Institute on Science for Global Policy (ISGP)

Global Emerging and Persistent Infectious Diseases (GEPID): *Armed Forces Impact*

The GEPID-Armed Forces Impact (AFI) Conference convened within the North Atlantic Treaty Organization (NATO) Headquarters in Brussels, Belgium on October 14—15, 2024

Organized in cooperation with the NATO Office of the Chief Scientist and the United States Department of Defense, Office of the Assistant Secretary of Defense for Health Affairs

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Global Emerging and Persistent Infectious Diseases (GEPID):
Armed Forces Impact

A Program and Conference organized in cooperation with the NATO Office of the Chief Scientist and the United States Department of Defense, Office of the Assistant Secretary of Defense for Health Affairs.

Convened by the ISGP within NATO Headquarters in Brussels, Belgium,
October 14 — 15, 2024

An ongoing series of dialogues, critical debates, and extended caucuses examining the role of science and technology in advancing effective domestic and international policy decisions.

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Introduction

Preface

The contents of this book were derived from the materials presented and subsequent discussions at the "Global Emerging and Persistent Infectious Diseases – Armed Forces Impact" (GEPID – AFI) Conference convened by the Institute on Science for Global Policy (ISGP) on October 14 and 15, 2024, within the North Atlantic Treaty Organization (NATO) Headquarters in Brussels, Belgium. The invitation-only, ISGP GEPID – AFI Conference, structured on a critical debate/caucus format pioneered by the ISGP for over sixteen (16) years, was conducted primarily in person, with restricted virtual access. Approximately fifty (50) internationally distinguished subject-matter experts, institutional leaders, and stakeholders from governmental, armed forces, private sector, academic, and public advocacy communities worldwide participated in the conference. As an integral component of the GEPID – AFI Program, the GEPID – AFI Conference focused on identifying and critiquing realistic strategies and options focused on the prevention, mitigation, and treatment of infectious diseases required to ensure the health of armed forces personnel and civilian populations with which they engage.

Current Realities and Challenges

Historically, societal responses to infectious disease outbreaks, epidemics, and pandemics have repeatedly shown that the absence of realistic policy foresight and evidence-based preparedness based on credible medical understanding and practical scientific and technological options often resulted in tragic outcomes that permeated across all sectors of society. The global impacts on human health, both for civilian and armed forces, were manifested in strained public health systems and in significant, even catastrophic, impacts on economic sustainability and societal stability.

The potential for myriad infectious disease outbreaks emerging from numerous currently recognized sources is anticipated to cause major global events in the foreseeable future. Recent experiences reinforce the conclusion that effectively combating infectious disease outbreaks in any given region and/or population requires global cooperation, shared resources, and detailed commitments that support early-stage, proactive actions. These collaborative efforts need to bridge the often-conflicting geopolitical positions with policies and actions that optimize the sustainability of public health, environmental priorities, and economic prosperity.

GEPID – AFI Conference Agenda

Policies designed to prevent, mitigate, and/or respond to existing and emerging infectious disease outbreaks are fundamentally important to support human health systems worldwide. While recent COVID-19 experiences are considered, the GEPID – AFI Conference agenda emphasized the criticality infectious diseases have on formulating and implementing anticipated NATO armed force decisions related to deployment. The need for NATO Allies and partners to continuously evaluate the significance of monitoring the status of infectious disease outbreaks worldwide (i.e., biosurveillance, data sharing) directly relates to protecting NATO armed forces and minimizing disease vector transmission in regions of deployment.

GEPID – AFI discussions on pandemic preparedness addressed the importance of improving the resiliency of NATO Allies regarding infectious disease events through effective preparedness and cooperation among NATO Allies and partners. Action-oriented debates focused on the supply and distribution of medical countermeasures, surveillance structures and diagnostic analyses, and maintenance of funding sources across states to sustain preparedness, mitigation, and response infrastructure to infectious disease threats. While compounding risks of infectious diseases across sectors are recognized, the GEPID – AFI Conference was structured to guide participants in furthering critical dialogue for cooperation among NATO Allies and partners on infectious disease threats. Attention was given to the importance of publicly articulating the recognized local, regional, and global benefits of these international actions, while candidly sharing potential risks, to obtain endorsements and identify opportunities for increased cooperation.

ISGP GEPID – AFI Debate/Caucus Model

The ISGP staff conducted over 350 confidential interviews and consultations with subject-matter experts and stakeholders from governmental, academic, armed forces, private sector, and public advocacy communities worldwide to structure the agenda and ensure diverse perspectives in the invitation-only GEPID – AFI Program and Conference.

The GEPID – AFI Conference was conducted using a modification of the ISGP "critical debate/extended caucus" model focused on convening an invitation-only, in-person event with restricted virtual access while ensuring the overarching commitments to the Chatham House Rule (not-for-attribution). The GEPID – AFI Conference provided a platform for participants with diverse perspectives and priorities to engage in intense, egalitarian debates among approximately fifty (50) subject-matter experts and leaders from governmental, academic, armed forces, private sector, and public advocacy communities worldwide.

The two (2)-day GEPID – AFI Conference was organized around (i) biomedical and technological capabilities and actionable decisions (ii) armed forces policies, cooperation, and communication. The program included sixty (60)-minute debates of five (5) concise, (one-page) Position Papers, authored by distinguished subject-matter experts and interlocutors, focused on critically evaluating credible scientific, technological, economic, communication, and policy options for practical GEPID decisions in armed force environments. At the outset of each debate, authors were provided five (5) minutes to summarize the major points presented in their respective Position Papers. After each sixty (60)-minute debate, a seventy five (75)-minute plenary caucus was convened for all participants.

The in-person debates and caucuses facilitated the engagement of all authors and participants in respectful, but often intense, exchanges of diverse views on clarifying evidence-based information and challenging conclusions. The plenary caucuses focused on identifying Areas of Consensus (AoC) and Actionable Next Steps (ANS) pertaining to Position Papers and debates. Each AoC articulates an aspirational goal reflective of realistic expectations and each ANS describes specific policies, decisions, and actions consistent with real-world conditions that are needed to achieve each AoC.

All debates and plenary caucuses were moderated by ISGP staff and were conducted under the Chatham House Rule (not-for-attribution). The GEPID – AFI Conference debates and plenary caucuses were recorded and used by the ISGP staff as a basis to prepare not-for-attribution summaries, AoC and ANS statements, and inform the preparation of concise Overarching Perspectives and Priorities (OPP) intended for public distribution. All recordings were held under the custody of the ISGP and subsequently destroyed.

Following the GEPID – AFI Conference, the ISGP organized an "Informal Summary Caucus" (ISC) convened at Sheraton Brussels Airport Hotel to facilitate continued discussion of conference themes and outcomes with available GEPID – AFI Conference participants. ISC participants examined the main perspectives and conclusions from the GEPID – AFI Conference, formulated concise OPP, and reviewed potential engagements and commitments from GEPID – AFI stakeholders focused on their real-world implementations.

ISGP GEPID Programs

ISGP GEPID Programs, structured around a multi-year, multi-venue format, address (i) the international challenges and priorities defining infectious disease preparedness and countermeasures required to combat the global nature of infectious disease and (ii) the detailed policies and decisions reflecting local geographical and

societal requirements needed to effectively address specific infectious disease events. As part of the ISGP GEPID Program, launched at the Johns Hopkins Bloomberg Center in Washington, D.C. (March 11—13, 2024) and within NATO Headquarters (October 14 and 15, 2024), it is anticipated that future ISGP GEPID Conferences will be convened at venues in Europe, Latin America, Africa, and Asia.

In general, ISGP programs invite subject-matter experts and senior leaders from across governmental, academic, private sector, and public advocacy communities worldwide to develop evidence-based policy options for real-world decisions that remain cognizant of the challenges to obtain sustained public acceptance and support. Both historical and contemporaneous infectious disease outbreaks are examined to assist public health systems in their preparation for, and response to, GEPID threats worldwide.

The ongoing commitment of the ISGP to not express any opinions, nor lobby on any issue, provided the neutrality required to organize and convene conferences addressing major societal challenges through the perspectives emerging from diverse evidence-based positions and priorities worldwide. Since all participants are briefed on the Chatham House Rule and formally agreed to abide by its restrictions, the ISGP debates and caucuses encourage the candid, respectful exchange of ideas and criticism needed to evolve practical decisions and actions shaped by evidence-based information.

ISGP Mission

The ISGP has pioneered the development of a new type of international, neutral environment based on a series of invitation-only conferences. These ISGP conferences are designed to provide distinguished scientists and subject-matter experts opportunities to concisely present their views of the credible scientific and technological options available for addressing major geopolitical and security issues. Over a sixteen (16)-year-plus period, these ISGP conferences have been convened on myriad globally significant policy topics informed by science and technology. The ISGP format emphasizes written and oral policy-oriented science and technology presentations and extensive debates led by an international cross-section of the policy and scientific community. ISGP conferences reflect global perspectives and seek to provide governmental and community leaders with a clear, accurate understanding of the real-world challenges and potential solutions critical to determining sound public policies. ISGP programs rely on the validity of two overarching principles:

1. Scientifically credible understanding needs to be closely linked to the realistic policy decisions made by governmental, private sector, and societal leaders

in addressing both the urgent and long-term challenges facing 21st century societies. Effective decisions rely on strong domestic and global public endorsements that motivate active support throughout societies.

2. Communication between scientific and policy communities requires significant improvement, especially concerning the endorsement or rejection of the often transformational scientific and technological opportunities continually emerging from global research communities. Effective decisions are facilitated by the ISGP format where the advantages and risks of credible science and technology options are candidly presented and critically debated among internationally distinguished subject-matter experts, policy makers, private sector, and community stakeholders.

Concluding Remarks

It is unfortunately anticipated that the failure to merit strong, ongoing public trust in rational and scientifically sound principles foreshadows serious societal consequences. Responsibilities for establishing and sustaining public trust in evidence-based information from scientifically credible research and technological developments, underlying often transformational changes currently underway in our lifestyles and livelihoods, are shared throughout government, the private sector, and public advocacy communities worldwide. The ISGP Programs and Conferences are designed to assist all aspects of society in fulfilling these responsibilities.

Overarching Perspectives and Priorities (OPP)

Introduction

Overarching Perspectives and Priorities (OPP) represent outcomes that have emerged across GEPID confidential interviews, the GEPID – AFI Conference convened within NATO Headquarters in Brussels, Belgium on October 14 and 15, 2024, and the Informal Summary Caucus (ISC) convened at Sheraton Brussels Airport Hotel on October 16, 2024.

An OPP accurately articulates an outcome from the GEPID – AFI Program and Conference in concise statements of ideas that merited consensus among participants and motivated broad support for specific actionable decisions. OPP statements recognize diverse, often conflicting, interpretations of credible scientific and technological understanding regarding infectious disease threats, their impacts on armed force decisions, and the evolving body of evidence emerging from existing and ongoing research and analyses. OPP have often been found to be an effective messaging tool for engaging both policymakers and the public *writ large.*

Many aspects of the ideas and concepts represented in the OPP are described in detail in the Areas of Consensus (AoC) and Actionable Next Step (ANS) sections. References to consistent OPP outcomes from previous ISGP conferences are also noted.

OPP 1: The profound, often tragic, human, economic, and geopolitical consequences resulting from failures to prepare for, and/or effectively respond to, global emerging and persistent infectious disease (GEPID) outbreaks (e.g., COVID-19 pandemic) have motivated major societal efforts worldwide, including within the armed forces, to significantly strengthen global health systems informed by evidence-based scientific understanding and practical technological options. Minimization of reasonably anticipated societal disruptions from GEPID outbreaks requires innovative, strategic advances in biosecurity policies tailored to specific needs within diverse economic and cultural populations that simultaneously garner broad public endorsement and sustainable compliance. **

OPP 2: The criticality of fulfilling commitments for timely communication among public health officials and stakeholders in governmental, private sector, public advocacy, and armed force communities cannot be overemphasized as fundamental to the formulation and implementation of strategic GEPID policies

and real-world actionable decisions. It is essential that domestic and international stakeholders across all aspects of society strengthen their ongoing, secure, and timely communication for aligning biosecurity policies and decisions enhancing GEPID pre-outbreak readiness and their efficient implementation. **

OPP 3: Optimizing the adaptability, agility, and sustainability of armed force training protocols, deployment criteria, medical countermeasures, and public health outcomes critically depends on integrating resource allocations and logistical cooperation among domestic and international stakeholders, especially those in the private sector. Armed force preparedness and response decisions need continuous, forward-looking dialogue and practical cooperation with the private sector *writ large* focused on currently recognized, and reasonably anticipated, GEPID challenges affecting deployed armed forces and their operational environments. **

OPP 4: Developing dynamic response strategies for medical countermeasures (e.g., diagnostics, vaccines, therapeutics) available for existing, and reasonably anticipated, GEPID outbreak scenarios requires critical attention to specific needs emerging from diverse population demographics, economic disparities, geographical landscapes, and cultural mores. Effectiveness of GEPID armed force policies and protocols based on credible scientific information and technological capabilities rely on monitoring and sharing diagnostic data accurately reflecting these diversities and their manifestations as distinct health challenges and conflicting attitudinal priorities within a given population. **

OPP 5: During GEPID outbreaks, the effectiveness of the civilian health sector, designed primarily to identify and respond to specific, ongoing public health needs, is often dependent on access to the scalable, technical, and strategic capabilities and resources (e.g., vaccines, therapeutics, distribution protocols) available from armed forces, especially with respect to advice, messaging, and logistical support. Early-stage cooperation among civilian and armed force agencies responsible for combating GEPID outbreaks often depends on long-term, anticipatory capacity building designed to mobilize local, regional, national, and international resources (e.g., shared biosurveillance information, development of medical countermeasures). **

OPP 6: The increasingly evident capability of the North Atlantic Treaty Organization (NATO) to coordinate GEPID policies, consistent with strategic global biosecurity, and organize the resourcing of their implementation, is critical to effectively address the complex economic, cultural, and geopolitical landscape characterizing diverse priorities and agenda within its Allies and partners. The rapid evolution of scientific understanding and technological options for combating GEPID, increasingly

conflicted public responses, and convoluted geopolitical pressures emphasizes the need for resilient NATO policies emerging from multi-level collaborations needed to establish robust biodefense, operational readiness, and sustained public acceptance.

OPP 7: The increasingly evident impacts of human health on individual performance strongly suggest that current Multi-Domain Operations (i.e., Air, Land, Maritime, Space, and Cyberspace), characterizing armed force policies, need to include a "Human" Domain. Strategically robust, operational armed force decisions, consistent with international commitments (e.g., Biological and Chemical Weapons Conventions), need to recognize the consequences of human health vulnerabilities on performance as individuals combat myriad health challenges (e.g., natural, accidental, and intentional biologic threats).

OPP 8: Strategic armed force policies and implementation protocols designed to combat GEPID events need to appropriately recognize the potential for the intentional or accidental introduction of bioweapons, either by state or non-state actors. Since opportunities for bioweapons to initiate and/or negatively impact GEPID outbreaks are significantly greater given advances in computational capabilities (e.g., artificial intelligence), simplified production methodologies, and heightened geopolitical tensions, significantly strengthening evidence-based scientific capabilities identifying bioweapons, and the attribution of their sources, needs to be a priority.

OPP 9: Ubiquitous public conversations concerning artificial intelligence (AI) and machine learning (ML) strongly suggest that armed force policies and protocols incorporate a rational understanding of existing and developing perceptions of AI and ML capabilities into policies and operational decisions related to GEPID events. Accidental, intentionally nefarious, and potentially self-generated AI and ML outcomes need to command significant attention within evolving armed force priorities, as well as in constructing clear, evidence-based public messaging.

OPP 10: The influence of mis- and disinformation regarding natural, intentional, and/or accidental infectious diseases, fostered by state or non-state actors, creates public confusion and decreases the receptivity of individuals, including armed force personnel, to trust evidence-based, credible scientific understanding and technological options. Increased attention to proactive policies and actions focused on combating GEPID mis- and disinformation, as well as its negative consequences, is a vital component of biosecurity, reflected in preparedness and response effectiveness. **

** Reference previous ISGP Emerging and Persistent Infectious Diseases (EPID) publications at www.scienceforglobalpolicy.org: "EPID: Focus on Surveillance" 2010; "EPID: Focus on Prevention" 2011; "EPID: Focus on Mitigation" 2011; "EPID: Focus on Societal and Economic Context" 2012; "EPID: Focus on Antimicrobial Resistance" 2013; "EPID: Focus on Pandemic Preparedness" 2014; "Foresight from the COVID-19 Pandemic: Science, Policy, and Communication (COVID-SPC)" 2023; "Global Emerging and Persistent Infectious Diseases (GEPID): Science/Technology, Policy, and Communication" 2024

Areas of Consensus (AoC) and Actionable Next Steps (ANS)

Introduction

The Areas of Consensus (AoC) and Actionable Next Steps (ANS) presented here were developed specifically from the Position Papers, debates, and caucus sessions during the GEPID – AFI Conference. The resulting AoC and ANS represent an integrated summary of perspectives and priorities emerging from all aspects of the GEPID – AFI Program and Conference. Methodologies for addressing these AoC and ANS are directly related to their impacts on the armed forces health systems used among North Atlantic Treaty Organization (NATO) Allies and partners. These AoC and ANS statements recognize the importance of diverse economic and geopolitical landscapes, as well as social and cultural norms.

AoC 1: Implement effective data collection, monitoring, and detection to prepare for, and respond to, infectious disease (ID) outbreaks.

Continuous environmental monitoring for biological threats, including the tracking of pathogen movements (e.g., effective detection, rapid identification), paired with appropriate medical countermeasures for protection and resilience against ID outbreaks within armed force communities is crucial. Existing research and development infrastructures (e.g., Multidrug-Resistant Organism Repository and Surveillance Network, National Center for Medical Intelligence) need to be leveraged by prioritizing the modernization of data systems (i.e., collection, analysis, dissemination, transmission) through a team of multi-disciplinary analysts (e.g., medical, intelligence, operational).

- **ANS 1.1:** Coordinate U.S. Department of Defense (DoD) biosurveillance efforts to include the intramural laboratory activities often neglected in larger strategy analyses (e.g., Biodefense Posture Review).
- **ANS 1.2:** Create the ability to seamlessly feed data into a multi-layered, interoperable data and analysis program using mathematical, epidemiological modeling that allows for access across disciplines (e.g., policy, clinical) and levels (e.g., federal, Combatant Commands, armed force intelligence).
- **ANS 1.3:** Incorporate data of all types (e.g., physical, digital) and new technological advances in data collection methods (e.g., geotagging, wastewater surveillance) using a One Health approach in artificial intelligence (AI) systems to include all animal (i.e., livestock, wildlife) and human

microorganism diseases and triangulate where a pathogen is emerging.

- **ANS 1.4:** Organize joint research and development between armed forces and civilian institutions to advance pathogen detection, including the study of pathogenicity islands, containment technologies, and accelerating innovations in vaccines, therapeutics, and diagnostics.
- **ANS 1.5:** Establish a publicly accessible, non-commercial database for the rapid development of countermeasures (e.g., mRNA vaccines).

AoC 2: Incentivize communication through ongoing collaboration and data sharing among private and public sectors.

Effective biosecurity measures, fundamental to armed forces decisions, require ongoing, pre-emergency communication among private and public sectors, focused on the secure, timely exchange of accurate, evidence-based biosurveillance data derived from multiple monitoring sources, diagnostic systems, and analytical approaches.

- **ANS 2.1:** Establish overarching public-private relationships utilizing existing and evolving efforts among governmental and intergovernmental institutions (e.g., Centers for Disease Control and Prevention (CDC), DoD, NATO), private sector entities (e.g., companies, corporations, coalitions), and leadership from public advocacy communities to coordinate the acquisition and utilization of biosurveillance information.
- **ANS 2.2**: Ensure biosecurity collaborations incorporate the relevant capabilities and perspectives of diverse public-private partners to identify interdisciplinary approaches focused on the specific priorities of the armed forces.
- **ANS 2.3:** Coordinate scientific, technological, and medical messaging from major public-private stakeholders responsible for biosecurity decisions and the formulation of domestic and international policy decisions, emphasizing the avoidance of "siloed" information from separate public-private sources.

AoC 3: Develop dynamic response plans to promote effective governance in ID outbreaks.

The strengths and attribution capabilities of defense systems to rapidly predict, detect, and respond to emerging ID events need to be harnessed to enhance the impact of armed force and medical preparedness and response. The development of improved, dynamic response plans and tailored medical countermeasures (e.g., diagnostics, vaccines, therapeutics) for a variety of ID scenarios allows adaptive responses to ID threats and the protection of armed forces and civilian populations alike.

