation efforts in Southeast Asia. In June 2017, Colonel Browne moved to Ft. Knox, Kentucky where he served as the FAO Branch Chief at the Human Resources Command managing the assignments and professional development of all FAOs worldwide.

In June 2019, Colonel Browne moved to College Station, Texas to attend Texas A&M University in the Bush School of Government as an Army War College Fellow where he will study International Affairs with an emphasis on East Asia.

Major General (U.S. Army) Gary Brito

Commanding General, U.S. Army Maneuver Center of Excellence

Major General Gary Brito, a native of Hyannis, Massachusetts, was commissioned an Infantry Officer through Penn State University and entered active duty in March 1987.

He most recently served as the Commanding General, Joint Readiness Training Center (JRTC) and Fort Polk. Previous assignments include Deputy Commanding General for Sustainment, then later Operations, 25th Infantry Division; Director, Force 2025 and Beyond, US Army Capabilities and Integration Center (ARCIC), Training and Doctrine and Command (TRADOC); and Operations Officer (G3) for III Corps, Fort Hood, Texas. In that capacity, he deployed and served as the Deputy Director, Afghanistan National Security Forces (ANSF) Development, International Security Assistance Force (ISAF) Joint Command in Kabul, Afghanistan. Throughout his career, MG Brito has served in a variety of command and staff assignments to include Commander, 120th Infantry Brigade, First Army; Commander, 1st Battalion, 15th Infantry Regiment, 3d Brigade, 3d Infantry Division; Operations Officer (S3), 2d Battalion, 8th Infantry Regiment; and later as the Brigade Operations Officer (S3), 2d Brigade, 4th Infantry Division. Additionally, he served as the Aide-de-Camp to the III Corps Commanding General, Fort Hood, Texas; and Chief, Commander's Planning Group (CPG) and interim Executive Officer to the Commanding General, TRADOC. Major General Brito has twice served at the National Training Center, Fort Irwin, California: first as a Company/Team and Battle Staff Observer/Controller and later as a Senior Battalion and Brigade Combat Team Trainer. He served in multiple company grade positions at Fort Benning, Georgia, and has deployed to both Iraq and Afghanistan.

MG Brito is a graduate of the Infantry Officer Basic and Advanced courses, Airborne and Ranger Schools, Combined Arms Staff Services School, Command and General Staff Officers Course, and Senior Service College at the Joint Advanced Warfighting School (JAWS), Norfolk, Virginia. He holds a Bachelor of Science degree in Community Studies from Penn State University, a Master's degree in Human Resource Management from Troy State University, and a second Master's degree in Joint Strategy and Campaign Planning from the Joint Advanced Warfighting School. He is also a graduate of the MIT Seminar XXI Program.

Major General Brito is married to the former Michelle Harper of Washington, DC. They have two sons, Matthew and Patrick.

Lieutenant General (Republic of Korea Army, ret.) In-Bum Chun

LTG(R) Chun was commissioned an infantry officer in 1981. Early service included assignments to the ROK/US Combined Forces Command (CFC) as contingency plans officer, assistant chief-of-staff, C-5, and as the ROK aide to the deputy CINC, CFC. Upon completion of regimental command, He was later assigned as the Chief of the Election Support Branch, Civil Military Affairs/Strategic Operations Directorate at the Multi National Forces (MNF) in Iraq for which he was recognized by both the Republic of Korea and the United States for his contribution to the first "Fair and Free" elections in Iraq with the Hwa-Rang Combat medal and US Bronze Star medal.

LTG(R) Chun's later assignments include command of the 27th Infantry Division; Assistant Chief of Staff, Operations for the ROK/US Combined Forces Command; and Assistant Chief of Staff, Operations, Ground Component Command. He became the Deputy Chief of Staff for Combined Forces Command and the senior member of the United Nations Military Armistice Commission in 2013. He was promoted to lieutenant general and assigned as commander ROK Special Warfare Command later that year. LTG Chun served as deputy commander, First ROK Army before retiring from active duty on 31 July 2016.

LTG(R) Chun has subsequently held concurrent fellowships with Brookings Institute and School of Advanced International Studies (SAIS), Johns Hopkins University. He was also a Distinguished Visiting Fellow with Georgia Tech at the Sam Nunn School of International Affairs. He is now Vice President for the Korea Freedom Federation.

LTG (R) Chun is married to Dr. Shim Hwa-Jin, former President of Sung-Shin Women's University. They have two sons – Min-Gyu and Min-Woo – and five dogs.

Major Caleb Dexter

U.S. Army Asymmetric Warfare Group

Caleb enlisted in the US Army Reserve following the 9/11 attacks and earned his commission from Federal Officer Candidate School in the spring of 2003.