- **ANS 3.1:** Leverage armed force funding and contracting mechanisms (e.g., Defense Production Act of 1950) to identify and evaluate available and reliable diagnostics, therapeutics, and vaccines suitable for future pandemics.
- **ANS 3.2:** Incorporate contracting stakeholders (i.e., private sector) to harness innovative frameworks and coordinate funding with other public sources to fill financial gaps in the armed force medical landscape.
- **ANS 3.3:** Allocate a portion of defense spending to support diagnostic testing, advanced vaccine and therapeutic development, and clinical trials for armed force ID priorities.
- **ANS 3.4:** Adapt existing national and international response guidelines and countermeasures through coordination meetings, programmatic reviews, and wargame or major-scaled resilience exercises to reinforce lessons learned from past ID outbreaks.
- **ANS 3.5:** Utilize biosurveillance data to develop a real-time network for laboratory and medical team deployment in critical areas for ID response.
- **ANS 3.6:** Produce countermeasures rapidly and with the scalability needed to protect armed forces, and ensure armed force personnel are primary stakeholders in receiving priority access to cutting-edge diagnostics, therapeutics, and vaccines in times of need.
- **ANS 3.7:** Employ insights from governance analyses (i.e., economic, environmental, and regional factors impacting ID response mechanisms) and landscape, cost-benefit assessments (i.e., outlining strengths, resources, and needs) to enhance the coordination, cost-effectiveness, and responsiveness of biosecurity capabilities (e.g., medical countermeasures) across armed force and civilian sectors.

AoC 4: Ensure comprehensive force health protection through confirmed diagnoses of ID for armed forces personnel.

Comprehensive health protection for armed forces needs to include qualified diagnoses for circulating pathogens (i.e., biological agents) within a given unit, ideally for each individual. Biomedically confirmed diagnoses enhance biosurveillance (i.e., detection of clustered cases or outbreaks) and support optimal clinical management, including psychological reassurance.

- **ANS 4.1:** Develop rapid, point-of-care and laboratory diagnostics through armed force, public, and private sector cooperation, with specific focus on diagnostics tailored to armed forces needs (i.e., common conditions of deployed personnel).
- **ANS 4.2:** Protect armed forces personnel through evidence-based

biosurveillance (i.e., data collection) in regions of current or anticipated deployment.
- **ANS 4.3:** Engage the private sector to design pathogen agnostic tools for ID diagnostics that are affordable and appropriate for austere environments.
- **ANS 4.4**: Combat misinformation and mistrust among armed forces members through consistent diagnostic protocols and early-stage communication by ID clinicians, including accessible, evolving explanations of credible scientific understanding.

AoC 5: Enhance collaboration among public and private sectors for biosurveillance and ID medical countermeasures designed for the specific needs of armed forces.

Productive and impactful force health protection requires sustainable, anticipatory, adaptive, and mutually beneficial collaboration among government and private sectors for biosurveillance and medical countermeasure development, to be implemented prior to the onset of an ID emergency.

- **ANS 5.1:** Define the unmet needs of the armed forces and identify the existing and yet to be developed technologies required to serve those needs.
- **ANS 5.2:** Prepare target product profiles to encourage industry development toward the needs of the armed forces.
- **ANS 5.3:** Develop incentivization structures (e.g., priority review vouchers) to ensure rapid mobilization around ID countermeasure development.
- **ANS 5.4:** Promote the development of technologies for long-term (i.e., 10, 20 year timeline), future solutions using an Advanced Research Projects Agency (ARPA)-type mechanism.
- **ANS 5.5:** Employ existing funding mechanisms (e.g., federally funded research and development centers (FFRDC)) to facilitate the efficient engagement of the private sector in the design and completion of high-priority programs affecting ID countermeasures and implementation protocols.
- **ANS 5.6:** Create and maintain databases to facilitate the review of existing technologies and the preparation of accurate material to brief policy-makers.
- **ANS 5.7:** Identify key vulnerabilities in supply lines, infrastructure, and logistical capabilities required to inform actionable decisions focused on enhancing countermeasure resiliency.

AoC 6: Promote cooperation among armed forces and civilian public health systems during ID crises.

To the degree that they are available and capable, armed forces need to support

stressed civilian public health systems for national relief efforts and international humanitarian operations during ID outbreaks. Collaboration between the armed forces and public health systems, both domestically and internationally (i.e., areas of deployment), is often essential to ensuring comprehensive responses and effective management of ID crises.

- **ANS 6.1:** Designate armed force command and control to lead coordination and direct armed forces support to civilian systems to assist in ID response, where appropriate.
- **ANS 6.2:** Utilize trained armed forces personnel (e.g., surveillance, medical, logistics) to aid in civilian response during uncontrolled or severe ID outbreaks.
- **ANS 6.3:** Leverage technical armed forces assets (e.g., computing power, monitoring systems) to examine ID progression in civilian populations and continuously maintain strategic and operational effectiveness during ID outbreaks.
- **ANS 6.4:** Educate medical leadership within armed forces regarding cultural awareness (e.g., cultural norms) to promote effective cooperation with civilian public health systems in countries needing support to control ID outbreaks.
- **ANS 6.5:** Ensure an effective communication system within armed forces to support public health authorities in operational areas for the dissemination of credible ID information to civilian populations, focusing on strengthening public trust.

AoC 7: Promote the role of NATO as a facilitator in the operational response to ID preparedness and response.

NATO is well positioned to coordinate with Allies and partners to overcome ID challenges by facilitating robust strategic and operational responses, including the support of existing overseas medical laboratories, hospital ships, and deployable diagnostic and medical response units. A resilient, NATO-facilitated framework for ID preparedness and response enhances biodefense, ID operational readiness, global health security, and multi-level collaborations.

- **ANS 7.1:** Enlist NATO to further prioritize ID response and biodefense research through coordination among civilian entities (e.g., public health entities, national laboratories) and NATO Allies and partners.
- **ANS 7.2:** Standardize data collection across the armed forces and establish common medical definitions (e.g., for acute gastroenteritis (AGE), respiratory tract infection (RTI), skin and soft tissue infection (SSTI)) via a NATO Science and Technology Organization Technical Activity Proposal.

- **ANS 7.3:** Share electronic medical records, information, and reports among NATO Allies and partners as a necessary asset for enabling effective biosurveillance measures.
- **AoC 7.4:** Coordinate the development and rapid publication of globally recognized (e.g., World Health Organization (WHO)) International Classification of Diseases (ICD)-10 codes for emerging ID with pandemic potential.
- **ANS 7.5:** Define the specific operational roles that NATO armed forces need to undertake to support civilian response to an ID threat.
- **ANS 7.6:** Develop an information messaging protocol to promote armed forces medical research and communicate the unique value of civilian-military cooperation in medicine and public health.
- **ANS 7.7:** Utilize an operational focus in data sharing to guide dialogue among private sector and NATO requisite program officers on the topic of biosurveillance and biointelligence.
- **ANS 7.8:** Pursue NATO-lead initiatives for cross-border supply chain transport and capability gap analysis to enhance supply chain resilience efforts.
- **ANS 7.9:** Establish a NATO consortium of laboratories to serve as a resource to conduct microbial forensics for ID attribution, working in concert with the private sector to map and leverage talent, infrastructure, and laboratories.

AoC 8: Promote international collaborations and capacity building among armed forces and the public health sector.

Scientific and technological capabilities and resources of defense laboratories and facilities need to effectively leverage cooperation with the private sector to expand public health engagements worldwide. To create mutual, bilateral benefits, there is a need to strengthen international partnerships by enhancing local laboratory capabilities from which mutually beneficial research and monitoring data emerges, supporting early warning ID systems.

- **ANS 8.1:** Embed modern research and logistical capabilities in regions of existing and potential deployment to enhance pandemic preparedness and biodefense.
- **ANS 8.2:** Foster biodefense collaborations among armed forces and subject-matter experts and stakeholders in academic, private sector, and governmental organizations that retain biologic samples in-country and support front-line ID capabilities.
- **ANS 8.3:** Ensure national and international organizations (e.g., WHO)

committed to public health are involved in surveillance, education, and training efforts.

- **ANS 8.4:** Develop culturally ethical and sustainable armed forces biodefense research projects aligned with specific armed force biodefense goals while advancing research and public health priorities within host countries.
- **ANS 8.5:** Standardize procedures to ensure consistency in data procurement, countermeasures (e.g., accessible monoclonal antibodies, phage libraries, vaccines), and biosecurity policies by sharing biologic material and genetic structures from pathogens prioritized by armed forces and civilian researchers.
- **ANS 8.6:** Organize laboratories and surveillance teams, comprising subject-matter experts, deployable to rural and/or underserved populations combating ID outbreaks.

AoC 9: Enhance education and training to sustain armed force ID preparedness and response initiatives.

Education and training for armed force healthcare workers (e.g., physicians, doctors, nurses, paramedics) are required to address the existing gaps in acquired knowledge, skills, practices, and behaviors among different healthcare communities, both civilian and armed forces. Education and training need to be prioritized along with data acquisition, diagnostic development, in-field applications, and innovative research. All these efforts need to be focused on improving the collaborative civilian and armed force management of ID threats.

- **ANS 9.1**: Prioritize the development and sustainment of multi-disciplinary, well-curated educational curricula for ID preparedness and response, with attention to novel, emerging pathogens.
- **ANS 9.2:** Implement new technologies (e.g., software, general purpose technology (GPT)) to support ID education and training.
- **ANS 9.3:** Utilize educational opportunities (e.g., partnerships with academic institutions to enable international student programs), both domestically and internationally, for biomedical research training, emphasizing relationships with international laboratories and public health agencies (e.g., African CDC).
- **ANS 9.4:** Invest in nurturing highly motivated young international scientists to expand the availability of qualified personnel, supporting ID biodefense, with an emphasis on communication skills (e.g., grant writing, public speaking).

AoC 10: Emphasize an ongoing, accurate understanding of the potential for accidental or intentional production of biological weapons by non-state actors.

While recognizing the primary concerns regarding state actors, the increasing accessibility of technological innovations minimizing the knowledge and facilities required to produce biological weapons demands an enhanced commitment to examine the potential democratization of biological weaponry by non-state actors (e.g., terrorists, amateurs). Enhanced biosecurity requires increased armed force attention to (i) the real-world risks from specific biological weapon characteristics (e.g., delivery mechanisms, incubation periods), (ii) anticipated advances from AI, and (iii) options for improved defense protocols involving monitoring (e.g., metadata analysis).

- **ANS 10.1:** Prepare for the weaponization of biothreat pathogens through identification of most likely agents, development of diagnostics, and rapid mobilization of appropriate countermeasures.
- **ANS 10.2:** Ensure that biosafety measures are followed (e.g., preventing accidental releases in research facilities) through standardized regulatory practices across countries.
- **ANS 10.3:** Leverage armed forces and civilian diplomacy in tandem to forge alliances and enforce compliance with international norms for biosecurity (e.g., Biological Weapons Convention).
- **ANS 10.4:** Mobilize NATO to take leadership in the biological AI realm by studying current risks and avenues for prevention and mitigation of biological weapons (e.g., develop rapid capabilities utilizing AI, restricting access to certain AI capabilities regarding biological threat agents).
- **ANS 10.5:** Improve scientific and technological attribution capabilities to identify non-state actors responsible for intentional infectious biological agent releases.

AoC 11: Designate "Human" as a sixth Domain of armed forces operations.

Armed forces need to acknowledge "Human" as a sixth Domain, including natural, intentional, and accidental biologic threats, to inform decision-making within the armed forces. The shift from a medical treatment focus to a biosurveillance-specific, outcome-driven paradigm, incorporating operational preparedness and defensive responses to an ID threat, is critical to the formulation and implementation of effective armed force policies as new technologies and actors emerge at the international level.

- **ANS 11.1**: Consult with senior representation from the five existing Domains (i.e., Air, Land, Maritime, Space, and Cyberspace) to identify how incorporating a sixth Domain can be integrated into primary NATO responsibilities needed to strengthen existing and planned Multi-Domain activities.
- **ANS 11.2:** Organize a multi-stakeholder conference to ensure NATO Allies and partners recognize the addition of the sixth, "Human" Domain as a key part of collective defense (i.e., Article 5 of North Atlantic Treaty).
- **ANS 11.3:** Disseminate information (e.g., biosecurity intelligence) relevant to biosurveillance and the role of the "Human" Domain in an accurate, timely manner to apply operational approaches to respond to natural, intentional, and accidental ID threats.
- **ANS 11.4**: Engage the private sector in discussions concerning scientific and technological advances that underpin existing capabilities within the "Human" Domain while exploring conceptual frontiers being researched.
- **ANS 11.5**: Prepare analyses concerning how governments and the public *writ large* can be productively informed to promote sustained support for "Human" Domain defense activities.

Institute on Science for Global Policy (ISGP)

Global Emerging and Persistent Infectious Diseases – Armed Forces Impact (GEPID – AFI) Program

GEPID – AFI Conference

Invitation-only, Two (2) Day Conference
In-person, with limited virtual access

Conference Agenda and Structure

Convened October 14 and 15, 2024 within North Atlantic Treaty Organization (NATO) Headquarters, Brussels, Belgium

Conference Overview

All proceedings are conducted under the Chatham House Rule (not-for-attribution) and Convened at Central European Time (CET).

- Two (2) day conference focused on (i) biomedical and technological capabilities and actionable decisions, and (ii) armed forces policies, cooperation, and communication
- Five (5) 60-minute Debates of Position Papers authored by internationally distinguished subject-matter experts and senior stakeholders
- Five (5) 75-minute Plenary Caucus Discussions
- One (1) 150-minute Summary Caucus Discussion

All proceedings were recorded for the purpose of preparing not-for-attribution summaries by the ISGP staff and were kept under the custody of the ISGP. All recordings will be destroyed once the GEPID – AFI publication is completed.

Conference Events: October 14 and 15, 2024

October 14	Biomedical and Technological Capabilities and Actionable Decisions	Three (3) sixty (60)-minute Debates each followed by a seventy-five (75)-minute Plenary Caucus
October 15	Armed Forces Policies, Cooperation, and Communication	Two (2) sixty (60)-minute Debates each followed by a seventy-five (75)-minute Plenary Caucus One (1) one hundred and fifty (150)-minute Summary Discussion/ Adjournment

Monday, October 14, 2024: Biomedical and Technological Capabilities and Actionable Decisions

Three (3) 60-minute debates (moderated by ISGP staff), each followed by a 75-minute plenary caucus (moderated and scribed by ISGP staff). All debates and caucuses, held under Chatham House Rule (not-for-attribution), were recorded. Recordings were maintained under the custody of the ISGP before being destroyed.

0630 - 0745 GMT
0730 - 0845 CET **Participant Check-in (Physical and Virtual)**
0830 - 0945 EET

0745 - 0800 GMT
0845 - 0900 CET **All participants seated around the table**
0945 - 1000 EET

0800 - 0830 GMT	
0900 - 0930 CET	**Introductory remarks:**
1000 - 1030 EET	Dr. George Atkinson, ISGP Founder and Executive Director Dr. Bryan Wells, NATO Chief Scientist Lieutenant General Janusz Adamczak, NATO Director General International Military Staff
0830 - 0930 GMT	
0930 - 1030 CET	**Debate 1: Assess infectious disease risks unique to armed forces and ensure the effective implementation of safety measures for active-duty military personnel against infectious disease threats.**
1030 - 1130 EET	*Moderated by Ms. Sophia Huntley Smith, Senior Fellow, ISGP* **Position Paper 1:** "Strengthening Defenses: The Critical Role of Biosurveillance in Detecting Emerging Infectious Diseases" **Author: Ret. COL Dr. Paige Waterman**, Chair of the Department of Medicine, Uniformed Services University of the Health Sciences
0930 - 1045 GMT	
1030 - 1145 CET	**Plenary Caucus 1: Assess infectious disease risks unique to armed forces and ensure the effective implementation of safety measures for active-duty military personnel against infectious disease threats**
1130 - 1245 EET	Participants identify Areas of Consensus (AoC) and Actionable Next Steps (ANS) *Moderated by Ms. Camelia Bou, Program Manager and Senior Fellow, ISGP, and scribed by Ms. Sophia Huntley Smith, Senior Fellow, ISGP, and Ms. Daniela Baeza-Breinbaur, Adjunct Senior Fellow, ISGP*
1045 - 1200 GMT	
1145 - 1300 CET	**Lunch (no-host)**
1245 - 1400 EET	

1200 - 1300 GMT
1300 - 1400 CET
1400 - 1500 EET

Debate 2: Advance research, data analyses, and diagnostic capabilities required to improve medical options for identifying and responding to naturally occurring and intentional infectious disease threats.
Moderated by Dr. Liat Kugelmass, Senior Fellow, ISGP
Position Paper 2: "Multidisciplinary Prioritisation, Data, Diagnostics, Education, and Training for Infectious Disease Threats"
Author: Col. Mark Bailey, Defence Professor of Military Medicine, Royal Centre for Defence Medicine, UK

1300 - 1415 GMT
1400 - 1515 CET
1500 - 1615 EET

Plenary Caucus 2: Advance research, data analyses, and diagnostic capabilities required to improve medical options for identifying and responding to naturally occurring and intentional infectious disease threats.
Participants identify Areas of Consensus (AoC) and Actionable Next Steps (ANS)
Moderated by Ms. Camelia Bou, Program Manager and Senior Fellow, ISGP, and scribed by Dr. Liat Kugelmass, Senior Fellow, ISGP, and Ms. Daniela Baeza-Breinbauer, Adjunct Senior Fellow, ISGP

1415 - 1430 GMT
1515 - 1530 CET
1615 - 1630 EET

Break

1430 - 1530 GMT
1530 - 1630 CET
1630 - 1730 EET

Debate 3: Establish military priorities and procedures for preventing and responding to the spread of pathogens among civilian populations to ensure national and international security.
Moderated by Ms. Peyton Newsome, Senior Fellow, ISGP

Position Paper 3: "Facing Future Viruses: Military-Civilian Healthcare Collaboration"
Author: Ret. Cdr. Dr. Stef Stienstra, Subject Matter Expert Chemical, Biological, Radiological and Nuclear (CBRN) Defense; Lecturer North Atlantic Treaty Organization (NATO) School, NATO Joint CBRN-defense Centre of Excellence

1530 - 1645 GMT
1630 - 1745 CET
1730 - 1845 EET

Plenary Caucus 3: Establish military priorities and procedures for preventing and responding to the spread of pathogens among civilian populations to ensure national and international security.
Participants identify Areas of Consensus (AoC) and Actionable Next Steps (ANS)
Moderated by Ms. Camelia Bou, Program Manager and Senior Fellow, ISGP, and scribed by Ms. Peyton Newsome, Senior Fellow, ISGP, and Ms. Daniela Baeza-Breinbauer, Adjunct Senior Fellow, ISGP

1645 - 1650 GMT
1745 - 1750 CET
1845 - 1850 EET

Conference Day One Adjournment

Tuesday, October 15, 2024: Armed Forces Policies, Cooperation, and Communication

Two 60-minute debates (moderated by ISGP staff), each followed by a 75-minute plenary caucus (moderated and scribed by ISGP staff), and one (1) 150-minute summary caucus discussion. All debates and caucuses, held under Chatham House Rule (not-for-attribution), were recorded. Recordings were maintained under the custody of the ISGP before being destroyed.