Since graduating from the Military Intelligence Officers' Basic Course, he has served on active duty at the Defense Intelligence Agency's Joint Intelligence Task Force Combating Terrorism and Supply Chain Risk Management Threat Analysis Center, as well as in Iraq as a battalion S-2 and now as the operations officer for the Asymmetric Warfare Group's Dense Urban Terrain Detachment.

In his civilian career, he has worked as an English teacher in Japan, a reporter at the Nihon Keizai Shimbun ("Nikkei") covering United Nations headquarters in New York City, a bond rater and risk manager on Wall Street, and is currently on a leave of absence from his position as a researcher at Cornell University.

He earned his BA from Cornell and MBA from the Yale School of Management.

Peter Ford

Director, Northeast Region, Corporate Risk Services

Mr. Ford, a 32-year veteran of the U.S. Department of State Diplomatic Security Service, has served as the Regional Security Officer (RSO) at U.S. embassies in Armenia, Switzerland and Mauritania. His other overseas assignments have been Deputy RSO at the U.S. Embassy in Honduras and Lebanon. In Iraq, Mr. Ford was the Director of the Office of Hostage Affairs, U.S. Embassy Baghdad.

Mr. Ford served as the U.S. Olympic Security Coordinator for the Rio de Janeiro Olympic Games, working with local, state and federal police. Prior to the games, Mr. Ford worked with top Brazilian Olympic security officials to review security procedures at high-profile events such as the NBA All-Star Game and PGA Tour Championship. Throughout the Olympics, Mr. Ford coordinated the deployment of more than 200 U.S. federal law enforcement officers from multiple agencies.

Mr. Ford has held a variety of domestic positions, including two tours as the Director and Deputy Director of the Overseas Security Advisory Council (OSAC) and two tours in the Protective Liaison Division, responsible for the protection of foreign embassies in the United States. In addition, Mr. Ford was the Diplomatic Security Service's representative to the House Foreign Affairs Committee and the House Homeland Security Committee.

Mr. Ford is a retired Lieutenant Colonel in the U.S. Army Reserve, while also serving a multitude of roles, including Commander of the Capitol Hill Joint Reserve Unit.

Captain Jesse Geyer

U.S. Army Asymmetric Warfare Group

Captain Jesse Geyer commissioned from North Georgia College and State University as a Second Lieutenant into the US Army in 2008 as a Chemical Officer.

CPT Geyer currently serves as an Integration Officer with the U.S. Army's Asymmetric Warfare Group (AWG), and he is currently working on the Dense Urban Terrain Team in AWG's Concepts Integration Squadron, commonly known as Dog Squadron.

CPT Geyer's previous assignments include 1st Squadron, 4th Cavalry Regiment, 1st Infantry Division, where he deployed to Tal Afar, Iraq during Operation Iraqi Freedom 09-11; 3rd Brigade Combat Team, 82nd Airborne Division; and 14th Chemical Reconnaissance Detachment, 3rd Special Forces Group (Airborne).

CPT Geyer earned his BA in Religion and Philosophy from Barton College where he also studied Biology. His other fields of study include Political Science.

Dr. Russell W. Glenn

Director, Plans & Policy G-2, U.S. Army TRADOC

Dr. Russell W. Glenn is a graduate of the United States Military Academy. He was commissioned in the United States Army as a Corps of Engineers officer and initially served with the 1_{st} Infantry Division. Subsequent assignments included duties as operations officer for the 2_{nd} Engineer Group in the Republic of Korea, assistant professor of mathematics at West Point, and a three-year tour with the 3_{rd} Armored Division headquartered in Frankfurt, Germany. His time with the division included a combat tour in Iraq during Operations Desert Shield and Desert Storm. Then Major Glenn thereafter served as an exchange officer with the British Army's Royal School of Military Engineering followed by a year as the senior army fellow at the RAND Corporation and three years with the School of Advanced Military Studies (SAMS), concluding a 22-year military career as one of the initial four authors of the army's primary war fighting doctrine. Dr. Glenn was a senior defense analyst with RAND from 1997 to early 2009 at which time he joined A-T Solutions as a senior analyst. He last served as an associate professor with the Strategic and Defence Studies Centre at The Australian National University in Canberra. Current responsibilities see him in the role of Director, Plans and Policy for the G-2, US Army Training and Doctrine Command.

Past research includes published studies on counterinsurgency, urban operations, military and police training, and intelligence operations. Dr. Glenn has a Bachelor of Science degree from the United States Military Academy and master's degrees from the University of Southern California (MS, Systems Management), Stanford University (MS, Civil Engineering and MS, Operations Research), and the School of Advanced Military Studies (Master of Military Art and Science). He earned his PhD in American history from the University of Kansas with secondary fields of military history and political science. Military education includes airborne, Ranger, and pathfinder qualifications. Dr. Glenn has appeared as a subject matter expert on *CNN Reports, MSNBC, National Public Radio,* and *The History Channel* in addition to being cited in *The Economist, Jane's Defence Weekly, The Los Angeles Times, Scientific American, The Wall Street Journal,* and Associated Press syndicated articles. He is the author of over fifty books or book length reports in addition to many articles. His most recent book is *Rethinking Western Approaches to Counterinsurgency: Lessons from Post-colonial Conflict* (Routledge). He is an author-editor of a forthcoming volume sponsored by the Association of the United States Army entitled *Trust and Leadership: The Australian Army Approach to Mission Command.*

Lise Grande

United Nations Resident and Humanitarian Coordinator; Yemen

Lise Grande has served with the United Nations since 1994, most recently as the Resident and Humanitarian Coordinator and UNDP Resident Representative for Yemen. Prior to this, she was the Deputy Special Representative of the Secretary-General and UN Resident and Humanitarian Coordinator for Iraq. Lise has also served in Armenia, Angola, Democratic Republic of Congo, East Timor, Haiti, India, Occupied Palestine, South Sudan, Sudan and Tajikistan, and has been involved in some of the United Nations' largest humanitarian and emergency operations as well as peace-keeping missions.

Charles (Sid) Heal

Commander (Los Angeles County Sheriff's Department, retired)

Charles "Sid" Heal retired as a commander from the Los Angeles Sheriff's Department in 2008 after nearly 33 years of service, more than half of which was spent in units charged with handling law enforcement special and emergency operations. In addition, he retired from the Marine Corps Reserve after 35 years and four tours of combat. He is the author of *Sound Doctrine and Field Command* as well as more than 190 articles on law enforcement subjects. He holds a bachelor's degree in police science from California State University, Los Angeles; a master's degree in public administration from the University of Southern California

and a master's degree in management from California Polytechnic University, Pomona. He is also a graduate of the FBI's National Academy and the California Command College and has taught at the U.S. war colleges for more than twenty years. He has been personally present or involved in major incidents such as the 1992 Los Angeles riots, 1994 Northridge earthquake, 1994 World Cup soccer finals, 1995 Oklahoma City bombing, 2001 attacks on the World Trade Center and Pentagon as well as the security of events with national and worldwide impact, to include the most watched non-sporting event in the world, the Annual Tournament of Roses Parade.

LTG (JGSDF, ret) Shigeru Kobayashi

Director General for Crisis Management, Tokyo Metropolitan Government

MAR. 1984 1st Field Artillery Regiment (Kitafuji)

MAR. 1990 Field Artillery Department, Fuji School (Fuji)

AUG. 1993 Personnel Assignment Division, Personnel Department, GSO (Hinokicho)

AUG. 1995 Research Division, Defense Plans and Operations Department, GSO (Hinokicho)

MAR. 1996 Aide-de-Camp to Director General of Defense Agency (Hinokicho)

MAR. 1998 Commander, 2nd Battalion, 5th Field Artillery Regiment (Obihiro)

AUG. 1999 Defense Planning Division, Defense Plans and Operations Department, GSO (Hinokicho)

AUG. 2002 1st R&D Division, JGSDF Ground Research and Development Command (Asaka)

JUL. 2003 Operations Division, Defense Plans and Operations Department, GSO (Ichigaya)

JUL. 2005 Commander, 9th Field Artillery Regiment (Iwate)

MAR. 2007 Chief, Personal Planning Division, Personnel Department, GSO (Ichigaya)

MAR. 2009 Director, Field Artillery Department. Fuji School (Fuji)

JUL. 2010 Director, Operations Support and Intelligence Department, GSO (Ichigaya)

JUL. 2012 Commanding General, 15th Brigade, Western Army (Naha)

AUG. 2014 Commanding General, 3rd Division, Middle Army (Senzo)

AUG. 2015 Vice President, National Defense Academy

JUL. 2016 Commanding General, Central Readiness Force (Zama)

MAR. 2018 Commanding General, Ground Component Command (Asaka)

AUG. 2018 Retirement

Director General for Crisis Management, Tokyo Metropolitan Government

Brigadier Ian Langford, DSC and Bars
Australian Army

Brigadier Langford joined the Australian Army in 1992 and has held a range of command and staff appointments in the army and Special Forces during his career. Brigadier Langford has served as the Commanding Officer, 2nd Commando Regiment and has commanded multiple Special Operations Task Groups in Afghanistan, Iraq, in addition to assuming domestic counter-terrorism duties. He has served in Australia's Joint Operations Command, Special Operations Headquarters, and as the plans officer in Army's Forces Command headquarters. Recently, Brigadier Langford led the Chief of Army's Initiative Group and assumed the role Director-General of Future Land Warfare, Army Headquarters, in December 2018.