0630 - 0745 GMT **0730 - 0845 CET** 0830 - 0945 EET	**Participant Check-in (Physical and Virtual)**
0745 - 0800 GMT **0845 - 0900 CET** 0945 - 1000 EET	**All participants seated around the table**
0800 - 0900 GMT **0900 - 1000 CET** 1000 - 1100 EET	**Debate 4: Examine military actions and decision-making processes considering the scope (e.g., transmission rates, morbidity) of diverse infectious disease threats, currently recognized and reasonably anticipated.** *Moderated by Ms. Sophie Bartholomaus, Senior Fellow, ISGP* **Position Paper 4:** "Optimizing the Role of the U.S. Military in Biodefense and Pandemic Preparedness" **Author: CAPT Andrew Letizia**, Science Director, Naval Medical Research unit, INDO PACIFIC
0900 - 1015 GMT **1000 - 1115 CET** 1100 -1215 EET	**Plenary Caucus 4: Examine military actions and decision-making processes considering the scope (e.g., transmission rates, morbidity) of diverse infectious disease threats, currently recognized and reasonably anticipated.** Participants identify Areas of Consensus (AoC) and Actionable Next Steps (ANS)

Moderated by Ms. Camelia Bou, Program Manager and Senior Fellow, ISGP, and scribed by Ms. Sophie Bartholomaus, Senior Fellow, ISGP and Ms. Daniela Baeza-Breinbaur, Adjunct Senior Fellow

1015 - 1145 GMT
1115 - 1245 CET **Lunch (no-host)**
1215 - 1345 EET

1145 - 1245 GMT
1245 - 1345 CET **Debate 5: Cultivate cooperation among stakeholders**
1345 - 1445 EET **in academic, private sector, military, and public advocacy communities to ensure coordinated actions regarding infectious diseases throughout military and civilian health systems.**
Moderated by Dr. Liat Kugelmass, Senior Fellow, ISGP
Position Paper 5: "Department of Defense Response Capabilities for Pandemic Threats"
Authors: Dr. Robert Kadlec, former Assistant Secretary of Health and Human Services (Preparedness and Response) and
Dr. Geoff Ling, Ret. Colonel, Medical Corps, U.S. Army; Professor of Neurology, Neurosurgery and Anesthesiology-Critical Care Medicine, Johns Hopkins Medicine

1245 - 1400 GMT
1345 - 1500 CET **Plenary Caucus 5: Cultivate cooperation among**
1445 - 1600 EET **stakeholders in academic, private sector, military, and public advocacy communities to ensure coordinated actions regarding infectious diseases throughout military and civilian health systems.**
Participants identify Areas of Consensus (AoC) and Actionable Next Steps (ANS)
Moderated by Ms. Camelia Bou, Program Manager and Senior Fellow, ISGP, and scribed by Dr. Liat Kugelmass, Senior Fellow, ISGP, and Ms. Daniela Baeza-Breinbauer, Adjunct Senior Fellow, ISGP

1400 - 1415 GMT	
1500 - 1515 CET	**Break**
1600 - 1615 EET	
1415 - 1645 GMT	
1515 - 1745 CET	**Final Summary Plenary Caucus**
1615 - 1845 EET	*Comments and Discussion on the initial outcomes from all five (5) Debate and Plenary Caucus Sessions Moderated by Ms. Camelia Bou, Program Manager and Senior Fellow, ISGP and Dr. Liat Kugelmass, Senior Fellow, ISGP and scribed by Ms. Peyton Newsome, Senior Fellow, ISGP, and Ms. Daniela Baeza-Breinbauer, Adjunct Senior Fellow, ISGP*
1645 - 1700 GMT	
1745 - 1800 CET	**Concluding remarks**
1845 - 1900 EET	Dr. George Atkinson, ISGP Founder and Executive Director Dr. Bryan Wells, NATO Chief Scientist
1700 GMT	
1800 CET	**Conference Adjournment**
1900 EET	

Position Paper One
Strengthening Defenses: The Critical Role of Biosurveillance in Detecting Emerging Infectious Diseases**

Paige Waterman MD, MACP, FIDSA, FASTMH, Colonel, US Army (Ret.)
Chair of the Department of Medicine, Infectious Disease Clinician, Uniformed Services University of the Health Sciences, Bethesda, MD, USA

Current realities

The literature abounds with what constitutes risks to deployed forces, chief among them being infectious diseases, whether through natural acquisition, intentional exposure, or unfortunate sequelae to other primary events (e.g., traumatic injuries resulting in wounds susceptible to infection). Of the approximately 9 million beneficiaries and service members serving in strategic positions in nearly 200 countries, it only takes one infected patient to threaten the well-being of our health system, as well as military readiness, with resistant and emerging infections of greatest concern. Absent an effective early warning system, we remain at risk of threatening not only our health, but military readiness and soft-power gains through global health security.

Several federal surveillance efforts exist to advise the U.S. regarding risks, largely coordinated within the Centers for Disease Control and Prevention (CDC). The Department of Defense (DoD) receives medical intelligence from the National Center for Medical Intelligence (NCMI), but this less-developed information is largely restricted to individuals with higher-level security clearances. Additionally, neither the CDC nor NCMI provides substantive early warning information to the various Combatant Commands (COCOMs), ground troops, medical personnel, or any other uniformed service member.

To effectively protect both military forces and the public *writ large*, the DoD must improve its biosurveillance efforts, particularly by integrating intramural laboratory activities that are often overlooked in broader strategic analyses. While the 2024 National Defense Authorization Act directed the DoD to review its current biosurveillance strategy, the resulting actions led to the creation of more fragmented efforts, divided primarily between biodefense and public health. There are some notable successes, such as the centralized Multidrug-Resistant Organism Repository

and Surveillance Network (MRSN) laboratory in Maryland, which has a strong surveillance network for resistant bacterial pathogens. However, the high-impact work and strategic value of MRSN are frequently misunderstood or neglected by rotating senior leadership. To fully leverage its capabilities, the MRSN, at the Walter Reed Army Institute of Research, must be able to seamlessly integrate its data into a comprehensive, multi-tiered analysis program that provides access to all relevant stakeholders (e.g., federal agencies, clinical teams, COCOMs, military intelligence, DoD policymakers).

Areas of Consensus (AoC) and Actionable Next Steps (ANS)

AOC 1.1: Existing research and development infrastructure needs to be leveraged across all settings with priority placed on modernizing the collection, transmission, and analysis of data by a team of multi-disciplinary analysts (e.g., medical, intelligence, and operational) crafted into a dynamic cloud-based format will provide the DoD the early warning it needs to activate and further develop safety measures for active duty forces.

- **ANS 1.1.1:** Coordinate DoD biosurveillance efforts to include the intramural laboratory activities often neglected in the larger strategy analysis.
- **ANS 1.1.2:** Create the ability to seamlessly feed data into a multi-layered, interoperable data and analysis program that allows for access at all levels (i.e., federal, clinical, COCOM, military intelligence, and DoD policy).
- **ANS 1.1.3:** Incorporate data of all types (e.g., physical, digital) and newer approaches (e.g., geotagging, wastewater surveillance - which has shown promise for viral pathogens).

*** A Position Paper prepared for presentation at the ISGP Debate/Caucus Conference of the ISGP Program on "Global Emerging and Persistent Infectious Diseases - Armed Forces Impact" (GEPID – AFI), organized and convened using in-person and limited internet access on October 14-15, 2024.*

Debate One Summary

This not-for-attribution Debate Summary was prepared by ISGP staff from an audio recording, and its transcription, of the debate of the Position Paper presented by (Ret. COL) Dr. Paige Waterman (see Position Paper above and author biographical information in the Appendix). Dr. Waterman initiated the debate with a 5-minute statement of her views and then actively engaged the Conference participants, including other authors, throughout the remainder of the 60-minute debate period. This Debate Summary represents the best effort of

the ISGP to accurately capture the comments offered and questions posed by all participants, as well as those responses made by Dr. Waterman and participants. Given the not-for-attribution format of the debate, the views comprising this summary do not necessarily represent the views of Dr. Waterman, as evidenced by her Position Paper. Rather, it is, and should be read as, an overview of the discussion and exchange of views and priorities, both in support and opposition, to points expressed by all those participating in the debate.

The armed forces face a number of infectious disease (ID) threats from those naturally acquired (e.g., respiratory or zoonotic illnesses, intentional exposure, engineered bio threats), or sequela to other primary events (e.g., wounds from traumatic injury). It may only require one infection to threaten others through a deployed force by impacting readiness, and potentially, public health security throughout large military and/or public communities. It was agreed that effective early warning systems against ID threats to the armed forces need to be significantly improved.

Currently, the U.S. Department of Defense (DoD) primarily relies on retrospective biosurveillance data from a variety of sources from the Centers for Disease Control and Prevention (CDC), the National Center for Medical Intelligence (NCMI), the Armed Forces Health Surveillance Division (AFHSD) at Global Emerging Infections Surveillance (GEIS), and the Defense Health Agency (DHA) Public Health division of the DoD. It was noted that the overall data collected from these agencies have not necessarily been able to provide a substantive early warning of ID threats to combatant commands, medical personnel *writ large*, research and development communities, and policy makers. Best practices for refining data and targeting specific areas of data collection (e.g., geospatial, metadata, emerging pathogens, targets identified by the military), along with distinguishing synthetic and naturalized ID threats were discussed. It was suggested that collective data be analyzed to customize responses leveraging respective agency capabilities to create a pre-hospital, pre-clinician surveillance network for preparatory ID threat response. It was mentioned that the DoD was caught unprepared for an ID threat to service members with the example of a bacterial pathogen, Acinetobacter, that presented itself with increased resistance and frequency and significant morbidity and mortality. More recently, the COVID-19 pandemic highlighted numerous gaps in ID preparedness, including the inability to effectively test for diseases and actively surveil, both resulting in dramatic health and readiness impairments to the armed forces.

The most effective response mechanisms to trigger a public health response after detection of a novel pathogen were discussed (e.g., biosurveillance environmental

sampling device, symptom-based public health tool, well-trained clinicians who detect an unusual factor with diagnostic laboratory support). It was noted that in the U.S., the DoD and other federal agencies have target-driven surveillance systems based on current emerging threats, but a biosurveillance environmental sampling device may not be currently commercially available or effective. It was noted that trained clinicians can be the most adept at noticing a novel pathogen first, but may not have the instruments, communication tools, and/or diagnostic capabilities to alert the necessary agencies into action. While a syndromic approach for detecting a novel pathogen can be effective, there are major opportunities to establish more efficient public health responses through improved interdisciplinary (i.e., government, private sector, academia) approaches focused on increasing data collection and technological responses. To increase effectiveness of multi-sector partnerships for long-term, sustainable success, enhanced communication, collaboration, and funding capabilities are needed to best prepare for emerging threats before they present within diverse populations and impact the armed forces.

There was concern regarding the spread of misinformation and discreditation of real data. To effectively counter misinformation and discreditation, social scientists need to be engaged in the early-stage design and analysis of data collection systems to improve the incorporation of effective communication tools, including methods for information dissemination. An understanding of the potential value of specific assets (e.g., results and partnerships emerging from overseas labs) is an important element in enhancing data collection. It was agreed that practicing communication strategies (i.e., evolving methodologies evaluating diagnostic and therapeutic needs, recognizing useful innovation as well as the emerging synthetic or naturalized options) within biosurveillance systems is necessary to plan an effective response.

It was suggested that the DoD improves its biosurveillance efforts by integrating intramural laboratory activities to focus on strategic analysis, topics that are often now overlooked. The DoD Multidrug-Resistant Organism Repository and Surveillance Network (MRSN), conceptualized in 2003 to respond to Acinetobacter (realized in 2009) was mentioned as an example that provides a "close to real time" genomic information collection system for newly diagnosed bacterial infections. It was mentioned that despite the global impact of SARS-CoV-2, there is a lack of a comparable system to the MRSN for viral diseases.

It was posited that several overseas DoD laboratories positioned strategically in important regions currently perform surveillance activities with programs funded through competitive proposals (e.g., the Global Emerging Infection Surveillance Program) that slow the acquisition and transfer of data. Although these overseas

laboratory data collection structures are routinely underfunded, each has the potential to serve as an important component within the early-warning system for disease monitoring. The funding support for overseas DoD laboratories needs to be more robust and continuous for both research and ongoing biosurveillance throughout their respective regions. Opportunities to focus on acquiring data for specific exposure threats are also essential for effective data collection and dissemination of value to armed forces.

There is a need to increase (i) diversity of sources from which biosurveillance data are collected (e.g., wastewater from airplanes, ships, hospitals, and other aggregated military locales) and (ii) incorporation of advanced methodologies (biometrics, geotagging) that link to existing clinical systems. The layering of information from multiple sources and interpreted via coordinated methods, can significantly improve data analysis systems. New biosurveillance data systems can be imagined as a "data science cycle" where information is collected and understood within its real-world context using analytic tools that prepare the messaging of the outcomes for dissemination to relevant stakeholders and the public *writ large*. As new and/or reanalyzed data become available, the "data science cycle" is updated in recognition of the need to continuously reevaluate notional and historical data sets to identify evolving trends, accurately characterizing a given disease.

Aside from increasing data collection, it was agreed that there is a need to simultaneously use infrastructure for research and development along with data storage, transmission, and analysis. Prioritization of data collection was also discussed, with potentially using machine learning to efficiently categorize relevant health data through algorithms designed to respond to early warning signs of ID threats. It was noted that a revised data system, using these technologies, can be used beyond research applications by broadening analytical teams outside of the scope of public health personnel to include intelligence and operational experts, social and environmental scientists, and bio and computer science engineers. Seamlessly feeding data into a multi-layered, interoperable system can increase access for stakeholders with diverse perspectives, reflecting the priorities of different communities (e.g., federal interagency, clinical, combatant commands, intelligence leaders, policy makers). The value of any proposed data collection and analysis system needs to connect communities with agencies such as the Defense Health Agency (DHA), the Defense Advanced Research Projects Agency (DARPA), the National Security Arms of the Defense Threat Reduction Agency (DTRA), and the Joint Program Executive Office for Chemical, Biological, Radiological, Nuclear Defense programs (JPEO-CBRN). Not less important was its interfaces throughout the relevant private sector and civilian communities from which the multilateral approaches and priorities can

enhance the synthesis of the information needed to implement real-world strategies. There was uniform consensus that the health of deployed armed forces requires the design and implementation of new biosurveillance systems to proactively assess and respond to ID threats. Engaging multilateral partners is essential in the creation of any new, collaborative biosurveillance system, rather than operating on the "siloed" paradigm from decades past.

In the implementation of a redefined biosurveillance data collection system, it was questioned how public and private sectors can most effectively prioritize investments by calibrating risks within identified challenges (e.g., technical development, political will, organizational inertia, funding limitations). It was noted that efficient funding opportunities can be determined by understanding the full scope of proposals from conception to outcomes. Funding of a given program can be increased based on its proven contribution to a data collection paradigm (e.g., wastewater biosurveillance) that can be used in real-world settings. Concurrently, ineffective research or faulty applications of research methods can be eliminated to shift funding to more successful efforts. Efficient funding for biosurveillance depends on leveraging against realistic applications, since simply increasing funding is not always effective. Within the military construct, surveillance is generally grouped with intelligence and reconnaissance from decision makers. Biosurveillance offers a credible foundation for informing intelligence *writ large* in an all source domain and can potentially lead into programmatic funded capabilities (i.e., command and control in military operations). Since resources are likely to remain constrained, with contested supply chains across Europe, Middle East, and the Asia Pacific, biosurveillance can coordinate defense and national security stakeholders for biointelligence decisions within the command and control construct.

It was agreed that having increased efforts on data collection and analysis can provide an increased understanding of multiple data streams, including using a One Health approach to examine multiple vectors (e.g., various species, laboratory data, degree of stability, population dynamics, climates, and regions). The overall approach is distinct from a singular response to human syndromes. Since armed forces personnel are deployed worldwide, they can introduce environmental disturbance or disease (i.e., by presence, equipment) to local humans, animals, and plants, resulting in unexpected economic damage in the area and subsequently decreases the popularity of the military within local communities. These factors need to be considered within the suggested paradigm shift of how governmental agencies organize their operations in military biosurveillance programs. Since human health factors impact both economic stability and national security, the dissemination and prioritization of data within these linkages between health,

economy, and security can determine appropriate response outputs. Within the context of the U.S., it was questioned whether the DoD Biodefense Posture Review (BPR) is a comprehensive tool for ID threat preparedness. While the concepts within the BPR are comprehensive, there is a need to establish funding collaboration and to improve communication among public health and biodefense communities that strengthens the boundaries in data sharing necessary to efficiently respond to an ID threat.

Position Paper Two
Multidisciplinary Prioritisation, Data, Diagnostics, Education, and Training for Infectious Disease Threats**

Col. (Prof.) Mark Bailey, MD FRCP FFTM DTM&H L/RAMC
Defence Professor of Military Medicine,
Royal Centre for Defence Medicine, UK

Current realities

Clinical and laboratory data on military infectious disease patients is under-utilised compared to that for trauma patients. These data are essential, however, to understand the impact of infectious disease in military personnel, even when a confirmed diagnosis is not made. In deployed military settings, confirmed diagnoses are often not made due to resource limitations. While there is currently a revolution underway in microbiology diagnostics, further development and innovation is required in order to determine which novel diagnostic tests are best suited for military use. These tests also need the ability to detect (possibly rare) infectious disease agents that could be used in deliberate release attacks. As such, having a robust system of making confirmed microbiology diagnoses will enable the identification of infectious diseases, along with the ability to distinguish between natural and intentional infectious disease threats.

Responses to infectious diseases include antimicrobial drugs, other antimicrobial treatments, immunoprophylaxis, chemoprophylaxis, environmental health (EH) measures, and infection control and prevention (ICP) measures. Similar to ongoing diagnostic efforts, infectious disease responses need further development, innovation, implementation, and evaluation to ensure that they are successful in a variety of military settings. Notably, innovation surrounding biomedical and technological capabilities for real-world, practical use is just as critical as novel research.

Research is of little value without effective implementation through education and training of military healthcare workers. Most military healthcare workers do not work permanently in military or deployed settings, especially military reservists and National Guard personnel in the U.S. Hence, there is usually a gap, or "delta," between their knowledge, skills, practices, and behaviour when they work in different healthcare settings.

Overall, the management of infection, including diagnosis, treatment, and prevention, requires a multidisciplinary approach involving medical microbiologists, infectious disease physicians, and public health specialists, including practitioners in EH and ICP. All these specialties should be consulted when optimising research agendas, data analyses, and diagnostic priorities for infectious disease threats, with input from practicing and deployable military healthcare workers being most important.

Areas of Consensus (AoC) and Actionable Next Steps (ANS)

AoC 2.1: Though rarely available for military patients, especially on deployments, comprehensive electronic medical records are a valuable asset for military health, even though they remain at risk to be compromised by electronic warfare.

- **ANS 2.1.1:** Target data collection to avoid incomplete or inconsistent data collection, or an excessive workload (i.e., for clinicians, etc.)
- **ANS 2.1.2:** Standardize data collection across military forces and alliances (e.g., North Atlantic Treaty Organization (NATO)) and establish common definitions via a NATO Science and Technology Organization Technical Activity Proposal.

AoC 2.2: Every military patient with an infectious disease needs to have a confirmed laboratory diagnosis so as to provide optimal clinical management, including psychological reassurance, improve force health protection, and promptly detect unusual cases or outbreaks.

- **ANS 2.2.1:** Develop diagnostics through private sector cooperation with military and public healthcare scientists.

*** A Position Paper prepared for presentation at the ISGP Debate/Caucus Conference of the ISGP Program on "Global Emerging and Persistent Infectious Diseases - Armed Forces Impact" (GEPID – AFI), organized and convened using in-person and limited internet access on October 14-15, 2024.*

Debate Two Summary

This not-for-attribution Debate Summary was prepared by ISGP staff from an audio recording, and its transcription, of the debate of the Position Paper presented by Col. Mark Bailey (see Position Paper above and author biographical information in the Appendix). Col. Bailey initiated the debate with a 5-minute statement of his views and then actively engaged the conference participants, including other authors, throughout the remainder of the 60-minute debate

period. This Debate Summary represents the best effort of the ISGP to accurately capture the comments offered and questions posed by all participants, as well as those responses made by Col. Bailey and participants. Given the not-for-attribution format of the debate, the views comprising this summary do not necessarily represent the views of Col. Bailey, as evidenced by his Position Paper. Rather, it is, and should be read as, an overview of the discussion and exchange of views and priorities, both in support and opposition, to points expressed by all those participating in the debate.

The debate predominantly revolved around whether it was necessary for every armed forces patient to have a confirmed diagnosis and how that would be achieved (i.e., diagnostic or clinical approach). If similar symptoms present within a given congregate setting (e.g., sailors in close cohabitation), it was argued that diagnostic testing for a sample of individuals may suffice for the group, supporting the claim that confirmed diagnosis for every individual may not be necessary. In contrast, while under certain circumstances performing diagnostics for a selection within a group may be adequate to accurately monitor the entirety of the cohort, it may also risk insufficient differentiation between cases presenting with similar symptoms (e.g., traveler's diarrheas, viral gastroenteritis, bacterial gastroenteritis). This outcome would not allow for the appropriate segregation of patients into different isolation areas to prevent further transmission, thereby supporting the argument that individual diagnosis is significant from clinical and operational perspectives. It was further argued that every patient may not need individual testing if knowledge and skill of the clinician, or artificial intelligence (AI), were leveraged to identify symptoms that support a different diagnosis from the larger outbreak.

The need for different types of diagnostics (e.g., lateral flow assays, immunoassays, molecular assays, serology, metagenomics, proteomics, epigenomics, next generation sequencing, pathogen agnostic tests) to suit different infectious disease (ID) circumstances (i.e., emerging unknown versus circulating known) was highlighted, with emphasis on learning the needs of deployed armed forces personnel. After exploring the tradeoffs between rapid and detailed diagnostics, it was suggested that a balance between the two options is optimal, assuming appropriate, but not excessive, training and policy instruction was available within the armed forces. It was noted that rapid diagnostics can help with specific therapeutic decisions (e.g., antibiotic selection) for syndromic treatment, in conjunction with an empirical treatment approach. Strong support was expressed for diagnostic tests and the rapid development and publication of globally recognized (e.g., World Health Organization) diagnostic codes for emerging ID with pandemic potential. These results would strengthen the monitoring of the evolution of an

ID event using electronic medical records (EMR). It was suggested that internal codes could be developed in the interim before formal International Classification of Diseases (ICD)-10 codes were published to better support clinical work during an emerging ID event.