Brigadier Langford's operational service includes multiple deployments to Timor Leste and Afghanistan and single deployments to Bougainville, Solomon Islands, Iraq, Israel, Lebanon, Syria, and the South-West Pacific. For his service, Brigadier Langford has been awarded several Australian commendations and the Distinguished Service Cross on three occasions.

Brigadier Langford is a distinguished graduate of the United States Marine Corps Command and Staff College and the School of Advanced Warfighting. He holds a bachelor's degree in management, a Master of Arts, a Master of Defence Studies, and a Master of Strategic Studies. He has been published in multiple service journals and as an independent author and is currently undertaking PhD studies.

Captain Jheaniell Moncrieffe
U.S. Army Asymmetric Warfare Group

Captain Jheaniell Moncrieffe enlisted in the U.S. Army as a 51T, Technical Engineer in 2001. In 2011, she commissioned through the University of Hawaii's Green to Gold program as an engineer officer.

CPT Moncrieffe currently serves an integration officer with the Asymmetric Warfare Group in Fort Meade, Maryland. As a part of the Dense Urban Terrain (DUT) Team, she is involved with the U.S. Army Corps of Engineers (USACE) planning effort to build a DUT training complex at the National Training Center (NTC) in California.

CPT Moncrieffe's previous assignments include the 29th, 15th, 65th, and 84th Engineer Battalions and the United Nations Command Military Armistice Commission (UNC-MAC) in Panmunjom, S. Korea. She deployed in support of Operation Iraqi Freedom 05-06.

CPT Moncrieffe holds a Bachelor's Degree in Diplomacy and Military

Tetsu Okumura, MD, PhD

Administration Officer and Medical Director of the Japan Poison Information Centre

Dr. Okumura was born in Fukuoka (1963) and graduated from the faculty of medicine at Juntendo University. After completing his postgraduate internship through the Hawaii University Postgraduate Program at Okinawa Prefectural Central Hospital (1988-89), he joined the emergency departments of Kawasaki Medical School (1990-91) and St. Luke's International Hospital in Tokyo (1993-96). At the time of the Tokyo subway sarin attack in 1995, he examined numerous sarin victims at St. Luke's International Hospital and subsequently began research in the specialized field of special anti-disaster measures, crisis control, and clinical toxicology. With these careers he became one of the authorities in the field of the medical countermeasures against chemical weapon agents and counterterrorism in Japan. He became a professor in the Department of Crisis Management Medicine on CBRNE Threats at Saga University in January in 2007. In 2009, he came to the office of Assistant Chief Cabinet Secretary for National Security and Crisis Management, Cabinet Secretariat, Government of Japan. He was engaged in the governmental arrangement of t medical transportation in Fukushima at the time of the East Japan Great Earthquake.

GEN (JGSDF, ret) Ryoichi Oriki

Former Chief of Staff, Japan Self-Defense Force Joint Staff

Education: National Defense Academy (March 1972)

Military Education: The National Institute for Defense Studies (August 1990)

Professional Career:

March 1972 Joined Japan Ground Self-Defense Force

July 1996 Head, Assignment Division, Ground Staff Office

January 2001 Director of Logistics Department, GSO

March 2003 Commanding General, 9th Division

August 2004 Vice Chief of Staff, Ground Self Defense Force

July 2005 Commanding General, Middle Army

March 2007 Chief of Staff, Ground Self Defense Force

March 2009 Chief of Staff, Joint Staff

January 2012 Retired from Japan Ground Self-Defense Force

June 2012 Special Advisor to Minister of Defense Morimoto

August 2012 Joined Fujitsu LTD as a senior adviser

April 2013 Special Advisor to Minister of Defense Onodera

July 2016 Special Advisor, National Security Agency

June 2018 Board member, Committee on National Space Policy of Cabinet Office

LTG (JGSDF) Kazuaki Sumida
Commanding General, Ground Component Command

March 1985 Antiaircraft Training Unit (Shimoshizu)

August 1991 Student, Command and General Staff Course, JGSDF Staff College (Meguro)

August 1993 Instructor, Antiaircraft Artillery School (Shimoshizu)

March 1995 Policy & Programs Division, Policy & Programs Department,
Ground Staff Office (Hinokimachi)

March 2001 Commander, 8th Antiaircraft Battalion (Kita-Kumamoto)

August 2002 Policy & Programs Division, Policy & Programs Department,
Ground Staff Office (Ichigaya)

August 2003 General Course, National Institute for Defense Studies (Meguro)

August 2004 Policy & Programs Division, Policy & Programs Department,
Ground Staff Office (Ichigaya)

December 2006 Commander, 8th Antiaircraft Group (Aonogahara)

March 2008 Chief, Policy & Programs Division, Policy & Programs Department,
Ground Staff Office (Ichigaya)

March 2010 Commanding General, 1st Antiaircraft Artillery Brigade

(Higashi-chitose)

March 2011 Deputy Chief of Staff, Middle Army (Itami)

August 2013 Director, Policy & Programs Department, Ground Staff Office (Ichigaya)

August 2015 Commanding General, 2nd Division (Asahikawa)

July 2016 Vice Chief of Staff, Joint Staff (Ichigaya)

August 2017 Commanding General, Eastern Army (Asaka)

August 2018 Present Assignment

Lieutenant General (JGSDF) Ryoji Takemoto
Commanding General, 1st Division

Education:

National Defense Academy

Doctor's Course, Tsukuba University

Advanced Officer Course - Artillery

Tactical Administrator Course, GSDF Staff College

Joint Advanced Course, Joint Staff Collage

Special Course of National Institute of Defense Studies

Military Career:

Mar 1987 Officer Candidate School (Camp Maegawara, Fukuoka)

Oct 1987 8th Artillery Regiment (Camp Kitakumamoto, Kumamoto)

Mar 1990 Doctor's Course, Tsukuba University

Mar 1995 Equipment Test & Evaluation Unit (Camp Fuji, Shizuoka)

Mar 1997 Ground Self Defense Force Staff College (Student) (Camp Meguro, Tokyo)

Mar 1998 Assistant to Assistant Director General,

Technical Research and Development Institute (Camp Misyuku, Tokyo)

Mar 2000 Assignment Division, Personnel Department, GSO (Camp Ichigaya, Tokyo)

Aug 2001 Commander, 112th Artillery Battalion (Camp Yufuin, Oita)

Aug 2003 Education Division, Education & Training Dept., GSO (Camp Ichigaya, Tokyo)

Aug 2005 Joint Staff Collage (Student) (Camp Meguro, Tokyo)

Aug 2006 Assignment Division, Personnel Department, GSO (Camp Ichigaya, Tokyo)

Aug 2007 Chief, 1_{st} Personnel Sec., Assignment Div., Personnel Dept., GSO
(Camp Ichigaya, Tokyo)

Aug 2009 Commander, 9_{th} Artillery Regiment (Camp Iwate, Iwate)

July 2010 Chief, 2_{nd} Operation Div., Operations Dept., Joint Staff (Camp Ichigaya, Tokyo)

July 2012 Deputy Chief of Staff (Operations), Eastern Army HQs. (Camp Asaka, Tokyo)

Aug 2014 Chief, Tokyo Provincial Cooperation Office (Camp Ichigaya, Tokyo)

Aug 2015 Chief, Artillery Division, GSDF Fuji School (Camp Fuji, Shizuoka)

July 2016 Chief, Personnel Department, GSO (Camp Ichigaya, Tokyo)

Mar 2017 Chief, Personnel & Education Dept., GSO (Camp Ichigaya, Tokyo)

Aug 2017 Commanding General, 11_{th} Brigade (Camp Makomanai, Hokkaido)

Aug 2018 Present Assignment (Camp Nerima, Tokyo)

Lieutenant General (JGSDF, ret) Noboru Yamaguchi
Japan Ground Self-Defense Force

LTG YAMAGUCHI (Ret.) is now a Professor at the International University of Japan and Advisor to the Sasakawa Peace Foundation. He graduated from the National Defense Academy of Japan (NDAJ) in 1974. He received his MA from the Fletcher School of Law and Diplomacy, Tufts University in 1988, and was a National Security Fellow at John M. Olin Institute for Strategic Studies, Harvard University in 1991-1992. After serving as Senior Defense Attaché at the Japanese Embassy in the United States (1999-2001), he held positions as Deputy Commandant of the GSDF Aviation School (2001-2002), Director for Research of the Ground Research and Development Command (GRDC, 2002-2005), and Vice President of the National Institute for Defense Studies (2005-2006). Since 2006 he held responsibilities as Commanding General of the GSDF Research and Development Command until he retired from active duty in December 2008. From 2009 to 2015 he taught at the NDAJ. After the Great East Japan Earthquake in March 2011, he served at the Prime Minister's Office as Special Advisor to the Cabinet for Crisis Management until September. In 2017, he was appointed by the Foreign Minister as a member of the Group of Eminent Persons for Substantive Advancement of Nuclear Disarmament.