The debate expanded to the larger topic of EMR implementation for focused, and perhaps standardized, data collection. EMR were touted for being legible and digitally archived, but often of limited value due to lost complexity of the information. It was also noted that EMR can be expensive, delayed to employ, and struggle with interoperability. It was advised that EMR, or more broadly, data collection for the armed forces, needs to be carefully designed with input from clinicians of all professions. It was proposed that commonly agreed upon definitions (e.g., for acute gastroenteritis (AGE), respiratory tract infection (RTI), skin and soft tissue infection (SSTI)) by an informed panel (e.g., North Atlantic Treaty Organization (NATO) Science and Technology Organization Human Factors and Medicine Panel) would benefit the data analysis system. Some concerns arose regarding how to address potential security threats (e.g., cyber attacks) within EMR systems.

The potential values of, and concerns with, AI in diagnostics and EMR were prominent in the debate. It was questioned whether AI and chatbots can be useful in front-end diagnostics for non-specialists or to accelerate the interpretation of data for specialists. It was suggested that while AI may aid in the development of clinical prediction rules or determine the degree of probability of a diagnosis (e.g., image analysis of a lesion by appearance), it is still important for other details of clinical information (e.g., time of development from exposure) to be gathered and processed by an experienced clinician, or at least have multidimensional input into AI. It was cautioned that use of AI for diagnostic aid would need to be initially supervised to ensure accuracy. Further, large language AI processing was discussed as a part of armed forces research, particularly for the digitization of handwritten charts with extraction and analysis of data. These results can have the potential to transform EMR from a rigid and limited system to a more functional record system.

Since the armed forces, especially in the U.S., is primarily a purveyor of diagnostic tests, rather than an innovator, the armed forces need to effectively engage with private sector companies to develop diagnostics suited to armed force clinical needs. As public laboratories often use older technologies and are not able to make field-appropriate, rapidly deployable diagnostic tests required by the armed forces, armed force agencies need to enhance private sector partnerships. Bidirectional dialogue between the armed forces and private sector was emphasized for the armed forces to better express their needs and the private sector to more easily explain their capabilities. Notably, the development of agnostic diagnostic tests for a wide range

of pathogens is of high importance, especially since armed force diagnostic needs may be niche or include emerging viruses that may be only relevant for a short time.

Training and education for armed forces and medical personnel received significant focus in the debate and are intricately tied to new developments in diagnostics. Notably, there is a need to address the gap in knowledge and skills among the civilian and armed force practices of armed forces healthcare workers, as many spend significant time working in civilian settings. Further, since specialists might not be present on deployments or remote cases, it was argued that the education and training burden put on armed forces could be balanced with "point and click" technology. In response, it was cautioned that interpretation of results is significant in addition to receiving the diagnostic result, and therefore, education and training, or at least a reach back service to a specialist, is critical. The importance of communication plans was discussed to prevent misinformation within armed forces ID. There was a particular focus on how armed force healthcare workers communicate to their patients, especially surrounding emerging ID or in the absence of a confirmed diagnosis. It was also noted that information shared among troop members through informal conversations can be useful to learn about common symptoms or transmission and can be carefully leveraged to combat misinformation.

Special attention was given to the unique situation of U.S. National Guard units and reservists, since they receive medical care both in the civilian and armed force sectors. Additional complexity arises from U.S. National Guard units being deployed from local environments, and due to not being federalized, report to 50 different governors (i.e., commanding officers). U.S. governors are not generally unified in their medical decisions (e.g., vaccinations, therapeutic treatments). It was noted that in the UK, reservists have some of the most delayed diagnoses, longest morbidities, and biggest comorbidities, particularly psychological aspects, because they do not remain part of the service after deployment. It was emphasized that reservists need to receive equal access to armed forces healthcare.

The debate was underscored by two key themes of (i) multidisciplinary approaches and (ii) prioritization of needs with regards to ID threats and strategic planning. Within prioritization of needs, urgency arose from the concern that the next war or ID threat may already be upon us. This view was highlighted by the conflict in Ukraine and the understanding that time and resources are finite. Within the context of ID, it was argued that the impacts on operational effectiveness, along with long-term effects on individuals (e.g., uncertainty due to lack of confirmed diagnosis, fatigue syndrome), need to be considered when determining a prioritization or scoring system for ID threats. Within limited resource settings, it was asserted that training programs and maintaining clinical skills while using

diagnostic tools (i.e., diagnostic aids that support but do not result in loss of skill of the user) must be emphasized in the event diagnostics fail or are unavailable.

Throughout the debate, there was an underlying contrast between the fields of ID and trauma. In trauma, the inciting event is almost always known, unlike in the ID field, especially for the first few cases. Further, the armed forces trauma field utilizes vast data collection, notably absent in ID. While some uncertainty was expressed about the utility of a similar data collection approach for ID, more sophisticated data collection was supported to understand not just mortality, but morbidity, operational effectiveness, and long-term consequences. The trauma field was lauded for having dedicated resources and for their ability to coordinate across different nations for data collection. Inspiration for a better ID system can be taken from the trauma field, in particular the Joint Trauma Registry, and the broader organization and policy that underpin the trauma field.

Position Paper Three
Facing Future Viruses: Military-Civilian Healthcare Collaboration**

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Current realities

Biological threats, including lethal toxins (e.g., botulinum, ricin) and emerging infectious diseases, naturally occurring (e.g., zoonotic diseases) or man-made (e.g., through biotechnology like CRISPR-Cas) pose significant risks to global society. Particularly, if a human-made or engineered pathogen were to escape or be released from a laboratory, the consequences could be catastrophic. Some synthetic pathogens could potentially kill more people and cause greater economic devastation than the SARS-CoV-2 outbreak. In a worst-case scenario, the global death toll could exceed historical records (e.g., the Black Death, which killed one in three people in Europe). The COVID-19 pandemic highlighted the importance of a robust and scalable bio-defense program to prevent negative economic impact and mass loss of life.

In the event of a major infectious disease outbreak, civilian health systems and military resources must work closely together for an effective response. Civilian agencies have the capacity to lead the public health efforts, while the military offers logistical support, security, and field hospitals. Military intelligence agencies have the infrastructure and capability to collect and analyze data at a global level, providing early warning of potential biological threats. Civilian health organizations, on the other hand, possess the expertise in epidemiology and public health, which is essential for accurate risk assessment. Joint training, scenario planning, and a shared understanding of protocols will ensure seamless cooperation during a crisis. Sharing information across these sectors facilitates swift, data-driven decision-making. Military support to the civilian sector is crucial when public health systems are overwhelmed, both for national relief efforts and for international humanitarian operations in CBRN-affected areas.

Areas of Consensus (AoC) and Actionable Next Steps (ANS)

AoC 3.1: Close cooperation between civilian public health systems and military defense is essential to manage public health crises. Continuous environmental monitoring for biological threats and unusual disease outbreaks is crucial, along with effective detection, rapid identification, tracking of pathogen movements, and preparedness with medical countermeasures for protection and resilience against infectious disease outbreaks.

- **ANS 3.1.1:** Arrange a leadership in global health surveillance to clarify responsibilities for monitoring infectious diseases that could lead to pandemics (e.g., World Health Organization).
- **ANS 3.1.2:** Enlist military alliances (e.g., NATO) to prioritize epidemic response and biodefense research through engagement with civilian entities.
- **ANS 3.1.3:** Support global research in military and civilian sectors to identify pathogenic diseases in humans, livestock, and wildlife, including the study of pathogenicity islands in these pathogens.
- **ANS 3.1.4:** Organize joint research and development between military and civilian institutions to advance pathogen detection, diagnosis, and containment technologies, accelerating innovations in vaccines, therapeutics, and diagnostics.
- **ANS 3.1.5:** Ensure information is shared across sectors to enable timely and informed responses to an outbreak.
- **ANS 3.1.6:** Identify and train military personnel who can be mobilized during severe infectious disease outbreaks to aid civilian response.

*** A Position Paper prepared for presentation at the ISGP Debate/Caucus Conference of the ISGP Program on "Global Emerging and Persistent Infectious Diseases - Armed Forces Impact" (GEPID – AFI), organized and convened using in-person and limited internet access on October 14-15, 2024.*

Debate Three Summary

This not-for-attribution Debate Summary was prepared by ISGP staff from an audio recording, and its transcription, of the debate of the Position Paper presented by (Ret.) Cdr. Dr. Stef Stienstra (see Position Paper above and author biographical information in the Appendix). Dr. Stienstra initiated the debate with a 5-minute statement of his views and then actively engaged the Conference participants, including other authors, throughout the remainder of the 60-minute debate period. This Debate Summary represents the best effort of the ISGP to accurately capture the comments offered and questions posed by all participants,

as well as those responses made by Dr. Stienstra and participants. Given the not-for-attribution format of the debate, the views comprising this summary do not necessarily represent the views of Dr. Stienstra, as evidenced by his Position Paper. Rather, it is, and should be read as, an overview of the discussion and exchange of views and priorities, both in support and opposition, to points expressed by all those participating in the debate.

It was widely agreed that armed forces have the necessary capabilities needed to aid and protect the civilian sector in the event of an infectious disease (ID) outbreak. For example, the U.S. Department of Defense (DoD) has access to supercomputers to model antibodies to any pathogen, including their characteristics (e.g., ease of manufacturing, stability, toxicity) to provide a set of best candidates for treating a novel pathogen infection. Across North Atlantic Treaty Organization (NATO) Allies, diverse approaches exist for integrating armed force capabilities into civilian systems to support public health priorities. In the Netherlands, the armed forces monitor wastewater and canal systems and analyze the data using armed force computing power to provide trusted reports to the civilian public health system, which are absorbed by authorities and integrated into response plans. There were concerns expressed, however, about the presupposition that effective governance and the ability to scale such systems are present, acknowledging that some countries may not have the infrastructure to support surveillance or early warning systems.

A military-civilian collaboration in Germany, with an armed force-commanded operational laboratory using polymerase chain reactions (PCR) to amplify DNA sequences, supports non-national civilian organizations (e.g., Doctors Without Borders). During the COVID-19 pandemic, UK armed force officers with skills in planning and logistics were deployed at national and regional levels to help civilian response. The NATO Joint Chemical, Biological, Radiological and Nuclear (CBRN) Defense Center of Excellence (COE) was designated to prepare civilian systems with response capabilities during the Qatar World Cup in 2022 to assist in designing defensive and first responder plans for civilian agencies. There is a need to establish effective strategies to prepare for, and respond to, ID threats by implementing successful tactics tailored to the needs of specific countries while ensuring the overall strategy accounts for a wide range of threats.

Other opportunities for enhancing armed force and civilian relationships were exemplified in the environmental surveillance conducted for the H5N1 "Avian Influenza" Virus in the U.S., wherein farmers were hesitant to offer information to the regulatory body (i.e., U. S. Department of Agriculture). Retaining a neutral, third-party to collect this information while maintaining public trust is needed to enhance the flow of data required for armed force decisions on ID.

It was noted that effective armed force applications in civilian public health response may or may not increase the popularity of the armed forces among civilians. It was contended that armed forces may be counterproductive in epidemic response, citing how the presence of uniformed service members in civilian communities can often result in fear rather than reassurance. Furthermore, in countries where trust in governmental authorities has eroded, it can prove difficult to convince the public *writ large* of the beneficial aid the government intends to provide.

The existing relationships between armed force health systems and public health systems globally were examined. Some participants maintained that in several European countries, the armed forces and public health systems work closely together. In the Netherlands, armed force doctors spend time in contract hospitals, getting civilian experience in medicine that is not of typical priority in the armed forces (e.g., obstetrics, pediatrics). Within the NATO Joint CBRN-Defense COE, armed forces and civilian personnel are trained together, allowing for better cooperation once operative. In the U.S., however, there is a divide between the armed forces and civilian healthcare systems, as armed forces personnel are treated in military hospitals, and civilians are treated in civilian hospitals, with little crossover. The existing strong relationships between U.S. armed forces and civilian health systems with respect to trauma and surgery were recognized, but these close relationships do not exist for ID. There is a significant need to strengthen this interconnectivity for ID.

Concern was voiced regarding the democratization of biological warfare, acknowledging how increasingly advanced computer systems and technology have removed barriers to entry and made the manufacturing of biological weapons more accessible for lay people. Participants warned against the use of artificial intelligence (AI) to aid criminals and terrorists in the creation of biological weaponry, and some advocated for a proactive posture in restricting access to certain AI capabilities or limiting knowledge-sharing about biological threat agents. Regarding the risk of biological weapons, it was noted that civilian actors will likely be the first responders, and because they are largely untrained in biological weaponry, they need armed forces support in the form of CBRN-defense units. These connections can provide the required equipped and rapid access to expertise needed to guide civilian response.

The ability to attribute an ID outbreak to a specific source, and specifically to nefarious intentions, was deemed a topic of importance. The status of attribution capabilities was questioned, and the advantages of having advanced attribution capabilities were asserted. Specifically, the ability to accurately attribute an outbreak can serve as a deterrent, thereby limiting the likelihood that a malicious actor will use biological warfare. Knowledge of rapidly applied attribution capabilities can aid in

convincing the public *writ large* that the source of an outbreak is correctly identified, thereby encouraging cooperation and response. Countries and organizations have various approaches for forensic attribution. The UK Microbial Forensics Consortia employes a One Health model that integrates the efforts of frontline laboratories from various sectors (i.e., clinical, veterinary, plant, food, and aquaculture) to strengthen microbial forensic outcomes in support of the accuracy of attribution capabilities at the national level. In contrast, the National Forensic Institute CBRN laboratory in the Netherlands was closed due to lack of sustainable funding.

Internationally, the Organisation for the Prohibition of Chemical Weapons offers forensic research, but only for a small number of biological threats which limits its capability for forensic attribution of ID. Recognizing the lack of consistency in forensic attribution prioritization, participants advocated for greater research and resources dedicated to enhancing forensic attribution capabilities. Since the Biological Weapons Convention prevents armed forces from engaging in biological warfare, participants argued that a civilian setting is best suited to determine attribution for a biological outbreak. Civilian law enforcement would be responsible for the detection of biological weaponry, and civilian justice systems supervise legal actions and punishment regimes. The sole involvement of the armed forces is to provide expertise and knowledge about biological threats. Opposition to civilian control of attribution processes noted that government-sponsored or armed force laboratories in adversary countries also have the capacity to create and deploy biological weapons. Civilian entities cannot be solely relied upon to identify, prosecute, and punish these crimes. There needs to be a degree of armed force involvement to ensure the safety and protection of armed forces personnel and civilians alike.

The importance of surveillance mechanisms designed to identify and detect unknown pathogens was highlighted. To advance pathogen detection, the criticality of prioritizing disease research and development for specific pathogens was noted. While the value of various lists of priority pathogens currently created by different national governments and international organizations were acknowledged, it was emphasized that tangible action to address potential and current threats are of highest priority. Creating a wide scale BioWatch Program of genetic information, sourced from the environment, was proposed, but participants cautioned against the potential consequences of false positive results that would disrupt the normal functionality of many societies. It was agreed that armed forces and NATO funds are essential to support an effective BioWatch Program, recognizing the financial difficulties within public health systems (i.e., lack of designated funds), and the challenges for production in private industry for a niche market.

The role of the private sector in preparing for, and responding to, ID within the armed forces was deliberated, noting how the private sector can offer great innovations in continuous environmental monitoring and sequencing for pathogen identification. While significant DoD-private sector collaboration exists in the U.S., armed force establishments in Europe are hesitant to involve the private sector due to legal constraints and regulations concerning competition and existing procurement agreements. These policies limit opportunities for armed forces to act as early-stage partners for private sector ID ventures in many European countries. There were also concerns about how the private sector is typically excluded from discussions surrounding global norms and policies and the division of responsibilities in preparing for and responding to global emerging and persistent ID threats. The NATO Development Fund and the Defence Innovation Accelerator for the North Atlantic were heralded as progressive approaches to leveraging private sector research and development for combating ID outbreaks. Some concern was expressed that current pathways are too reluctant to engage with private industry and do not work quickly enough to foster productive development.

The need for enhanced communication strategies and information sharing to bridge the knowledge gap between intelligence and practitioners was identified. Some participants discerned that civil service personnel conclude that information only flows unilaterally and that armed forces are only interested in receiving data, not sharing it, even when there is practical use within civilian systems. The challenge of sharing data among government departments and nations was recognized. Even when data is successfully shared, concern about misinterpretation of data by non-subject-matter-experts and generalist decision makers was cautioned. A software or service that can unify efforts in a non-biased platform to facilitate government-to-government collaboration was proposed.

It was also acknowledged that collaboration is not only about a formal exchange of information, but a mutual cooperation in understanding and presenting data, predicated on comprehension of how cultural differences can impact the interpretation of data. Such intercultural gaps can be resolved through in-depth communication engaging knowledgeable participants with diverse perspectives and priorities informed by experience within distinct environments and cultures. The proliferation of misinformation among professionals and the public *writ large* arising from inaccurate communication during crises was identified, leading to widespread distrust in authorities. The increasing weaponization of ID disinformation by governments and criminal organizations was noted with concern.

The advantages and disadvantages regarding the classification of health data and information were debated. It was argued that authorities need to use transparent

communication strategies when feasible to allow for an open scientific view of new developments in healthcare, while others countered that health information is a national security issue. It was asserted that because of the wealth of information that exists outside of prevailing authorities (i.e., U.S., NATO, World Health Organization), the exchange of information between entities needs to be unrestricted. The open exchange of information was viewed as important for bolstering public health responses worldwide. Retaining health data and ID information by highly classified institutions was considered risky given the opportunities to promote unfounded rumors that expand the impact of fake news underlying public confusion and distrust. Adversaries need to be discouraged from using mis- and disinformation by establishing a trusted system for rapidly providing accurate ID information.

Position Paper Four
Enhancing the Role of Military in Biodefense and Pandemic Preparedness**

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Current realities

The U.S. Department of Defense (DoD) and other militaries have unique biodefense research capabilities, objectives, strengths, and weaknesses for surveillance and product development.

DoD requirements for medical readiness are different from research priorities in the civilian sector due to different epidemiologic considerations and immunologic goals, specifically determined by the classic epidemiologic triad (i.e., host, pathogen, and environment). Often the hosts are young, healthy adults, 75-90% of whom are men, and may be exposed to a pathogen to which they are immunologically naïve for ill-defined but often extended periods of time, occasionally with little preparation. Militaries often have interest in different epidemiologic end points beyond preventing severe illness and death, including lost duty days. An emphasis on minimizing illness leads to immunologic approaches focusing on a high level of protection during deployment. The pathogens of interest are often not endemic or emerging in the U.S., and therefore industry and academia may be less incentivized to invest in these areas despite high pandemic potential. Lastly, the unique military environments, including congregant settings, operating in areas of conflict, and austere conditions, lead to unusual exposures and need for easy-to-use countermeasures with uncomplicated supply lines and logistic support.

Embedded overseas labs on every continent are a strength of the DoD, many of which are more than 50 years old. Other strengths of the DoD include military-to-military and military-to-civilian research projects targeting priority pathogens, allowing for access to unique samples and biologic materiel. However, the DoD struggles with competing operational and clinical priorities that impede funding. Further, the DoD is not staffed with specialized experts who can support bench-to-bedside countermeasure development. DoD operations are also limited by geopolitical climate and acceptance by partner nations.

Areas of Consensus (AoC) and Actionable Next Steps (ANS)

AoC 4.1: Mil-to-mil and mil-to-civ biodefense projects offer unique opportunities to enhance global biosurveillance and medical countermeasure development. An understanding of the priorities, strengths, and shortcomings of military biodefense research programs can improve coordination between all scientists to support global health and pandemic preparedness objectives.

- **ANS 4.1.1:** Foster biodefense collaborations between militaries and subject-matter experts in academia, industry, and other governmental organizations that emphasize keeping biologic samples in host countries and bring capabilities to the frontline.
- **ANS 4.1.2:** Develop ethical and sustainable biodefense research projects that have specific objectives aligned with unique biodefense goals of the military while achieving contemporary public health goals of international partners where the research originates.
- **ANS 4.1.3:** Perform surveillance for novel and known pathogens in high-risk locations (i.e., known areas where outbreaks are likely to occur based upon microbe classes and economic, ecologic, political, and environmental factors).
- **ANS 4.1.4:** Obtain and share biologic material or genetics structures from priority pathogens to support the development of countermeasures (e.g., off-the-shelf monoclonal antibodies, phage libraries, vaccines).
- **ANS 4.1.5:** Transfer finished countermeasure products, technology, and manufacturing capabilities to the international location from which it was sourced for future deployment.
- **ANS 4.1.6:** Invest in a pipeline of young international scientists, focusing on capability building, especially communication skills (e.g., grant writing, public speaking).