Appendix C: Select Definitions

megacity - An urban area of extraordinary population size, geographic spread, physical and social complexity, and similarly exceptional characteristics, to include influence with at least national and broader regional scope.[68]

Multi-Domain Operations - Operations conducted across multiple domains and contested spaces to overcome an adversary's (or enemy's) strengths by presenting them with several operational and/or tactical dilemmas through the combined application of calibrated force posture; employment of multi-domain formations; and convergence of capabilities across domains, environments, and functions in time and spaces to achieve operational and tactical objectives. (TRADOC Pamphlet 525-3-1)

operation - 1. A sequence of tactical actions with a common purpose or unifying theme. (JP 1) 2. A military action or the carrying out of a strategic, operational, tactical, service, training, or administrative military mission. (JP 3-0).

operational environment - A composite of the conditions, circumstances, and influences that affect the employment of capabilities and bear on the decisions of the commander. Also called OE. (JP 3-0).

operational level of warfare - The level of warfare at which campaigns and major operations are planned, conducted, and sustained to achieve strategic objectives within theaters or other operational areas. (JP 3-0).

strategic level of warfare - The level of warfare at which a nation, often as a member of a group of nations, determines national or multinational (alliance or coalition) strategic security objectives and guidance, then develops and uses national resources to achieve those objectives. (JP 3-0).

strategy - A prudent idea or set of ideas for employing the instruments of national power in a synchronized and integrated fashion to achieve theater, national, and/or multinational objectives. (JP 3-0).

tactical level of warfare - The level of warfare at which battles and engagements are planned and executed to achieve military objectives assigned to tactical units or task forces. (JP 3-0).

Urban area - A continuously built upland mass of urban development. [It] is best thought of as the "urban footprint" – the lighted area that can be observed from an airplane (or satellite) on a clear night.[69]

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[68] Russell W. Glenn, "Ten Million is Not Enough: Coming to Grips with Megacities' Challenges and Opportunities," *Small Wars Journal* (January 25, 2017), http://smallwarsjournal.com/jrnl/art/ten-million-is-not-enough-coming-to-grips-with-megacities%E2%80%99-challenges-and-opportunities (accessed January 18, 2018).
[69] "Demographia World Urban Areas," 12th annual edition, April 2016, accessed February 21, 2017, http://www.demographia.com/db-worldua.pdf (accessed August 29, 2019).

Appendix D: Summary of Observations in PMESII-PT Format

Political observation 1: Actual disaster responses provide excellent training opportunities. However, exercise caution if members of the public will be included.

Military observation 1: There will always be a threat seeking to take advantage of disaster.

Military observation 2: HADR is the realm of nontraditional military missions. Organizational adaptability and flexibility in exercising command and control will be essential.

Economic observation 1: HADR preparation is a system funded without recognition of that fact.

Social observation 1: "The first report is always wrong" is as true during HADR contingencies as wartime operations.

Social observation 2: Mechanisms for sharing information and coordination must be established, published, and practiced before a disaster.

Social observation 3: The same social problems found in an urban area on a daily basis will be found in displaced persons facilities.

Social observation 4: HADR responders must recognize that megacity populations – even those in the most ethnically homogeneous of countries – will include both permanent residents and visitors who are ethnically diverse and speak a broad range of languages. This will complicate relief operation collaboration.

Social observation 5: Always keep in mind the need to maintain the public trust both in the immediate and more distant futures.

Social observation 6: As world populations age, knowing the locations of the infirm and the nature of elderly and others' medical and other support needs will become increasingly important.

Social observation 7: Urban residents and visitors should be advised of how to prepare for and react to a disaster prior to an event.

Social observation 8: Community members will be key to disaster recovery. Pre-event education and policies for coordinating their emergency response efforts will enhance the effectiveness of participation.

Social observation 9: Understanding coalition member organizational cultures and those of the population receiving HADR is fundamental to success.

Social observation 10: Megacity residents should not be overlooked as sources of information.

Information observation 1: Data analysis conducted prior to a disaster will pay dividends during HADR.

Information observation 2: Communications during HADR are arguably responders' most important capability. They will also be among the most fragile.

Information observation 3: The information and perspectives representatives from various organizations can offer are undervalued benefits of a comprehensive approach to operations (one that brings all relevant parties together during HADR).

Information observation 4: Communications technologies are part of a system.

Information observation 5: Information's primary purpose is sometimes…to inform.

Information observation 6: Ninety-nine percent of a population in a city of 25 million willing to support a coalition means 250,000 are not willing to do so.

Information observation 7: Seek to stay "left of bang" (ahead of a problem) by establishing a reputation for providing the population correct information and doing so regularly both before an adversary sends misinformation and thereafter.

Information observation 8: Previous and future HADR operations in megacities are (and will be) sources of lessons learned. As artificial intelligence matures, government authorities should employ it to capture and analyze evacuation patterns, record damage to utilities, and otherwise support improved planning and response during future events.

Information observation 9: Creating a multinational security infrastructure will be key during major world events in megacities.

Information observation 10: Pre-event data collection and analysis programs underpin effective local response in the aftermath of a catastrophe.

Infrastructure observation 1: Infrastructure is more than physical subsystems alone.

Infrastructure observation 2: Command and control infrastructure is exceedingly complex during megacity HADR.

Infrastructure observation 3: There is a need to review laws, policies, and regulations to ensure they support rather than hinder effective HADR response.

Infrastructure observation 4: The rate of megacity infrastructure expansion makes it difficult to maintain awareness of changes, particularly regarding subterranean features.

Physical environment observation 1: Conceiving of the urban environment in terms of density, flow, and tempo helps understanding of megacity environments.

Physical environment observation 2: Plans should include designation of less exposed locations as alternate headquarters, supply distribution points, and other key nodes.

Time observation 1: Community members are first first responders.

Time observation 2: External assistance will likely provide little value-added to search and rescue efforts.

Time observation 3: Policies dictating emergency medical technician (EMT) and other first responder permissions require reevaluation.

Appendix E: Summary of Recommendations in DOTMLPF-P Format

Doctrine recommendation 1: Clarify roles and responsibilities for organizations managing and supporting HADR. Include community members in this clarification.

Doctrine recommendation 2: Multi-Domain Operations (or its conceptual kin such as Cross-Domain Operations and Accelerated Warfare) and mission command both have much to offer during HADR. Capture lessons and train to capitalize on these benefits.

Doctrine recommendation 3: Develop guidance and procedures to promote effective unity of effort, unity of message, and intelligence sharing.

Doctrine recommendation 4: Create megacity HADR response plans – both generic and specific to high-risk urban areas – from which actions can be adapted during operations.

Doctrine recommendation 5: Use plans and exercises to identify initial HADR missions and commanders' intents, thus accounting for communications failures in the immediate aftermath of a disaster.

Doctrine recommendation 6: Create doctrine to support comprehensive approach operations involving joint, multinational, whole-of-government, and other-than-government civilian organizations.

Doctrine recommendation 8: Seize on exercises and planning sessions to identify mutually acceptable ways of dealing with military and other organizations' various coordination styles, decision-making processes, and additional cultural characteristics that could impede effective HADR response.

Doctrine recommendation 9: Maintain a systems perspective throughout all components of megacity functions.

Organization recommendation 1: Make future Bilateral Coordination Action Teams (BCAT) joint.

Organization recommendation 2: When possible, put one organization in overall charge of megacity operations.

Organization recommendation 3: Train and rehearse for HADR headquarters and other movements just as is done during combat exercises.

Organization recommendation 3: Determine information and intelligence sharing procedures prior to actual HADR operations.

Organization recommendation 4: Form a partnership of megacities to exchange existing policies and lessons learned from disasters.

Organization recommendation 5: Consider assigning liaison teams to select urban areas of notable security importance or those likely to require HADR assistance due to their vulnerability.

Organization recommendation 6: Develop doctrine and relationships to achieve more than mere cooperation or coordination.

Organization recommendation 7: Compile and maintain lists of HADR-relevant experts with contact information.

Training recommendation 1: Develop adaptable, less confrontational ways of achieving "red teaming" objectives that are culturally acceptable yet effective when dealing with representatives of other nationalities or organization types (to include those from NGOs, IGOs, faith-based organizations, and industry).

Training recommendation 2: Integrate multiple non-traditional partners when both planning for and conducting exercises.

Training recommendation 3: Improve virtual and constructive megacity training capabilities at all three levels of operation.

Training recommendation 4: Train for competition and return to competition missions – to include megacity HADR – just as is done for armed conflict operations.

Materiel recommendation 1: Ensure key technologies will function in urban areas. Given the exceptional environmental conditions these environments pose, be prepared to revert to low-tech/no-tech alternatives.

Materiel recommendation 2: Do not rely on single technologies during urban operations.

Materiel recommendation 3: Develop laws, regulations, and policies for leveraging current and emerging technologies for use during urban operations now.

Materiel recommendation 4: Develop means of communicating three-dimensional coordinates to all HADR partners.

Materiel recommendation 5: Identify and address solutions to potential difficulties with prospective HADR partners before emergency situations.

Materiel recommendation 6: Develop communications systems, databases, software, and other capabilities able to address both operational security and need-to-share requirements.

Leadership and education recommendation 1: Find the experts to lead or support megacity HADR operations rather than defaulting to the individual on duty or the leader of the unit prioritized for immediate deployment.

Leadership and education recommendation 2: Analyze the HADR megacity implications for mission command of MDO, Cross-Domain Operations (Japan Self-Defense Force), Accelerated Warfare (Australian Army), and other partner emerging operational concepts and the concepts themselves.

Leadership and education recommendation 3: Design coalition exercises to address both the specific topic at hand and team building more generally.

Leadership and education recommendation 4: Recognize that megacity HADR leadership can demand talents different from those that got a military officer or other authority promoted.