*** A Position Paper prepared for presentation at the ISGP Debate/Caucus Conference of the ISGP Program on "Global Emerging and Persistent Infectious Diseases - Armed Forces Impact" (GEPID – AFI), organized and convened using in-person and limited internet access on October 14-15, 2024.*

Debate Four Summary

This not-for-attribution Debate Summary was prepared by ISGP staff from an audio recording, and its transcription, of the debate of the Position Paper presented by CAPT Andrew G. Letizia (see Position Paper above and author biographical information in the Appendix). CAPT Letizia initiated the debate

with a 5-minute statement of his views and then actively engaged the Conference participants, including other authors, throughout the remainder of the 60-minute debate period. This Debate Summary represents the best effort of the ISGP to accurately capture the comments offered and questions posed by all participants, as well as those responses made by CAPT Letizia and participants. Given the not-for-attribution format of the debate, the views comprising this summary do not necessarily represent the views of CAPT Letizia, as evidenced by his Position Paper. Rather, it is, and should be read as, an overview of the discussion and exchange of views and priorities, both in support and opposition, to points expressed by all those participating in the debate.

An underlying theme throughout the debate was the importance of trust while conducting and communicating research, especially when designing scientific research and working with partners at overseas laboratories. There is a need to understand how interagency relationships work with world actors (e.g., nongovernmental organizations), both within the U.S. and globally, to support the role of armed force biodefense and pandemic preparedness (e.g., through publications, relationships with laboratories, etc.). A better understanding for interagency relationships can be achieved through training and immersing armed forces personnel stationed in overseas laboratories to build firsthand relationships with key stakeholders in the biodefense field. Participants agreed upon the essential role of harmonious relationships in having sustainable and cooperative work to enhance medical readiness for partner armed forces with mutual benefit for the host country.

The unique skill set the armed forces bring to interagency relationships was acknowledged, especially with respect to leveraging overseas assets. Unfortunately, the armed forces community often remains ineffective in fulfilling promised cooperation through effective medical interventions for patients. The importance of partnering with academic and private sector communities overseas was emphasized, especially through established interagency relationships (e.g., Defense Advanced Research Projects Agency, North Atlantic Treaty Organization (NATO) Allies and partners) that permit specialists to be involved in the conceptualization, manufacturing, and scaling of innovative medical developments. Creating a trusted, virtual, globally distributed network of credible interlocutors with medical expertise was viewed as more valuable than much of the research being conducted. Such a network enables rapid access to extensive research and monitoring sources that can be activated at the point of need.

The NATO Science and Technology Organization was identified as an appropriate philosophical framework for establishing cooperative models composed

of a network of scientists with various capabilities. It compares favorably to the existing U.S. Department of Defense (DoD) network used to enhance the role of the armed forces in biodefense and pandemic preparedness. The need to outline the strengths and weaknesses of each nation and their armed forces leadership is crucial to enable effective understanding and sustainable relationship building with partner nations. Individuals who hold combat and command leadership positions need to act as connectors, uniting individuals who conduct and interpret critical infectious disease research.

The potential benefits of marketing efforts outlining the work accomplished and methods employed at overseas medical laboratories were addressed. Currently, the absence of transparent exchanges of monitoring, diagnostic, and medical research information negatively affects biopreparedness, biodefense, and global health security objectives. Marketing the benefits of shared research progress underpins the establishment of strong international partnerships among research laboratories worldwide. The need to enhance ethical and sustainable biodefense research projects globally was confirmed under conditions that ensure the results are of mutual value for all partners. Increasing the capabilities for medical laboratory research internationally not only improves global health security and biodefense, but also creates sustainability in research objectives by inspiring a new generation to continue valuable scientific endeavors.

Questions arose regarding how the armed forces defines a priority pathogen on which armed forces medical research focuses for impacts on deployment decisions. While existing lists of priority pathogens were identified, there remains a need to acknowledge how different cohorts need distinct information for medical readiness (i.e., lost duty days), especially for identifying specific countermeasures designed to prevent severe disease outcomes. Priority pathogens were noted as being those contagious pathogens for which there are no known countermeasures (e.g., Aerosolized Nipah Virus). Such pathogens are a priority not only for how they affect troops, but because they lack prior medical research focus. Though the DoD can supplement pertinent infectious disease research (e.g., influenza), these endeavors are better suited for the National Institutes of Health as they have the directed budget to sustain specific research programs. In addition to identifying priority pathogens, spillover events were determined to be increasingly important to understand, since effective biosurveillance is predicated on the identification of novel infections through sequencing the entire genome of the pathogen.

There was strong support regarding enhancing the capabilities, and concurrently the benefits, provided by overseas medical laboratories. Of special importance is the clarification of how U.S. armed forces research laboratories serve

the needs and priorities of the host countries in which they operate (e.g., development and provision of countermeasures). There remains the additional need for educating and training local healthcare workers at overseas armed force research laboratories to enhance interoperability, identified as a key component to biopreparedness. Limited resources and the consideration of opportunity costs continue to be barriers to initiating local public healthcare training efforts. The role of staffing, or the lack thereof, at overseas laboratories limits the accessibility of producing quality armed force medical research. It is important to acknowledge these barriers and identify creative solutions to focus on the primary goal of improving quality of life through effective biopreparedness research and implementation. Though there are many logistical constraints impacting the role of armed forces medical research internationally (i.e., lack of training, staffing, and funding), there is a need for mentorship to inspire the next generation of physician scientists by (i) providing and incentivizing educational opportunities for local individuals in host countries, (ii) facilitating armed forces medical training to promote job opportunities, and (iii) showing mentees the satisfaction and intrigue that accompanies contemporary armed forces medical research discoveries.

It was acknowledged that overseas laboratories are placed in strategic locations, but questions arose regarding their ability to be agile with project development and identifying novel pathogens (i.e., preventing lags in project funding, as seen during the COVID-19 pandemic). The complexity in obtaining funding and the challenges faced by researchers to modify a project were identified as critical barriers to project agility. Since these issues are often associated with contracting mechanisms, improvements that increase flexibility in managing project contracts are needed to support research progress. Educational and training opportunities focused on the quality of scientific writing are required to secure the grant funding underpinning sustained, advanced armed force medical research projects important for the ongoing viability of strategic overseas partnerships engaged in medical research. The host country needs to be prepared to continue the ongoing research programs after the armed forces medical researchers depart.

There was consensus on the importance of capacity building in medical research personnel and infrastructure by investing in the local, talented researchers and institutes to strengthen host countries administratively and financially. It was recognized that armed force researchers have different incentives than academic researchers to conduct medical research overseas and to support long-term training within host countries. Armed force researchers are incentivized via armed forces priorities to use a variety of skills and expertise to address specific challenges of immediate importance. Academic researchers are often incentivized to be

recognized as senior authors on publications addressing overarching medical issues having gravitas in international research communities. Each type of researcher can be engaged within armed forces frameworks to leverage in host country capacity building (e.g., scientific grant writing). Capacity building was acknowledged as being the future of any program, with many institutes and foundations having interest and capacity to financially contribute in efforts to strengthen and sustain armed force medical research programs.

Questions arose concerning the source of funding for overseas laboratories, with responses explaining that funding is secured through diverse institutions with competing priorities, including armed forces, academic partners, and private sector entities (e.g., Defence Health Agency, Wellcome Trust). The need to ensure project goals from the funding sources resonate and align with the priorities and public health goals of the host country and armed force research partners was emphasized, highlighting the need for additional grant writing training to sustain progressive projects.

Position Paper Five
Department of Defense Response Capabilities for Pandemic Threats**

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Current realities

While the timing and cause of future pandemics is unknown, the threat remains constant. Planning, coordination, surveillance, prompt response, rapid diagnostics, and flexibility are critical components of an effective countermeasure. The U.S. response to COVID-19 identified a mixture of successes and failures, and highlights the critical need for a rigorous, uniform national response plan, within the context of global cooperation.

While several government agencies are uniquely suited to lead the preparation and supervision for the next pandemic response, the Department of Defense (DoD) is best positioned to coordinate and streamline a response plan through a network of existing agencies. The Defense Advanced Research Projects Agency (DARPA) makes pivotal investments in breakthrough technologies for national security, led by milestone driven research, rather than incremental advancements. The Defense Threat Reduction Agency (DTRA) provides cross-cutting solutions to deter strategic attacks against the U.S. and its allies, and to prevent, reduce, and counter weapons of mass destruction and emerging threats. The Joint Program Executive Office for Chemical, Biological, Radiological, and Nuclear Defense (JPEO-CBRND) maintains full situational awareness of CBRN defense needs and policies. The Defense Health Agency (DHA) enables the Army, Navy, and Air Force medical services to provide a medically ready force for combat operations, disaster response, and humanitarian missions.

The DoD has proven contracting authority and can facilitate the transfer of funds necessary to enable an effective infectious disease response plan. The DoD has contracted health research through the above entities, as well as the Congressionally Directed Medical Research Programs (CDMRP), a global funding organization that

fosters novel approaches to congressionally targeted biomedical research areas. The DoD can also allocate funding through the Defense Auditing Agency (DAA).

Areas of Consensus (AoC) and Actionable Next Steps (ANS)

AoC 5.1: There is a need to harness the strengths and capabilities of the DoD surveillance systems to rapidly predict, detect, and respond to emerging pandemic threats. Learning from experiences during the COVID-19 outbreak, the development of an improved, dynamic response plan tailored to a variety of infectious disease scenarios will enhance the impact of military and medical responses.

- **ANS 5.1.1:** Leverage DoD funding mechanisms to identify and test available and reliable therapeutics and vaccines for suitability to the next pandemic.
- **ANS 5.1.2:** Allocate a portion of the DoD budget to support advanced testing, vaccine development, and clinical trials.
- **ANS 5.1.3:** Develop consistent and transparent national response guidelines and containment measures.
- **ANS 5.1.4:** Utilize surveillance data to develop a real-time network for laboratory and medical team deployment hot spots.

*** A Position Paper prepared for presentation at the ISGP Debate/Caucus Conference of the ISGP Program on "Global Emerging and Persistent Infectious Diseases - Armed Forces Impact" (GEPID – AFI), organized and convened using in-person and limited internet access on October 14-15, 2024.*

Debate Five Summary

This not-for-attribution Debate Summary was prepared by ISGP staff from an audio recording, and its transcription, of the debate of the position paper prepared jointly by Dr. Robert Kadlec and Dr. Geoffrey Ling (see Position Paper above and authors' biographical information in the Appendix). Dr. Ling participated through restricted online access. Dr. Kadlec initiated the debate with a 5-minute statement, then actively engaged the conference participants, including other authors, throughout the remainder of the 60-minute period. This Debate Summary represents the best effort of the ISGP to accurately capture the comments offered and questions posed by all participants, as well as those responses made by Dr. Kadlec and other participants. Given the not-for-attribution format of the debate, the views comprising this summary do not necessarily represent the views of Dr. Kadlec or Dr. Ling, as evidenced by their position paper. Rather, it is, and should be read as, an overview of the discussion

and exchange of views and priorities, both in support and opposition, to points expressed by all those participating in the debate.

Throughout the debate, the potential of pandemics to become national security threats was discussed in terms of their broad political, economic, public health, social, and military impacts. It was broadly justified that incorporating defense-oriented strategies (e.g., operationalizing public health response and wartime contract models) can enhance coordination and efficiency among domestic and international stakeholders. Participants deliberated the advantages of utilizing wartime contracting approaches when responding to a public health crisis. Of note, a primary shortcoming encountered by the U.S. government during public health emergencies was the ability to rapidly contract with the private sector in a timely and effective manner. The U.S. Department of Defense (DoD) has a unique capacity to contract and transfer funds at faster speeds than other U.S. government agencies. To address the limitation of contracting and timing, it was suggested to leverage specialized expertise, including the appointment of a chief contracting officer with a background in the U.S. Special Operations Command procurement, for the use of expedited mechanisms (i.e., other transaction authorities and letter contracts which can be written within a day). This recommended approach could bypass traditional bureaucratic delays and enable rapid, perhaps immediate, action during a public health emergency.

It was questioned whether the DoD is responsible for coordinating and enhancing a pandemic health response within the U.S. While the DoD is well-positioned to streamline certain aspects of a response, the National Security Council (NSC), Centers for Disease Control and Prevention (CDC), U.S. Agency for International Development (USAID), and State Department hold explicit leadership and coordination roles within the U.S. National Biodefense Strategy. It was noted that while the DoD possesses unique capabilities (e.g., security, logistics, transport, and contracting), it does not have a predefined or automatic role in the U.S. national pandemic response structure. There was emphasis on defining and integrating DoD contributions, noting that significant components of DoD medical capabilities reside in the reserves and the National Guard, a shared responsibility having dual utility through the integration of both federal and state assets. Effective integration of DoD resources, alongside civilian agencies, can significantly enhance pandemic readiness and response.

Overall, there is a need to identify the most opportune contributions of the DoD to combating public healthcare emergencies (e.g., liaising with foreign militaries, supporting medical countermeasure development, enhancing logistical and operational efficiencies). The decisive execution of action by the DoD was

exemplified with the success of Operation Warp Speed, which challenged traditional timelines for vaccine development. By integrating military-like efficiency with the expertise of agencies like the Center for the Biological Advanced Research and Development Authority (BARDA), National Institutes of Health (NIH), Food and Drug Administration (FDA), and CDC, the response effort to the COVID-19 pandemic was operationalized through effective collaboration among governmental and private sector communities.

Within the context of the U.S., it was mentioned that the private sector routinely engages BARDA concerning pandemic readiness, raising questions regarding the role of the DoD within that established dynamic. BARDA was created to help bring candidate drugs, therapeutics, or vaccines to market despite a lack of investment by the private sector, and to assist small companies to meet the requirements for FDA regulatory approval while retaining cost-efficiency and effectiveness. However, it was emphasized that the slow nature of BARDA processes hinders successful response during public health emergencies and therefore, the operational expertise of the DoD is instrumental in accelerating actions to combat infectious diseases pandemics. DoD capabilities also address gaps in the Department of Health and Human Services (HHS) which lack the logistical infrastructure (e.g., leveraging military aircraft to quickly transport equipment and personnel globally) and contracting agility necessary for a large-scale, time-sensitive response.

To prepare for future infectious disease (ID) outbreaks, governments and private sector partners need to perfect their coordinated actions though ongoing modeling exercises using a "strategically meaningful target case" (i.e., current outbreak or circulating disease) around which to plan and practice the execution of a unified response to a pandemic. It was agreed that practice exercises are achievable and need to be conducted routinely to evaluate strengths and weaknesses in advance of a public health crisis. It was noted that "pressure testing" rapid response systems at all levels is critical since it can reveal downstream stressors that may appear from unforeseen sources.

Redistributing investment in research and development (R&D) to focus on foundational research rather than final product development was suggested to better prepare for future pandemics. Sustained commitments to foundational research on viral families with pandemic potential would ensure a useful, timely scientific basis to support rapid responses (e.g., therapeutics, vaccines) in the event of an outbreak. By advancing promising therapeutic and countermeasure candidates to Phase I or II clinical trials, along with preclinical animal testing, public health systems can be better prepared to rapidly scale solutions in a public health crisis. An

integrated approach coordinating the efforts across R&D, manufacturing, regulatory frameworks, and public information campaigns was viewed as essential.

Current programs and funding for therapeutic and vaccine development within the DoD were discussed, raising the question of whether there needs to be more funding allocated or new programs proposed for pandemic threats within the biodefense realm. It was explained that a vital issue is the lack of dedicated funding mechanisms and flexibility to rapidly allocate resources across agencies, as evidenced in the initial stages of the COVID-19 pandemic when budgetary and appropriation restrictions limited the transfer of allocated funding to DoD. It was suggested that a Joint Task Force be established, modeled after Operation Warp Speed, to enable rapid, agile funding pathways to the appropriate U.S. agencies responding to ID outbreaks.

The critical role of biosurveillance in pandemic preparedness and response was emphasized by referencing lessons emerging from previous health crises (e.g., COVID-19 pandemic). Despite technological and diagnostic advancements, the U.S. has not fully integrated biosurveillance capabilities into a cohesive, real-time surveillance system. Fixed laboratories and testing networks remain underutilized and the monitoring of emerging and persistent ID among animals and humans is inadequate. The recent avian influenza outbreaks worldwide illustrate the patchwork characteristics of current biosurveillance systems. A robust biosurveillance program requires collaboration among the armed forces, public health entities, private sector, and international allies (e.g., World Health Organization, North Atlantic Treaty Organization - NATO) to share accurate and relevant surveillance data. It was also noted that an effective, comprehensive biosurveillance system includes microbial forensics to determine attribution (i.e., identifying the sources of a disease) and the rapid sharing of relevant data. All of these components underpin the early detection of potentially harmful pathogens and trigger the evidence-based warnings required to enable timely actions needed to prevent and/or minimally mitigate future biological outbreaks.

It was acknowledged that during the COVID-19 pandemic, bilateral pandemic support among the military and civilian sectors was critical to effective actions as illustrated by the differences between leveraging the military-civilian partnerships efforts in large nations (e.g., U.S.) and smaller nations (e.g., Norway). The Norwegian Defense Institute supported the Norwegian Ministry of Health to test personal protective equipment (PPE), a practice which may not be suitable in all countries. In some countries, the armed forces are not always positioned to provide technical assistance to the public health sector, especially if there are better equipped, more suitable institutional sources. The U.S. HHS led civilian efforts, including diagnostic testing and distribution of PPE while relying on agencies like the CDC, Occupational

Safety and Health Administration (OSHA), and National Institute for Occupational Safety and Health (NIOSH) for technical assessments.

Given the global nature of GEPID challenges, a more integrated, coordinated global approach to ID is needed since the health threats in one country, while distinct, can have worldwide implications. Cooperation among global health initiatives can both mitigate local outbreaks and build critical knowledge to prevent evolving pandemics. One way to mitigate local outbreaks while building critical knowledge is by aligning R&D with real-world needs, focusing on areas where diseases are actively impacting vulnerable populations (i.e., conducting clinical trials and deploying interventions). It was noted that health security is a shared responsibility, requiring that resources and actions be directed toward addressing ID threats across diverse societal landscapes. Attention to the health challenges in low-to-middle-income countries is especially important not only in addressing their specific needs, but also with respect to containing and mitigating international impacts. Countermeasures often designed for high-income populations and surroundings may be unsuitable for lower income environments due to high-costs or technical complexities. Failing to bridge these differences in population needs can significantly delay efforts to combat the global spread of an ID and increase its severity. Proactive, cost-effective strategies to address disease outbreaks in resource-limited areas (e.g., dilutional vaccines) often depend on fostering private-sector involvement to develop scalable solutions. Private sector entities have demonstrated interest in advancing pandemic preparedness activities in vulnerable populations around the globe, but sustained engagement requires appropriate incentives (e.g., priority review vouchers).

Concerns regarding differing perspectives between the U.S. and European countries concerning armed forces involvement in crisis management reinforced the importance of tailoring crisis response strategies to regional norms and governance structures and priorities. While the U.S. approach often includes significant armed forces engagement, European armed forces typically provide support and avoid taking leadership roles. During the COVID-19 pandemic, European countries focused on fostering collaboration between the European Union and NATO, particularly in overlapping priorities (e.g., stockpiling vaccines and antibiotics, rather than relying on military leadership.

The critical role of NATO during public health crises was discussed, especially recognizing how NATO leveraged its science and technology community during the COVID-19 pandemic to coordinate actions among senior leaders from NATO Ally countries with expertise in defense as well as in science, and technology. Facilitating the exchange of perspectives on key scientific and technological gaps (i.e., surveillance, diagnostics) enhanced the effectiveness of response strategies. Although

not intended to dictate military-oriented solutions, the discussions facilitated by NATO fostered a shared understanding among NATO Allies that enabled them to address gaps in their respective national systems (e.g., governments, academia, and private sectors).

NATO has also taken proactive steps to combat disinformation, particularly regarding anti-vaccination narratives influenced by both state and non-state actors. These engagements demonstrated the adaptability of NATO to evolving challenges and the value of the convening role of NATO among trusted Allies and partners who have diverse priorities focused on common challenges. Incorporating international perspectives for ID preparedness and response reflected positively on NATO and its broad relevance beyond traditional armed forces matters to support the critical challenges arising during global health emergencies.