Leadership and education recommendation 5: Encourage coalition membership to all relevant parties, even those habitually unwilling to associate themselves with the military.

Leadership and education recommendation 6: Consider assigning experienced leaders from non-traditional sources to critical security positions.

Personnel recommendation 1: Designate alternate locations where emergency responders should report if their primary place of work is unreachable.

Facilities recommendation 1: Incorporate women's perspectives in the design and running of shelters, displaced person or refugee camps, and similar facilities.

Facilities recommendation 2: Plan and provide for transportation to disaster facilities. Include the capability to transport those with mobility issues and pets.

Facilities recommendation 3: Maintain 24-hour law enforcement presence at disaster facilities.

Facilities recommendation 4: Keep disaster facility residents informed.

Policy recommendation 1: Review past HADR operations in urban areas and monitor similar future operations to identify regulations, policies, and laws in need of adaptation.

Policy recommendation 2: Consider creating the equivalent of Tokyo's disaster preparedness maps and seek consistency in portraying information on maps and during public and private reporting.

Policy recommendation 3: Recognize that misuse of disaster relief resources can outweigh the benefits of their provision, requiring suspension of some aspects of HADR.

Policy recommendation 4: Incorporate community representatives in pre-disaster planning and preparations.

Policy recommendation 5: Identify key megacity terrain prior to a disaster.

Policy recommendation 6: Consider insights from other-than-military operations when developing urban operations guidance.

Policy recommendation 7: Prioritize and assign post-disaster support of specific infirm and mobility-impaired residents to emergency providers or community volunteers.

Policy recommendation 8: Locate key physical infrastructure where it is not likely to fail during a disaster.

Appendix F: Joint Doctrine Note 1-16 (Red Teaming)[70]

Joint Doctrine Note 1-16 on Red Teaming provides these multinational red teaming considerations:

- **Multinational operations may have multinational red teams**. Some of the organizations that employ red teams may have multinational components, either as an integrated or parallel command structure, or in the form of national liaison officers. In some of these cases, the US commander may assign members of the foreign forces to serve on the US red team or to regularly collaborate with it. Such red team interactions with foreign officers have many advantages, but like all interactions with foreign officers, they can also pose unique cultural issues and potential security challenges.

- **Foreign officers can improve the red team's cultural perspectives.** Foreign officers, whether assigned to the team or informally collaborating with it, can help the red team understand the informational and cultural aspects of the OE. In addition, they can be especially useful when developing alternative views of the OE or situation. The red team, nevertheless, should be aware that some foreign officers, however well-intentioned, may have their own unconscious biases and hidden agendas, and their inputs should be used judiciously.

- **Foreign officers may have foreign agendas.** Foreign officers are subject to their own national chains of command. Input they provide to the red team may need to be preapproved by their leadership. Their participation may also be contingent on their leaders having the option to approve any resultant red team final product. The red team should be aware that foreign officers may use their membership on the team to advance foreign policy priorities.

- **Disclosure and releasability may be a concern.** Releasability and disclosure are major considerations, and these may vary depending on whether the foreign representatives are exchange officers, who typically sign nondisclosure agreements, or liaison officers, who usually do not. Red team interactions with foreign officers and distribution of red team products must conform to existing intelligence sharing agreements and disclosure authorities. Since red teams often address multiple issues simultaneously, care must be exercised to ensure foreign participation in red team deliberations is strictly confined to approved subjects. In general, security issues may be less of a concern when operating as part of a long-standing alliance, such as the North Atlantic Treaty Organization, or when the conditions of a multinational operation, and subsequent red team deliberations, are limited to narrowly defined missions.

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[70] *Command Red Team*, Joint Doctrine Note 1-16, Washington, D.C.: Joint Chiefs of Staff, May 16, 2016, III-10 to III-11. The complete document can be downloaded at https://www.hsdl.org/?view&did=793582 (accessed August 28, 2019). The red teaming literature is plentiful. Among the valuable additional offerings are Appendix K (Red Teams) in *Joint Planning*, Joint Publication 5-0, Washington, D.C.: Joint Chiefs of Staff, June 16, 2017; and "Defense Science Board Task Force on The Role and Status of DoD Red Teaming Activities," Washington, D.C.: Office of the Undersecretary of Defense for Acquisition, Technology, and Logistics, September 2003.

- **Foreign members can facilitate understanding of allied and partner perceptions.** The OE not only includes the perceptions and mindsets of our adversaries but also those of our partners. A red team with foreign members can excel at providing these perceptions and may be able to provide unique insights that a US-only red team may overlook. The red team can assist the US staff in understanding the cultural traits that influence a multinational partner's constraints, capabilities, and political will, thus facilitating the development and maintenance of important military relationships.