The politicization of ID response was discussed in recognition of how domestic and international political pressures can shape decision-making during public health crises. The UK response to vaccine shortages demonstrated the extremities that required attention (e.g. a far-reached proposal to conduct a military raid on a Dutch factory to secure vaccine supplies). These cases demonstrated how national interests can conflict with global cooperation during health emergencies. In the U.S., the politicization of ID policies during a critical year of domestic politics (e.g., presidential election cycles) further complicated the COVID-19 pandemic response and introduced significant political turmoil (e.g., public health misinformation, distrust of relevant health officials and agencies). The dynamics between public health policies and domestic politics during the COVID-19 pandemic provided clear messages concerning the need for clear, depoliticized frameworks to guide pandemic preparedness and response. Credible, evidence-based public health priorities and messaging cannot be undermined by political agenda.

The increasing significance of internationally sourced disinformation surrounding public health emergencies was noted as perhaps the most significant challenge potentially influencing armed force decisions associated with infectious disease and/or public health emergencies. As a tool to infuse public confusion over (i) countermeasure and health advisory recommendations, (ii) geopolitical policy imperatives, and (iii) motivation for physical actions, disinformation can be viewed as requiring attention from armed force leadership. Disinformation needs to be proactively confronted as a potentially significant component within armed force decisions related to infectious disease and public health challenges.

Informal Summary Caucus (ISC): Significant Outcomes and Consequential Decisions

Introduction

Recognizing the diversity among the participants and the critical, ongoing importance for timely analysis of the outcomes from the two (2)-day GEPID – AFI Conference held within NATO Headquarters, the ISGP organized and convened a third-day event focused on the reviews and critiques from a cross-section of available armed force, governmental, academic, and private sector GEPID – AFI participants. This "Informal Summary Caucus" (ISC) was convened at Sheraton Brussels Airport Hotel on October 16, 2024. This invitation-only ISC, moderated by ISGP staff, was designed for in-person participation only (no virtual access) and was conducted under the Chatham House Rule (no attribution).

ISC Agenda

Initially, ISC participants were tasked with examining the main perspectives, priorities, and conclusions from the GEPID – AFI Conference convened within NATO Headquarters concerning specific scientific, technological, communication, regulatory, and policy topics, especially with respect to formulating real-world decisions and implementing actionable next steps.

Secondly, ISC participants provided concise (i.e., two-sentence) Overarching Perspectives and Priorities (OPP) viewed as accurately (i) conveying Areas of Consensus (AoC) and Actionable Next Steps (ANS) outcomes and (ii) prioritizing critical issues informing leadership decisions and communication with the public *writ large*. The OPP presented previously in this book reflect contributions from all GEPID – AFI Conference and ISC participants.

Finally, ISC participants considered how their respective communities (e.g., academic, educational, scientific research, technological development, government, private sector, public advocacy) might potentially become actively engaged as GEPID – AFI stakeholders in supporting these AoC, ANS, and OPP statements. While commitments were not discussed, it was generally agreed that GEPID – AFI and ISC participants are well positioned to communicate these GEPID – AFI outcomes throughout their respective communities. These efforts can be anticipated to connect

stakeholders having major contributions to facilitate real-world progress on both specific GEPID – AFI issues and GEPID overall.

Not-for-attribution summaries of the main ISC discussion points and conclusions are presented in this book.

Informal Summary Caucus (ISC)
Significant Outcomes and Consequential Decisions

Wednesday, October 16, 2024
Sheraton Brussels Airport Hotel
1930 Zaventem, Belgium

Overview

Following the ISGP GEPID – AFI Conference convened within NATO Headquarters, the ISGP organized an "Informal Summary Caucus" (ISC) convened at Sheraton Brussels Airport Hotel. This invitation-only ISC, moderated by ISGP staff, was designed for in-person participation only (no virtual access) and was conducted under the Chatham House Rule (no attribution).

All proceedings were recorded for the purpose of writing not-for-attribution summaries by the ISGP Staff. The recordings were kept under the custody of the ISGP before being destroyed following the GEPID – AFI publication.

ISC Agenda

Wednesday, October 16, 2024

0800 - 0830 CET	**Participant Check-in** *Coffee and refreshments provided*
0830 - 1000 CET	**Session 1: Perspectives and Conclusions** Examine the perspectives and conclusions from the participants in the NATO Headquarters GEPID – AFI Conference concerning specific scientific, technological, communication, regulatory, and policy topics, especially with respect to the processes of formulating real world decisions and implementing actionable next steps. *Moderated by Ms. Camelia Bou, Program Manager and Senior Fellow, ISGP, under the Chatham House Rule (no attribution)*
1000 - 1015 CET	**Break**

1015 - 1145 CET	**Session 2: Overarching Perspectives and Priorities (OPP)** Formulate concise Overarching Perspectives and Priorities (OPP) accurately conveying outcomes from the GEPID – AFI Conference designed to effectively communicate with leadership in government, private sector, and public advocacy communities, as well as the public *writ large.* *Moderated by Dr. Liat Kugelmass, Senior Fellow, ISGP, and scribed by ISGP Staff under the Chatham House Rule (no attribution)*
1145-1300 CET	**Lunch** *Lunch provided*
1300 - 1500 CET	**Session 3: Real-world Implementations** Review potential engagements and commitments from GEPID – AFI stakeholders in terms of specific OPP, Areas of Consensus (AoC), and Actionable Next Steps (ANS) outcomes focused on their real-world implementations while recognizing existing, and reasonably anticipated, scientific, technological, policy, regulatory, economic, and geopolitical challenges. *Moderated by Ms. Peyton Newsome, Senior Fellow, ISGP, under the Chatham House Rule (no attribution)*
1500 CET	**Adjournment of ISC**

Informal Summary Caucus (ISC)
Significant Outcomes and Consequential Decisions
Summary: Discussion Points and Conclusions

Perspectives and Conclusions

ISC participants shared main conclusions and perspectives from the GEPID – AFI Conference debates and caucus sessions, along with constructive comments, including critical perspectives on topics not discussed during the GEPID – AFI Conference convened within NATO Headquarters.

Strengthening communication about the significance and urgency of biosurveillance with senior leaders (e.g., North Atlantic Treaty Organization (NATO) leadership, armed forces leadership *writ large*) was emphasized as critical to successfully addressing infectious disease (ID) priorities. The effectiveness of ID preparedness and response relies on previously established trust throughout senior leadership, especially during crises when clear articulation and accurate understanding regarding ID (e.g., transmissibility, impact) is of critical importance. The value of ongoing ID preparation, particularly during inter-pandemic periods, was emphasized due to the typical inattention on the continuing development of necessary infrastructure and resources when an ID threat is not immediately present.

The essential role of the armed forces during an ID event was emphasized due to their capabilities for rapid response and access to resources and trained personnel as a well-equipped organization. Having well-trained personnel available on-site is especially critical for the successful implementation of many ID response missions. However, armed forces were noted as previously being underprepared for the COVID-19 pandemic, as resources were not efficiently or effectively utilized. It was suggested to include armed forces personnel and decision makers in discussions for ID preparedness to enhance ID outbreak response.

It was expressed that the enhancement of outward communication efforts, including the rapidly evolving and uncertain nature of ID information, was underemphasized during the GEPID – AFI Conference. There is a need to utilize the skills of social and behavioral scientists capable of communicating accurate ID information through messaging designed to be well received and trusted by the public *writ large*. Effective public communication relies on an understanding of the psychologies associated with mis- and disinformation (e.g., sociology, behavioral science). The general absence of an appreciation for the underlying methods used in mis- and disinformation campaigns hampers the ability of the public to distinguish these disruptive sources from evidence-based information that merits trust. Efforts

to reach GEPID – AFI goals need to emphasize multidisciplinary projects that combat mis- and disinformation attacks.

While climate changes were repeatedly noted as a major threat multiplier for ID, it was noted that this important issue was not discussed at length during the GEPID – AFI Conference. Since evolving climatic conditions impact environmental parameters that directly alter the emergence and severity of ID events (e.g., habitat change, animal migration, disease vector geographic distribution), the ID challenges encountered by armed forces and their surrounding public health entities can dramatically change. In the current Anthropocene, ID challenges are compounded by biological factors being dually driven by both nature and human influence, exacerbating the need to address climate realities when evaluating best practices for ID preparedness and response.

Real-world Implementations

ISC participants reviewed potential engagements and commitments from GEPID – AFI stakeholders focused on their real-world implementations while recognizing existing, and reasonably anticipated, scientific, technological, policy, regulatory, economic, and geopolitical challenges. Discussions focused on what organizational structures and strategies are needed to formulate realistic policies and effectively implement real-world decisions, especially through public-private partnerships.

The critical need to promote the integration and revitalization of data systems, both within countries (e.g., between agencies, jurisdictions) and among NATO Allies (e.g., sharing armed force health data) to enhance global ID response was strongly endorsed. A functioning, integrated (e.g., among armed force branches, departments, agencies, governments) armed force-led biosurveillance apparatus needs to utilize existing civilian structures and processes. Success for implementing this system relies on confronting the challenges arising from philosophical differences among armed forces and civilian sectors (i.e., hesitancy of some government sectors to be involved with armed forces) and myopic perspectives within armed force leadership restricting opportunities for external collaboration.

Within the U.S., the Military Health System needs to interface more robustly with the private sector, allowing commercial entities to develop methodologies and systems that integrate efficiently with privatized biosurveillance structures. It was suggested to implement target product profiles to attract private sector involvement in enhancing robust biosurveillance systems. An exemplary privately-contracted, integrated biosurveillance system was described as having governments contract with the private sector to create platforms focused on electronically collecting biosurveillance data (e.g., from emergency rooms, public health institutes) across

all 50 U.S. states and algorithmically analyzing evidence-based results in terms of interpretable, actionable insights.

The need for interoperable systems across NATO Allies and partners was emphasized, with standardized definitions and formats for sharing biosurveillance data, to allow for preparedness and response to ID threats across NATO responsibilities. It was noted that some entities (e.g., agencies, countries) may be hesitant to share data, therefore various levels of interpretation may be needed to compartmentalize the transfer of specific information, intelligence, and/or analysis. It was agreed that increasing trust among all stakeholders is the first step to integrating data systems, highlighting the need for proponents (i.e., GEPID – AFI Conference participants) to champion integration through cross-sector, relationship-building.

Compartmentalization and competing priorities throughout armed forces and government agencies were noted as hindrances to developing ID threat policies and actions, especially in highly classified settings. Liaisons who have worked in public service and the private sector were described as ideal candidates to facilitate cooperation, acting as informed insiders who can assist the private sector in meeting the needs of governments. Prominence was placed on the significant role that GEPID – AFI participants play as "connectors" in these settings (e.g., within countries, among NATO Allies and partners, throughout public and private sectors). The role of connectors also needs to extend beyond high-level public and private stakeholders to reach local communities in ID-impacted areas, building trusted relationships between researchers and the public *writ large*. These efforts need to emphasize the importance and mutual benefits of biosurveillance activities.

It was noted that to create functional, solutions-based networks, individuals and institutional entities need to embrace open communication to facilitate information sharing and coordination among armed forces, civilian, and private sector stakeholders. To facilitate continuous dialogue and trust among stakeholders, it was suggested that government, private sector, public advocacy, and armed force agencies establish routine (i.e., specific place and time), in-person meetings to candidly discuss prioritization of pathogens, interpretation of monitoring, diagnostic protocols, and research data, as well as review preparedness and response strategies in secure settings. It was questioned which organization should act as the intermediary in facilitating these discussions, with the ultimate assertion that the forum needs to be independent and under the control of a neutral third party.

Acknowledgement

The Institute on Science for Global Policy (ISGP) wishes to acknowledge the numerous individuals and organizations whose support and contributions significantly aided the organization and convening of the "Global Emerging and Persistent Infectious Diseases – Armed Forces Impact" (GEPID – AFI) Conference within the North Atlantic Treaty Organization (NATO) Headquarters in Brussels, Belgium on October 14 and 15, 2024. Additionally, the ISGP organized an Informal Summary Caucus (ISC) on October 16, 2024, for available participants to engage in expanded discussions concerning the outcomes from the GEPID – AFI Conference.

The ISGP is especially indebted to the authors of the five (5) Position Papers addressing a variety of critical topics fundamental to infectious disease concerns impacting NATO armed forces. The content of these Position Papers provided the material on which each debate and plenary caucus focused throughout the two (2)-day event. Biographical information for the six (6) Position Paper authors is provided in this ISGP GEPID – AFI Book.

The ISGP greatly appreciates the willingness of the more than 350 subject-matter experts and stakeholders in the academic, governmental, public advocacy, and private sector communities worldwide who were interviewed by the ISGP staff for the preparation and organization of the GEPID – AFI Program and Conference.

The success of every ISGP conference critically depends on the active engagement of all invited participants and authors in the often-intense debates and probing caucuses moderated by the ISGP staff under the Chatham House Rule (not-for-attribution). The exchange of strongly held views, innovative proposals, and constructive critiques shared throughout the debates and caucuses fostered an unusual, and perhaps unique, environment focused on clarifying evidence-based understanding for both subject-matter experts and decision makers. These debates and caucuses addressed specific questions related to formulating and implementing forward-looking research and policies, as well as fostering effective public, private sector, and governmental relationships spanning scientific, regulatory, public messaging, and private sector decisions. The ISGP greatly appreciates the active engagement of all participants and their willingness to candidly share expertise and perspectives.

The members of the ISGP Board of Directors also deserve recognition for their time and efforts in helping to create a viable, increasingly relevant, not-for-

profit organization committed to addressing many of the most critical scientific, technological, and societal questions of our time. Biographical information on members of the ISGP Board of Directors is presented here.

The enthusiastic and highly professional interviewing, analysis, and writing skills of the ISGP staff were essential to not only organizing and structuring the conference itself, but also to moderating and recording the often-diverse views and perspectives expressed in the critical debates and caucuses. Their skillful, egalitarian efforts are especially evident in the not-for-attribution summaries of debates, Overarching Perspectives and Priorities, the Areas of Consensus, and Actionable Next Steps emerging from the GEPID – AFI Conference. Brief biographies of the ISGP staff are provided.

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Dr. George H. Atkinson,
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Biographical Information of Position Paper Authors

Col. (Prof.) Mark Bailey, UK Defence Medical Services (DMS) senior physician in infectious diseases and tropical medicine, Defence Professor of Military Medicine at the Royal Centre for Defence Medicine, and Professor of Infection at the University of Warwick.

Col. Bailey has worked in China, Nepal, Sierra Leone, Cyprus, Afghanistan, Iraq, Sri Lanka, South Sudan, and Belize. He manages military and civilian patients with a wide range of infectious, tropical, and travel medicine problems in the UK and on deployments as in-patients, out-patients, and via telemedicine services. As head of the DMS Academic Department of Military Medicine, he oversees the work of 22 researchers working on a variety of military medicine projects. Col. Bailey is a UK representative on the NATO Science and Technology Organisation (STO) Human Factors and Medicine (HFM) panel. He also undertakes numerous teaching and examining activities alongside being the Chief Examiner for the UK Apothecaries DTM&H examination and Honorary Secretary for the RCPSG Faculty of Travel Medicine.

Dr. Robert Kadlec, former Assistant Secretary of Health and Human Services for Preparedness and Response

Dr. Kadlec recently served as the U.S. Senate-confirmed Assistant Secretary for Preparedness and Response (ASPR) at the U.S. Department of Health and Human Services (HHS) where he led interagency responses to several public health emergencies and natural disasters. During the COVID-19 pandemic, Dr. Kadlec helped conceive, develop, and initiated the vaccine program known as Operation Warp Speed and directed the pandemic response on behalf of HHS. As a former Air Force officer and physician, he served senior roles in the White House and Department of Defense. His prior roles in the U.S. Senate as the Deputy Staff Director for the Senate Select Committee on Intelligence and staff director of the Subcommittee for Public Health Preparedness and Bioterrorism supported his work on the Pandemic and All-Hazards Preparedness Act and the Prepare for and Respond to Existing Viruses, Emerging and New Threats (PREVENT) Pandemics Act. Dr. Kadlec previously co-wrote the biodefense strategy (Biodefense in 21st Century) during the President Bush Administration, leading initiatives that shaped national policy for public health emergencies.

CAPT Andrew Letizia, Science Director, Naval Medical Research Unit, INDO PACIFIC

United States Navy Captain Andrew Letizia is a practicing Internal Medicine and Infectious Diseases physician holding academic appointments at the Uniformed Services University and Baptist Medical Center at Wake Forest University with over eighty peer-reviewed publications including first authored manuscripts in The New England Journal of Medicine and Lancet Respiratory Medicine. Currently serving as the Naval Medical Research Unit INDO PACIFIC's Science Director, he oversees 26 research projects in 10 countries in Asia and Oceania valued at approximately $8M annually. As a leader in military emerging infectious diseases and global health security, Captain Letizia has won the Meritorious Service Medal (two awards), Joint Commendation Medal, the Department of Defense's Military Health System's Award for "outstanding leadership in pursuit of excellence for their country" (twice), and the Delores M. Etter Top Scientist Award for research "highly beneficial to national defense".

Dr. Geoffrey Ling, Ret. Colonel, Medical Corps, U.S. Army; Professor of Neurology, Neurosurgery and Anesthesiology-Critical Care Medicine, Johns Hopkins Medicine

Dr. Geoffrey Ling is a pharmacologist and physician. Clinically, he is an attending neuro critical care physician at Johns Hopkins Hospital and Emeritus Professor at the Uniformed Services University of the Health Sciences. He served on Advisory Councils of the NIH-National Institute of Neurological Disorders and Stroke for 10 years and the NIH-National Center for Advanced Translation Science for 4 years. Dr. Ling recently completed a 4-year tenure on the Veterans Administration's National Research Advisory Council as he is a retired U.S. Army Colonel after 21 years on active duty. He was the Founding Director of the Biological Technologies Office at the Defense Advanced Research Projects Agency (DARPA), where he developed strategic partnerships (public and private), investment strategies, and conduct mentoring. Dr. Ling served as the Deputy Director and as a Program Manager in the Defense Sciences Office, he is board certified in both neurology and neuro critical care, and he has published more than 200 peer-reviewed articles and book chapters.

Ret. Cdr. Dr. Stef Stienstra, Subject Matter Expert Chemical, Biological, Radiological and Nuclear (CBRN) Defense; Lecturer North Atlantic Treaty Organization (NATO) School, NATO Joint CBRN-defense Centre of Excellence

Dr. Stienstra holds doctorates in both biochemistry and medicine and recently completed a 40-year career as an officer in the Dutch Armed Forces, serving as a Subject Matter Expert in CBRN defense, retiring with the rank of Commander in the

Royal Dutch Navy Reserve Special Services. He continues to lecture at the NATO School in Oberammergau, Germany, and the Joint NATO CBRN-Defense Centre of Excellence in Vyskov, Czech Republic, on CBRN-related topics. Dr. Stienstra is also a visiting professor at the University of Rome Tor Vergata, lecturing for their CBRN-MSc program. He is an expert in Civil-Military Cooperation and has been deployed on several military missions in Asia and Africa. He earned a diploma in "Organization of International Organizations, UN Structures, and NGOs" from Harvard University, along with numerous other postdoctoral certifications. Dr. Stienstra has completed strategic special projects for the Ministry of Defense, such as developing "mission safety" concepts, and co-authored the recent Dutch Defense-Industry Strategy. In 2014, he was a member of the Nuclear Knowledge Summit (NKS) team at the Nuclear Security Summit in the Hague. Dr. Stienstra has authored 41 peer-reviewed scientific publications and over 400 professional literature articles, and he is the primary inventor of three patents related to dermatology and blood cells. In his most recent role at the Dutch Ministry of Defense, Dr. Stienstra developed the Bio-DID-Cap (bio-detection, identification, and diagnosis system), which will be tested through the Concept Development & Experimentation process in partnership with TNO in the Netherlands. Furthermore, he organized PACE-exercise training on asymmetric attacks for the European Commission and participated in missions for the European Union CBRN Risk Mitigation Centers of Excellence. In this role, he has trained local CBRN experts in Africa and Asia through several European initiatives.

Ret. COL. Dr. Paige Waterman, Chair of the Department of Medicine, Uniformed Services University of the Health Sciences

Dr. Paige Waterman, a retired Army Colonel and infectious disease expert, is the Chair of Medicine at the Uniformed Services University of the Health Sciences. A leader in the fight against antimicrobial resistance (AMR), Dr. Waterman has worked with national and international teams to detect emerging pathogens and implement antimicrobial stewardship. She served as Deputy Director of the Multidrug-Resistant Organism Repository at Walter Reed Army Institute of Research and helped establish AMR surveillance at the Armed Forces Health Surveillance Directorate. Dr. Waterman has led clinical trials, vaccine production, and infectious disease policy efforts, including biodefense initiatives within the Executive Office of the President. She also remains a key Department of Defense representative on U.S. interagency efforts to combat AMR including the Presidential Council to Combat Antibiotic Resistance Bacteria and the Interagency Combating Antibiotic Resistant Bacteria Task Force.

Biographical Information for ISGP Board of Directors

Dr. George Atkinson, Chair

Dr. Atkinson founded the Institute on Science for Global Policy (ISGP) in 2008 and serves as Executive Director and is an Emeritus Professor of Chemistry, Biochemistry, and Optical Science at the University of Arizona, where he served as the Head of the Department of Chemistry. He was the founder of Innovative Laser Corporation serving the semiconductor industry. Dr. Atkinson has served in various roles as a Science Adviser within the U.S. Federal government including as the Science and Technology Adviser (STAS) to U.S. Secretaries of State Colin Powell and Condoleezza Rice. Together with the U.S. Department of Energy, he led the U.S. Department of State's negotiations on the lTER - Nuclear Fusion Program, and coordinated State Department engagement on H5N1 Avian Influenza. He also created and launched the Jefferson Science Fellows program for senior U.S. scientists to become directly engaged with the U.S. Department of State. Dr Atkinson designed and launched the ISGP as a new type of international forum in which credible experts provide governmental and societal leaders with understanding of the science and technology that can be reasonably anticipated to help shape the increasingly global societies of the 21st century. Dr. Atkinson has received National Science Foundation and National Institutes of Health graduate fellowships, a National Academy of Sciences Post-Doctoral Fellowship, a Senior Fulbright Award, the SERC Award (UK), the Senior Alexander von Humboldt Award (Germany), a Lady Davis Professorship (Israel), the first American Institute of Physics' Scientist Diplomat Award, a Titular Director of the International Union of Pure and Applied Chemistry, the Distinguished Service Award (Indiana University), an Honorary Doctorate (Eckerd College), the Distinguished Achievement Award (University of California, Irvine), and was selected by students as the Outstanding Teacher at the University of Arizona. He received his B.S. (high honors, Phi Beta Kappa) from Eckerd College and his Ph.D. in physical chemistry from Indiana University. He was the former President of Sigma Xi, The Scientific Research Society. His educational scientific research and diplomatic achievements have been recognized with distinguished appointments and awards globally in 16 countries.

Dr. Janet Bingham, Member

Dr. Bingham is the former President of the George Mason University (GMU)

Foundation and Vice President of Advancement and Alumni Relations. GMU is the largest research university in Virginia. Previously, she was President and CEO of the Huntsman Cancer Foundation (HCF) in Salt Lake City, Utah. The foundation is a charitable organization that provides financial support to the Huntsman Cancer Institute, the only cancer specialty research center and hospital in the Intermountain West. Dr. Bingham also managed Huntsman Cancer Biotechnology Inc. In addition, she served as Executive Vice President and Chief Operating Officer with the Huntsman Foundation, the private charitable foundation established by Jon M. Huntsman Sr. to support education, cancer interests, programs for abused women and children, and programs for the homeless. Prior to joining the Huntsman philanthropic organizations, Dr. Bingham was the Vice President for External Relations and Advancement at the University of Arizona. Prior to her seven years in that capacity, she served as Assistant Vice President for Health Sciences at the University of Arizona Health Sciences Center. Dr. Bingham has been recognized as one of the Ten Most Powerful Women in Arizona.

Mr. Fred Downey, Member

Mr. Downey's career includes 24-year career in the U.S. Army, including Pentagon postings as Assistant to the Director of Net Assessments at OSD and Strategy Team Chief for the Strategic Plans and Policy Directorate on the Department of the Army Staff. He is a former U.S. Army strategist and longtime defense and international affairs expert on Capitol Hill. He was Vice President of National Security at Aerospace Industries Association (AIA). Mr. Downey joined AIA from the office of Connecticut Senator Joe Lieberman where he served as Senior Counselor and Legislative Aide for Defense and Foreign Affairs. He served as the Senator's key staff person on these issues for 12 years. As Lieberman's representative to the Senate Armed Services Committee, Mr. Downey staffed the Senator in his role as chairman of the Airland Subcommittee, overseeing Army and Air Force policy and budget issues and the annual defense authorization bill. Before joining Sen. Lieberman, Mr. Downey worked on defense analytical services for TASC.

Dr. Linda Duffy, Member

Dr. Duffy retired in 2019 from her dual capacities in U.S. Federal Government Service as Senior Scientist Administrator and Interagency Innovation Leader in the Department of Health Human Services, National Institutes of Health, at the National Center for Complementary and Integrative Health, and at the DHHS Office of the Secretary. Among her many service achievements at the DHHS and NIH, she launched and chaired the Trans-NIH Probiotics/Prebiotics and Microbiome Inter-agency Work Group and served for many years as an Inter-agency Subject Matter

Expert in advisory capacities as committee member and Chairperson. Dr. Duffy received a DHHS Innovation Leader Award in 2016 and was appointed to serve in the dual role of Senior Scientific Advisor in the DHHS Office of the Secretary, within the Office of the National Coordinator, Division of Science Technology. Since retiring from Federal Government service, Dr. Duffy has continued to serve as an Advisory Board member for the Institute on Science for Global Policy (ISGP). She is also a distinguished science policy advisor for several inter-agency and public-private partnership initiatives and serves as a Science Technology expert and Board Advisor for numerous private industry and non-profit organizations, including for the ARCeH (Advancing Research for Children's Environmental Health). Dr. Duffy has devoted her passion for evidence-based science on performance and stood for ethics, accountable governance, and science technology standards throughout her career, including in her advisory roles with the Mars Research Review Board and Kibow Technology Inc. Early in her career, Dr. Duffy served as a former Peace Corps Volunteer in Cote d'Ivoire, West Africa. Subsequently she served in a dual capacity as Scientific Director of the Women and Children's Health Research Foundation and as a Distinguished Professor Emeritus with former joint appointments in the Departments of Pediatrics, Epidemiology, and Microbial Pathogenesis at the University of Buffalo. She received her Masters degree from Dartmouth College and completed her doctoral and postdoctoral studies under NIH National Cancer Institute Research Fellowships at the University of Buffalo.

Admiral (Ret.) Thomas Fargo, Member,

Admiral Fargo became the Chairman of Hawaiian Electric Industries (HEI) in May 2020. HEI is the parent company for Hawaiian Electric Company, American Savings Bank and Pacific Current. He previously served for nine years as the Chairman of Huntington Ingalls Industries, America's largest military shipbuilder, and Chairman of USAA until August 2021. Following a distinguished career serving the U.S. Navy and the Department of Defense, Admiral Fargo transitioned to corporate leadership in March 2005, as President of Trex Enterprises, a privately held high technology company. In April 2008, he became a Managing Director of J.F. Lehman and Co., with principal responsibilities as President and CEO of HSF Holdings/Hawaii Superferry. He held the John M. Shalikashvili Chair in National Security Studies at the National Bureau of Asian Research from 2009 to 2016. Admiral Fargo completed his military career as the twentieth officer to hold the position of Commander of the U.S. Pacific Command. As the senior U.S. military commander in East Asia, the Pacific and Indian Ocean areas, he led the largest unified command while directing the joint operations of the Army, Navy, Marine Corps and Air Force across 100 million sq.

miles. He was responsible to the President through the Secretary of Defense as the U.S. military representative for collective defense arrangements in the Pacific. Admiral Fargo also served as the 29th Commander-in-Chief of the U.S. Pacific Fleet from October 1999 to May 2002. His service as a leader in the Pacific was preceded by his command of the U.S. Fifth Fleet and Naval Forces of the Central Command during two years of Iraqi contingency operations from July 1996 to July 1998. His 35 years of service included five commands in the Pacific, Indian Ocean, and Middle East as well as six tours in Washington, D.C. Born in San Diego, CA, he attended high school in Coronado, CA, and Sasebo, Japan. Admiral Fargo graduated from the United States Naval Academy in June 1970, and has additional Governance, Business, and Financial training from Harvard and Stanford Universities. He is a 1989 recipient of the Vice Admiral James Bond Stockdale Award for Inspirational Leadership, and a 2013 recipient of the Naval Academy Distinguished Graduate Award. Additionally, Admiral Fargo serves on the Boards of Directors for Matson, and is the lead director at The Greenbrier Companies. Previous service included the Boards of Northrop Grumman Corporation, Alexander & Baldwin Inc., and Hawaiian Airlines. He is active in the community, serving on the Boards of Directors for the Friends of Hawaii Charities, the Iolani School Board of Governors for 16 years, and the Hawaii State Junior Golf Association.

Dr. Tom Fingar, Member

Dr. Fingar is a Shorenstein APARC Fellow in the Freeman Spogli Institute for International Studies at Stanford University. He was the inaugural Oksenberg-Rohlen Distinguished Fellow in 2010-2015 and the Payne Distinguished Lecturer at Stanford in 2009. From 2005 through 2008, he served as the first Deputy Director of National Intelligence for Analysis and, concurrently, as Chairman of the National Intelligence Council. Dr. Fingar served previously as Assistant Secretary of the State Department's Bureau of Intelligence and Research (2000-2001 and 2004-2005), Principal Deputy Assistant Secretary (2001-2003), Deputy Assistant Secretary for Analysis (1994-2000), Director of the Office of Analysis for East Asia and the Pacific (1989-1994), and Chief of the China Division (1986-1989). Between 1975 and 1986 he held a number of positions at Stanford University, including Senior Research Associate in the Center for International Security and Arms Control. Dr. Fingar is a graduate of Cornell University (A.B. in Government and History, 1968), and Stanford University (M.A., 1969 and Ph.D., 1977 both in Political Science). His most recent books are Reducing Uncertainty: Intelligence Analysis and National Security (Stanford, 2011), The New Great Game: China and South and Central Asia in the Era of Reform, editor (Stanford, 2016), Uneasy Partnerships: China

and Japan, the Koreas, and Russia in the Era of Reform, editor (Stanford, 2017), and Fateful Decisions: Choices that Will Shape China's Future, edited with Jean C. Oi (Stanford, 2020), From Mandate to Blueprint: Lessons from Intelligence Reform (Stanford 2021).

Dr. Claire Fraser, Member

Dr. Fraser is the Professor Emerita and Founding Director of the Institute for Genome Sciences at the University of Maryland School of Medicine in Baltimore, MD where she holds joint faculty appointments in the Departments of Medicine and Microbiology and Immunology. Until 2007, she was President and Director of The Institute for Genomic Research (TIGR) in Rockville, MD, and was involved in the early phases of the Human Genome Project. She led the teams that sequenced the genomes of nearly 100 microbial organisms, including important human and animal pathogens, an effort that launched the new field of microbial genomics. Her current research interests are focused on the role of the human microbiome in health and disease. Her previous work with the FBI on the Amerithrax investigation between 2001 and 2008 led to the identification of four genetic mutations in the anthrax spores that allowed the FBI to trace the material back to its original source. She is one of the world's experts in microbial forensics and the growing concern about its dual uses – research that can provide knowledge and technologies that could be misapplied. Dr. Fraser has authored more than 300 publications, edited three books, and served on the editorial boards of nine scientific journals. For 10 years, she was the most highly cited investigator in the field of microbiology. Her list of numerous awards include: the E.O. Lawrence Award, the highest honor bestowed on research scientists by the Department of Energy, the Promega Biotechnology Award from the American Society of Microbiology, and the Charles Thom Award from the Society for Industrial Microbiology. She has been elected to Maryland Women's Hall of Fame, been named an Influential Marylander honoree, and was awarded the World Trade Center Institute's International Leadership Award. Dr. Fraser is a member of the National Academy of Medicine, and in 2019, she became President-Elect of the American Association for the Advancement of Science (AAAS) and served as President from 2020 – 2021.

Dr. George Korch, Member

Dr. Korch is currently the President of GeoBIO LLC, a consulting entity established to provide advice and expertise in biodefense, medical countermeasure development, and public health policy, and is the former Director of Battelle National Biodefense Institute's National Biodefense Analysis and Countermeasures Center, a government biodefense research laboratory created by the Department of Homeland Security.

He was part of the creation of the NBACC in the wake of the establishment of the DHS in 2003. Dr. Korch previously served in Fort Detrick as the Commander of the U.S. Army Medical Research Institute of Infectious Diseases. Before joining BNBI in December 2018, Korch served for several years as the Science Adviser to the Assistant Secretary of Preparedness and Response for the Department of Health and Human Services. He briefly served as Acting Assistant Secretary for Preparedness and Response due to the departure of a colleague from the role to the Department of Defense. Dr. George Korch holds a doctorate from the Department of Immunology and Infectious Diseases at the Johns Hopkins University Bloomberg School of Hygiene and Public Health and is a Visiting Professor in the Department of Microbiology and Immunology. He is also a member of the American Association for the Advancement of Science, has several scientific publications and has been awarded numerous civilian and military awards and honors.

Dr. David Moran, Member

Dr. Moran is President of Technology International Partnerships, LLC, and Past-Publisher of Sigma Xi, The Scientific Research Society, "American Scientist" and the "Chronicle of the New Researcher". He has served as President of the National Technology Transfer Center; Director of Industrial Advanced Development & Industrial Outreach, Advanced Technology, Office of Naval Research; Program Element Administrator for Nuclear Propulsion, R&D, Naval Material Command; Director, David Taylor Institute; Assistant Technical Director, Director of Research, and Technology Director, Naval Ship R&D Center. His professional experience in research and teaching at universities includes the U.S. Naval Academy, Full Professor, Navy Chair; West Virginia University; George Washington University; Research Naval Architect, U.S. Navy. He earned a Ph.D. in Hydrodynamics & Mathematics, IIHR; Sc.M., M.I.T., Ocean Engineering, Hydrodynamics; Sc.B., M.I.T.; Harvard University; University Iowa; and Graduate, Federal Executive Institute. He served at Harvard University's JFK School as Senior Official for National Security. He is a member of the Boards of: Tucker Community Foundation; Community Trust Foundation; Preston Community Fund; and Past-Treasurer, Board of Directors, Maryland Garrett College. His publications include 102 Scientific Papers, 12 Patents in Hydrodynamics and Aerodynamics, and two published books.

Mr. Joseph Nimmich, Member

Mr. Nimmich is a Partner at Potomac Ridge Consulting. He formerly was Senior Executive Advisor at Booz Allen Hamilton's Civil and Commercial Group. Prior to Booz Allen Hamilton, he served as the Deputy Administrator of the Federal Emergency Management Agency (FEMA) from September of 2014 until

January 2017. During his tenure, his primary focus was on strengthening and institutionalizing FEMA's business architecture over the long term to achieve the Agency's mission. He joined FEMA in 2013, as the Associate Administrator for the Office of Response and Recovery. He was responsible for directing the Response, Recovery, and Logistics Directorates, as well as the Office of Federal Disaster Coordination. Prior to joining FEMA, he was the Director of Maritime Surveillance and Security at Raytheon Corp., where he directed maritime surveillance and security operations, as well as their emergency response capabilities. He served in the U.S. Coast Guard for more than 33 years, retiring as a Rear Admiral. His Coast Guard assignments included the First Coast Guard District based in Boston, Massachusetts, where he was responsible for all Coast Guard operations across eight states in the northeast and 2,000 miles of coastline from the U.S.-Canadian border to northern New Jersey. He earned his M.B.A. from the Stern School of Business at New York University.

Ambassador Thomas Pickering, Member

Ambassador Pickering was Vice Chair of Hills and Co. International Consultants until the end of the last decade when he joined Denton's Global Advisors where he is now a Senior Counselor. He co-chaired a State Department-sponsored panel investigating the September 2012 attack on the U.S. diplomatic mission in Benghazi. He served as U.S. Ambassador to the United Nations in New York, the Russian Federation, India, Israel, El Salvador, Nigeria, and the Hashemite Kingdom of Jordan. Ambassador Pickering also served on assignments in Zanzibar and Dar es Salaam, Tanzania. He was U.S. Under Secretary of State for Political Affairs, President of the Eurasia Foundation, Assistant Secretary of State for Oceans and International Environmental and Scientific Affairs, and Boeing Senior Vice President for International Relations. He also Co-Chaired an international task force on Afghanistan, organized by the Century Foundation. He received the Distinguished Presidential Award in 1983 and again in 1986 and was awarded the Department of State's highest award, the Distinguished Service Award in 1996. He holds the personal rank of Career Ambassador, the highest in the U.S. Foreign Service. He graduated from Bowdoin College and received a Master's Degree from the Fletcher School of Law and Diplomacy at Tufts University and a second Master's Degree from the University of Melbourne where he attended on a Fulbright fellowship in Australia.

Mr. Tom Quinlan, Member

Mr. Quinlan currently serves as the President and CEO of R. R. Donnelley. As a seasoned executive with experience leading and growing B2B manufacturing and services companies, he is familiar with the print, digital marketing, and business

communication industries. He served as President and CEO, RRD (2007-2016), and Chairman, President, and CEO, LSC Communications (2016-2020). Mr. Quinlan holds a finance MBA from St. John's University and a BS in Business Administration from Pace University. He currently serves on Pace University's Board of Trustees, YMCA of Greater NY, The American Ireland Fund, and the Army War College Board of Visitors.

Dr. Eugene Sander, Member

Dr. Sander served as the 20th president of the University of Arizona (UA), stepping down in 2012. He was formerly the Vice Provost and Dean of the UA's College of Agriculture and Life Sciences, overseeing 11 academic departments and two schools, with research stations and offices throughout Arizona. He also served as UA Executive Vice President and Provost, Vice President for University Outreach and Director of the Agricultural Experiment Station and Acting Director of Cooperative Extension Service. Prior to his move to Arizona, Dr. Sander served as the Deputy Chancellor for biotechnology development, Director of the Institute of Biosciences and Technology, and head of the Department of Biochemistry and Biophysics for the Texas A&M University system. He was Chairman of the Department of Biochemistry at West Virginia University Medical Center and Associate Chairman of the Department of Biochemistry and Molecular Biology at the College of Medicine, University of Florida. As an officer in the United States Air Force, he was the Assistant Chief of the biospecialties section at the Aerospace Medical Research Laboratory. He graduated with a Bachelor's Degree from the University of Minnesota, received his Master's Degree and Ph.D. from Cornell University, and completed postdoctoral study at Brandeis University. As a biochemist, Dr. Sander worked in the field of mechanisms by which enzymes catalyze reactions.

Dr. David Schejbal, Member

Dr. Schejbal became president of Excelsior University in 2020. He is the fourth President since Excelsior's founding in 1971. He is a leading voice in adult and nontraditional higher education. Under his leadership, Excelsior focuses on providing a student-centric experience while growing programmatic and experiential opportunities. Throughout his career, Dr. Schejbal's primary focus has been on making education accessible, affordable, and flexible for all students. He previously served as Vice President and chief of digital learning at Marquette University. Prior to joining Marquette, he was Dean of Continuing Education, Outreach, and E-learning at the University of Wisconsin-Extension (UWEX), working across all 26 campuses of the system to extend the resources of the University to communities throughout the nation. In this role, Dr. Schejbal helped launch the UW Flexible

Option, the first system-wide competency-based, self-paced learning option in the country. Before joining UWEX, Dr. Schejbal held academic leadership positions at the University of Illinois at Urbana-Champaign and Northwestern University. Dr. Schejbal earned his BA from Iowa State University and a PhD in Philosophy from the University of Connecticut. Dr. Schejbal has received many awards, including the Julius M. Nolte Award for Extraordinary Leadership, which is the highest award given by the University Professional and Continuing Education Association (UPCEA). His affiliations with industry organizations include serving as a member of the governing board of the Presidents Forum, Chair of the Board of Visitors of the Army War College, and the past President of UPCEA. Dr. Schejbal is a frequent keynote speaker, and his insights about reinventing higher education have appeared in such publications as Forbes, EvoLLLution, Innovative Higher Education, and Inside Higher Ed.

Ms. Frances "Fran" Ulmer, Member

Ms. Ulmer is a Visiting Associate Fellow at the Belfer Center's Arctic Initiative and is the former Chair of The Nature Conservancy's Global Board of Directors. She was a Visiting Professor in the Department of Earth System Science at Stanford University from 2017 to 2018. Ms. Ulmer was appointed by President Obama as the Chair of the U.S. Arctic Research Commission (USARC) in March 2011 and served in that role until August 2020. From 2014 to 2017, Ms. Ulmer was a Special Advisor on Arctic Science and Policy at the State Department. In June 2010, President Obama appointed her to the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling. From 2007 to 2011, she served as Chancellor of the University of Alaska Anchorage, Alaska's largest public university. Before that, Ms. Ulmer was a Distinguished Visiting Professor of Public Policy and Director of the Institute of Social and Economic Research at UAA. She served as an elected official for 18 years as the Mayor of Juneau, a State Representative, and as Lieutenant Governor of Alaska. She previously worked as legal counsel to the Alaska Legislature, Legislative Assistant to Governor Jay Hammond and Director of Policy Development for the state. In addition, she was the first Chair of the Alaska Coastal Policy Council and served for more than 10 years on the North Pacific Anadromous Fish Commission. She has served on numerous local, state, and federal advisory committees and boards. Ms. Ulmer earned a J.D. cum laude from the University of Wisconsin Law School, and has been a Fellow at the Institute of Politics at Harvard Kennedy School.

Dr. Maria Velissariou, Member

Dr. Velissariou is a former Fortune 100 R&D Executive with diverse global experience driving vision and strategy, innovation, and advocacy in high-impact corporate and

nonprofit organizations. Throughout her career, she has been strategically focused on translating science and technology into scalable innovation solutions. She is an advocate for sustainable food systems, science-based policy, and funding for food research. Dr. Velissariou served as the Global Corporate R&D VP and CSO for Mars. She led the function's enterprise-wide approach for Quality and Science in partnership with the business segments and equipped R&D with new digital capabilities. Before Mars, she held senior leadership positions including CSTO at the Institute of Food Technologists (IFT), and VP Global Nutrition R&D and VP Quaker Foods North America R&D at PepsiCo. Additionally, she served in various roles at Kraft Foods and Dow Corning Europe. Dr. Velissariou is the founder and CEO of Maria Velissariou Consulting LLC and an entrepreneur in food circularity with a focus on the intersection of Food, Climate, and Health. She received a Ph.D. and M.S. in Biochemical Engineering from the University of Birmingham (UK), and a B.Eng. in Chemical Engineering from the Aristotle University of Thessaloniki (Greece). She also completed executive studies at Oxford University (Economics of Mutuality) and Cornell University (Executive Leadership, High Performance Leadership & Digital Leadership). She serves in various board and advisory positions in the profit and nonprofit sectors, is a Senior Fellow at The Conference Board, and has been a long-standing advocate for women in STEM. In 2024, she was inducted in the "Marquis Who's Who in America". A native of Greece, she also holds U.S. and UK citizenships and currently resides in Washington, D.C.

Additional ISGP Board Participants

Ambassador Richard Armitage, Special Adviser

Ambassador Armitage is the President at Armitage International, where he assists companies in developing strategic business opportunities. He served as Deputy Secretary of State from March 2001 to February 2005. Richard Armitage, with the personal rank of Ambassador, directed U.S. assistance to the New Independent States (NIS) of the former Soviet Union. He filled key diplomatic positions as Presidential Special Negotiator for the Philippines Military Bases Agreement and Special Mediator for Water in the Middle East. President Bush sent him as a Special Emissary to Jordan's King Hussein during the 1991 Gulf War. Ambassador Armitage also was Deputy Assistant Secretary of Defense for East Asia and Pacific Affairs in the Office of the Secretary of Defense. He graduated from the U.S. Naval Academy. He has received numerous U.S. military decorations as well as decorations from the governments of Thailand, Republic of Korea, Bahrain, and Pakistan. Most recently, he was appointed an Honorary Companion of The New Zealand Order of Merit. He serves on the Board of Directors of ConocoPhillips,

ManTech International Corporation, and Transcu Ltd., is a member of The American Academy of Diplomacy as well as a member of the Board of Trustees of the Center for Strategic and International Studies.

Camelia Bou, Secretary to the Board

Ms. Bou has worked for the ISGP for over two years contributing the organization and convening of multiple ISGP programs and conferences. She graduated from Northeastern University with a M.S. Environmental Science and Policy after completing a B.A. in International Affairs and Economics. Ms. Bou worked at the Rian Immigrant Center in the Learning Exchange Program as a program assistant, helping students and recent graduates from Ireland on the J-1 visa on their job search in the United States.

Emeritus

Dr. Charles Parmenter, Member

Dr. Parmenter is a Distinguished Professor Emeritus of Chemistry at Indiana University. He also served as Professor and Assistant and Associate Professor at Indiana University in a career there that spanned nearly half a century (1964-2010). He earned his bachelor's degree from the University of Pennsylvania and served as a Lieutenant in the U.S. Air Force from 1955-57. He worked at DuPont after serving in the military and received his Ph.D. from the University of Rochester and was a Postdoctoral Fellow at Harvard University. He has been elected a Member of the National Academy of Sciences and the American Academy of Arts and Sciences, and a Fellow of the American Physical Society and the American Association for the Advancement of Science. He was a Guggenheim Fellow, a Fulbright Senior Scholar, and received the Senior Alexander von Humboldt Award in 1984. He received the Earle K. Plyler Prize, was a Spiers Medalist and Lecturer at the Faraday Society, and served as Chair of the Division of Physical Chemistry of the American Chemical Society, Co-Chair of the First Gordon Conference on Molecular Energy Transfer, Co-organizer of the Telluride Workshop on Large Amplitude Motion and Molecular Dynamics, and Councilor of Division of Chemical Physics, American Physical Society.

In Memoriam

Dr. Ben Tuchi, Member and Secretary/Treasurer

Dr. Tuchi served on the boards of two additional non-profit corporations; he was Treasurer of the Campus Research Corporation and President of the Arizona Research Park Authority. He received his B.S. and M.S. degrees in Business Administration from the Pennsylvania State University and his Ph.D. in Finance

from St Louis University. His full time teaching career began in 1961 at St. Francis College and continued until 1976 at West Virginia University. From 1976 through 1996 he served in cabinet levels at West Virginia University, The University of Arizona, The University of North Carolina at Chapel Hill, and finally as Senior Vice Chancellor for Business and Finance of the University of Pittsburgh. During those assignments he was simultaneously a tenured professor of finance. He retired from the last executive post in 1996 and returned to a full-time teaching position as Professor of Finance at the University of Pittsburgh, until his retirement in 1999. For the two years prior to his retirement he was the Director of Graduate Programs in Business in Central Europe, at Comenius University, making his home in Bratislava, The Slovak Republic.

Mr. Jim Kolbe, Member

For 22 years, Mr. Kolbe served in the United States House of Representatives, elected in Arizona for 11 consecutive terms, from 1985 to 2007. Mr. Kolbe served as a Senior Transatlantic Fellow at the German Marshall Fund of the United States, and as a Senior Adviser to McLarty Associates, a strategic consulting firm. He advised on trade matters as well as issues of effectiveness of U.S. assistance to foreign countries, on U.S.-European Union relationships, and on migration and its relationship to development. He was also Co-Chair of the Transatlantic Taskforce on Development with Gunilla Carlsson, the Swedish Minister for International Development Cooperation. He also was an adjunct Professor in the College of Business at the University of Arizona. While in Congress, he served for 20 years on the Appropriations Committee of the House of Representatives, was chairman of the Treasury, Post Office and Related Agencies subcommittee for four years, and for his final six years in Congress, he chaired the Foreign Operations, Export Financing and Related Agencies subcommittee. He graduated from Northwestern University with a B.A. degree in Political Science and then from Stanford University with an M.B.A. and a concentration in economics.

Dr. Mike Buch, Member

Dr. Buch held B.A., M.S., and Ph.D. degrees in Analytical Chemistry and Biotechnology. He had nearly three decades of experience in the consumer healthcare industry in various roles of increasing responsibility with some of the world's leading companies. He served as Chief Science Officer and Board Member at Young Living Essential Oils and had expertise in leading global strategic development programs, open innovation programs, licensing programs, consumer healthcare R&D, advanced technologies labs, advanced optical analysis labs, and biosensor design and research. He was also a member of several prestigious associations,

including the American Chemical Society, The New York Academy of Science, and the American Association for the Advancement of Science.

Dr. Henry Koffler

Dr. Koffler served as President of the University of Arizona (UA) from 1982-1991. He also held UA professorships in the Departments of Biochemistry, Molecular and Cellular Biology, and Microbiology and Immunology, positions from which he retired in 1997 as Professor Emeritus of Biochemistry. He was Vice President for Academic Affairs, University of Minnesota, and Chancellor, University of Massachusetts/ Amherst, before coming to the UA. Dr. Koffler served as a founding Governor and founding Vice-Chairman of the American Academy of Microbiology, and as a member of the governing boards of Fermi National Accelerator Laboratory, the Argonne National Laboratory, and the Superconducting Super Collider Laboratory. Among the honors that Dr. Koffler has received are a Guggenheim Fellowship and the Eli Lilly Award in Bacteriology and Immunology.

Biographical Information for ISGP Leadership and Staff

George Atkinson, Ph.D., Executive Director, and Founder

Dr. Atkinson founded the Institute on Science for Global Policy (ISGP) in 2008 and serves as Executive Director. He is an Emeritus Professor of Chemistry, Biochemistry, and Optical Science at the University of Arizona, where he served as the Head of the Department of Chemistry. He was the founder of Innovative Laser Corporation serving the semiconductor industry. He served in various roles as a Science Adviser within the U.S. Federal Government including as the Science and Technology Adviser (STAS) to U.S. Secretaries of State Colin Powell and Condoleezza Rice. He designed and launched the ISGP as a new type of international forum in which credible experts provide governmental and societal leaders with understanding of the science and technology that can be reasonably anticipated to help shape the increasingly global societies of the 21st century.

Program Manager, Senior Fellows

Camelia Bou, M.S., Program Manager, Senior Fellow

Ms. Bou graduated from Northeastern University with a B.A. in International Affairs and Economics and M.S. in Environmental Science and Policy. During her time at Northeastern University, she participated in a faculty-led program in Thesaloniki, Greece focused on the effects of genocide in Greek society called "Genocide and its Aftermath Dialogue of Civilizations". As part of one of her graduate courses, she was able to attend COP 26 Glasgow virtually as an observer, where she had the opportunity to explore her interest in international climate policy. Ms. Bou worked at the Rian Immigrant Center in the Learning Exchange Program as a program assistant, helping students and recent graduates from Ireland on the J-1 visa on their job search in the United States.

Sophie Bartholomaus, Senior Fellow

Ms. Bartholomaus is a graduate of Roanoke College where she earned a B.A. in Public Health. She has a desire to aid and educate communities, which is rooted in her work with the Local Environmental Agriculture Program (LEAP), a nonprofit located in southwest Virginia. Through her work with LEAP, she was able to inform the local public on the importance of local, sustainable farming, along with bringing green spaces and community gardens to areas with food insecurity. Through working with various nonprofits, she has gained experience in program development, grant proposal writing, budgeting, and community outreach.

Liat Kugelmass, Ph.D., Senior Fellow

Dr. Kugelmass graduated from Cornell University with a Ph.D. in Polymer Chemistry after completing her undergraduate studies at Vassar College. Her doctoral dissertation focused on chemical recycling strategies using photothermal agents to depolymerize plastics back into their starting materials, to promote a more circular plastics economy. Dr. Kugelmass's passion for environmental issues has translated across various research projects, which have ranged from plastics recycling to harnessing energy from microbes. During her graduate studies, Dr. Kugelmass also organized and facilitated Diversity, Equity, and Inclusion programming for the purpose of diversifying the field of Chemistry and STEM at large.

Peyton Newsome, Senior Fellow

Ms. Newsome is a graduate of University of Massachusetts Lowell with a B.S. in Criminal Justice and a minor in Psychology. She is currently earning her Master of Public Policy from Northeastern University. In her time at UMass Lowell, Ms. Newsome was involved in numerous research projects with the Center for Security and Terrorism Studies and the Psycho-Legal Experimental Applications Lab, and she completed the Immersive Scholars and Emerging Scholars programs. Most recently, Ms. Newsome was working with UMass Lowell's Climate Change Initiative on their Climate Pathways project, which studied the reactions of participants to the climate change model, En-ROADS. She was proud to graduate with the Chancellor's Medal for Distinguished Academic Achievement and a Trustees' Key. Ms. Newsome also spent some time working with the non-profit, Seeding Success, researching and organizing criminal justice reform efforts in Memphis, TN.

Sophia Huntley Smith, Senior Fellow

Ms. Smith graduated from the University of Vermont with her B.A. and B.S. from the Rubenstein School of Environment and Natural Resources. During her time at the University of Vermont, she joined the Student Government Association and was elected Chair of the Committee on the Environment. Within this role, she undertook a nine year mission to divest the University's endowment from fossil fuel holding companies. During her term, Ms. Smith was able to see this goal to fruition by coordinating between diverse stakeholders. This success allowed her to become a member of the University's Board of Budget, Finance, and Investment Committee and the Socially Responsible Investment Advisory Council which oversaw the transition of the endowment's investments as well as the cash reserves into a green fund. She received the Student Government Association Service Award in 2020 for her efforts and continues to work towards sustainable and environmental conservation within her communities and local economies.

Fellows

Gayle Ballard, M.A., M.B.A., Fellow

Ms. Ballard graduated from Bradley University with a B.S. in Political Science and an M.A. in Guidance, Counseling, and Psychotherapy. Ms. Ballard also earned an M.B.A. from St. Xavier University, with an additional specialization in Healthcare Administration. In addition, she received a Post Graduate Executive Certificate of Achievement, Institute for Business Strategy Development, Kellogg School of Management, Northwestern University. Ms. Ballard has traveled to 43 countries and has extensive experience working with both domestic and international businesses focused on financial and operational business growth and success, strategic planning & implementation, mergers and acquisitions, start-up's, turnarounds, and innovation.

Adjunct Senior Fellows

Ms. Charlene Atkinson, Adjunct Senior ISGP Fellow

Ms. Atkinson is a lifelong teacher in both New York and Arizona with degrees and graduate credits from the State University of New York at Buffalo, University of Siena, Italy, Hunter College, New York, and University of Colorado.

Mattia Anfosso Lembo, M.A., Adjunct Senior Fellow

Mr. Lembo is a former employee of the Embassy of Italy in Accra, Ghana, with a strong academic and professional foundation in international relations and a passion for geopolitics. He graduated with honors from the University of Trieste in 2019, earning an M.A. in Diplomacy and International Cooperation, and also holds a Master's in Diplomatic Studies from the Italian Society for International Organization in Rome. At the Italian Embassy in Accra, Mr. Lembo fully immersed himself in a dynamic international environment, enhancing his expertise in the complexities of West African politics and economics. His responsibilities included in-depth analyses and report preparation on issues impacting the region, from security concerns like terrorism to humanitarian crises such as famine and drought.

Daniela Baeza-Breinbaur, M.Sc., Adjunct Senior Fellow

Ms. Baeza-Breinbauer is a Project Manager and Researcher at the London School of Economics (LSE) where she leads the Food Systems and Security Hub (FSSH) and oversees projects in the fields of Food Security, Environmental Economics, Development Economics, and Human Rights. By training, she is a Development and Environmental Economist with a background in Human Rights and Science Policy. She has previously consulted for a variety of government and non-government institutions. Some of her recent work includes evaluating the effectiveness of

interventions to strengthen rural governance for food security on behalf of Welthungerhilfe and assessing the food security implications of trade negotiations between the European Union and Mercosur for the European Commission. She holds an M.Sc. in International Development Management from the LSE, an M.Sc. in Environmental Economics from the LSE, and an Advanced Diploma in Agriculture and Farming Systems from Capel Manor. She is also a current PhD candidate in Environmental Economics at the LSE Grantham Research Institute.

ISGP Programs and Conferences

ISGP books from ISGP Conferences listed below are available to the public without charge and can be downloaded from the ISGP Website: www.scienceforglobalpolicy.org. Hardcopies of these books are available by contacting info@scienceforglobalpolicy.org.

ISGP GEPID Program conferences and books:

- *Global Emerging and Persistent Infectious Diseases (GEPID): Science/Technology, Policy, and Communication,* convened March 11—13, 2024 at the Johns Hopkins Bloomberg Center in Washington, D.C., in cooperation with the Bloomberg School of Public Health, School of Advanced International Studies, and Science Diplomacy Hub at Johns Hopkins University and the University of Maryland School of Medicine.

ISGP Signature Conferences conferences and books:

Emerging and Persistent Infectious Diseases (EPID):

- *Focus on Antimicrobial Resistance,* convened March 19—22, 2013, in Houston, Texas, U.S., in partnership with the Baylor College of Medicine.
- *21st Century Borders/Synthetic Biology: Focus on Responsibility and Governance*, convened December 4—7, 2012, in Tucson, Arizona, U.S., in partnership with the University of Arizona.
- *Focus on Societal and Economic Context*, convened July 8—11, 2012, in Fairfax, Virginia, U.S., in partnership with George Mason University.
- *Focus on Mitigation*, convened October 23—26, 2011, in Edinburgh, Scotland, U.K., in partnership with the University of Edinburgh.
- *Focus on Prevention*, convened June 5—8, 2011, in San Diego, California, U.S.
- *Focus on Surveillance*, convened October 17—20, 2010, in Warrenton, Virginia, U.S.
- *Global Perspectives* convened December 6—9, 2009, in Tucson, Arizona, U.S., in partnership with the University of Arizona.

Food Safety, Security, and Defense (FSSD):

- *Equitable, Sustainable, and Healthy Food Environments*, convened May 1—4, 2016 in Vancouver, British Columbia, Canada, in partnership with Simon Fraser University.

- *Food Security and Diet-linked Public Health Challenges* convened September 20—23, 2015 in Fargo, North Dakota, in partnership with North Dakota State University.
- *Focus on Food and the Environment*, convened October 5—8, 2014, in Ithaca, New York, in partnership with Cornell University.
- *Focus on Food and Water,* convened October 14—18, 2013, in Lincoln, Nebraska, U.S., in partnership with the University of Nebraska–Lincoln.
- *Focus on Innovations and Technologies,* convened April 14—17, 2013, in Verona, Italy.
- *Global Perspectives* convened October 24, 2012, in Arlington, Virginia, U.S., in partnership with George Mason University.

ISGP Global Challenges conferences and books:

ISGP Climate Change Program (ICCP)

- *The Shore's Future: Living with Storms & Sea Level Rise*, convened November 20—21, 2015, in Toms River, New Jersey, in cooperation with the Toms River Working Group, Barnegat Bay Partnership, Barnegat Bay Foundation, and the Jay and Linda Grunin Foundation.
- *Sea Level Rise: What's Our Next Move?*, convened October 2—3, 2015, in St. Petersburg, Florida, in cooperation with the St. Petersburg Working Group.

ISGP Climate Change Arctic Program (ICCAP)

- *Sustainability Challenges: Coping with Less Water and Energy,* convened June 5, 2015, in Whittier, California, in cooperation with the Whittier Working Group.
- *Living with Less Water*, convened February 20—21, 2015, in Tucson Arizona, in cooperation with the Tucson Working Group.

ISGP Academic Partnerships conferences and books:

- *Socioeconomic Contexts of Sustainable Agriculture* convened October 14—15, 2016, in Danbury, Connecticut, in partnership with Western Connecticut State University.
- *Water and Fire: Impacts of Climate Change*, convened April 10—11, 2016, in Sacramento, California, in partnership with California State University.
- *Communicating Science for Policy*, convened August 10—11, 2015, in Durham, North Carolina, in partnership with Sigma Xi, The Scientific Research Society.
- *Food Security: Production and Sustainability*, convened April 24—25, 2015, in St. Petersburg, Florida, in partnership with Sigma Xi, The Scientific Research Society, and Eckerd College.

- *Safeguarding the American Food* Supply, convened April 10—11, 2015, in Collegeville, Pennsylvania, in partnership with Sigma Xi, The Scientific Research Society, and Ursinus College.
- *Focus on Pandemic Preparedness,* convened April 11—12, 2014, in Collegeville, Pennsylvania, U.S., in partnership with Ursinus College.

ISGP Science and Governance conferences and books:

- *Global Pathways to Hydrogen Energy Futures – Japan,* convened by the ISGP at the Pacifico Yokohama Conference Center in Yokohama, Japan, April 6—9, 2023.
- Foresight from the COVID-19 Pandemic: Science, Policy, and Communication, convened using an internet format February 27—March 1, 2023.
- *Global Pathways to Hydrogen Energy Futures - Island Community Priorities*, convened using internet platforms spanning fifteen (15) time zones on June 21—23, 2022 (Western Hemisphere).
- *The Future of Modern Agriculture conference, convened September 22, 2020, in a hybrid in-person (Rome, Italy) / internet format, with support from The Office of Agricultural Policy, U.S. Department of State.*
- *Sustainable Agriculture: The Role of Plant Breeding Innovation conference, convened November 17—19, 2020, in an internet format, with support from the American Seed Trade Association and Euroseeds.*
- *Climate Impact on National Security (CINS–1, CINS–2A, CINS–2B), convened November* 28—December 1, 2016, April 3—4, 2017, and May 17—19, 2017 in partnership with the U.S. Army War College in Carlisle, Pennsylvania.
- *The Genomic Revolution* convened September 6, 2014, in cooperation with the Parliamentary Office on Science and Technology of the British Parliament within the House of Lords. London, United Kingdom.

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