

AT THE HEART  
OF THE MISSION

**NDIA**



JOHNS HOPKINS  
APPLIED PHYSICS LABORATORY



# NATIONAL HEALTH SYMPOSIUM

**Bridging the Health Divide: From Research to Operations**

March 5–6, 2019 | Johns Hopkins University Applied Physics Laboratory

**EVENT SUMMARY**

# CONTENTS

EVENT SUMMARY .....	3
AGENDA .....	9
TABLETOP DISPLAYS .....	11
BIOGRAPHIES .....	12
ORGANIZERS .....	16

## ACKNOWLEDGMENTS

We thank the symposium speakers for their insightful presentations and the participants for their thoughtful discussions. We are grateful to the National Defense Industrial Association (NDIA) and Johns Hopkins University Applied Physics Laboratory (APL) National Health Mission Area staff members for their support of the event, including assistance with planning, graphics design, and documentation.

The views expressed in this document are those of the authors and are not to be construed as official views of any of their organizations.

## SAVE THE DATE

The 2020 National Health Symposium will be held **April 21–22, 2020**, on the APL campus. Like the inaugural event, the symposium will bring together civilian, military, and government leaders from diverse organizations in health and health care delivery science to discuss the most pressing topics in the field.

Watch for details. We hope to see you there!

# EVENT SUMMARY

## Bridging the Health Divide: From Research to Operations— The Johns Hopkins University Applied Physics Laboratory Inaugural National Health Symposium

Over 160 civilian, military, and government leaders from more than 50 organizations in health care delivery, health research, and industry gathered for two days at the inaugural Johns Hopkins University Applied Physics Laboratory National Health Symposium. The theme of the symposium was “Bridging the Health Divide: From Research to Operations” in all settings. We discussed several recent technological breakthroughs and identified practical approaches to overcome barriers to an envisioned systems engineering–based health care system. Topics discussed ranged from specific novel methods and devices to such broad issues as health systems research and how to effect change in large populations. Discussion panels included (1) Realizing the Promise of Health Sciences, (2) Engineering the Future of Medicine, and (3) Delivering Health Everywhere. The multidisciplinary audience left the symposium energized by the promise of a new, systems engineering–based health system driven by evidence from collaborative,

synergistic research. The inaugural Johns Hopkins APL National Health Symposium was video recorded. Videos are available to the public on APL’s YouTube channel: <https://www.youtube.com/user/jhuapl>.

### BACKGROUND TO THE SYMPOSIUM

Health care costs in general, and especially in the United States, are rising at unsustainable rates.<sup>1</sup> Paradoxically, despite significant investment in health care, US expenditures result in mediocre health outcomes that are below those of dozens of other nations that spend far less per capita on health care.<sup>2</sup> Regina Herzlinger of the Harvard Business School noted that “such problems beg for innovative solutions involving every aspect of health care—its delivery to consumers, its technology, and its business models.”<sup>3</sup> At the same time, many obstacles frustrate attempts to implement innovation in health care.<sup>4</sup> Technological innovation and its efficient transfer to operational practice offer significant opportunities to improve





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outcomes at lower cost, resulting in increased value for the patient.

APL and the National Defense Industrial Association (NDIA) joined forces to gather over 160 civilian, military, and government leaders from more than 50 organizations in health care delivery, health research, and industry at the inaugural National Health Symposium. Our intent was to focus on the translation of advances in research and development to the delivery of health care in all settings. By bringing together this eclectic group of leaders, we wanted to explore the latest breakthroughs and identify practical approaches to overcoming barriers to our envisioned future of health. Lastly, we wished to discuss a future of excellence in health care delivery in all environments, including the battlefield and amidst natural or human-made disasters.

## **OVERVIEW OF THE SYMPOSIUM**

The two-day symposium featured keynote talks interspersed with panel discussions engaging leaders from across the health community, as well as lightning talks by APL scientists presenting their current research efforts. In addition, several technology exhibits were available for the attendees throughout the meeting.

## **OVERVIEW OF PRESENTATIONS**

Vice Adm. Raquel C. Bono, MD, is the director of the US Defense Health Agency (DHA), leading a joint combat support agency enabling the Army, Navy, and Air Force medical services to support the combatant commands during both peacetime and war. The DHA administers the TRICARE health plan, providing worldwide medical and dental care to more than 9.4 million uniformed service members, retirees, and their families.<sup>5</sup> Vice Adm. Bono began her talk, “Bridging the Health Divide: From Research to Operations,” by noting that she has observed barriers to innovation at both the practitioner level and the highest levels of the US military health care system. She stated she believed some of these barriers to innovation were “self-inflicted,” a result of the tremendous variability across the military medicine platform. Vice Adm. Bono gave an example concerning one medical device (the intravenous infusion pump), stating the DHA has “at least one of every imaginable IV infusion pump ever made.”

The resulting variance in this one device presents challenges in training, quality, and safety in its use. This issue, multiplied by hundreds of devices, presents enormous challenges to military medical care. Thus began a recurrent theme over the next two days of the desperate need for an overarching systems engineering approach in health care devices and systems. Vice Adm. Bono pressed forward with her belief that standardization—“eliminating the variance and variability”—is necessary before innovation can occur. She concluded with the observation that the military health care system has and will continue to partner with civilian academic institutions, providers, and medical researchers in a collective effort to effect innovation in health care.

Dr. Antony Rosen, MB, ChB, is the Mary Betty Stevens Professor of Medicine, professor of pathology and cell biology, director of the Division of Rheumatology, vice dean for research at the Johns Hopkins School of Medicine, and co-director of inHealth, the Johns Hopkins program in precision medicine and individualized health. He began his talk on precision medicine by discussing the strengths and weaknesses of human clinicians as compared to the artificial intelligence (AI) systems analyzing large databases in precision medicine efforts.<sup>6</sup> He focused in on the ability of AI to identify subgroups of patients in populations with great accuracy, an attribute that clinicians distinctly lack. To conduct these kinds of analyses, the existence of large, longitudinal databases with accurate measurements of the correct variables are necessary. He described the elucidation of scleroderma as essentially a paraneoplastic syndrome, in that the immune response to a certain type of cancer results in the clinical presentation of scleroderma. This discovery, he noted, “has huge importance on how you understand how to diagnose, how you treat, how you predict, and how you prevent.” He believes there are thousands of similar relationships awaiting discovery. Dr. Rosen concluded his talk by declaring that precision medicine enables a cascading process that “benefits everybody from patients to providers to health systems to payers to the military to society.”

Dr. Guy Miller, MD, PhD, is founder of Atomix Bioworks and described by many as a futurist. He is guided by the notion that understanding how to measure complex biological systems and processing unique data streams are essential to solving some of

the world's most pressing health problems. Dr. Miller championed the use of inductive, rather than deductive, logic to lead the coming paradigm shift in US health care. He identified two blind spots in our current thinking: (1) that we have a disease care system rather than a health care system, and (2) that we consider biologic systems as machines—in other words, that they are the sum of their parts, devoid of their magnificent gestalt. He suggested putting a premium on function, gathering functional data on biological systems rather than concentrating on the parts of the system. Dr. Miller recommended the use of contextual data—“higher-resolution, lower-latency metrics of system performance”—to analyze disease processes. He felt this was akin to taking vital signs at the cellular level, a process that could measure health (homeostasis) and disease (the movement away from homeostasis). He noted this could also lead to presymptomatic diagnosis of disease and the precise guidance of genomics tools.



Adm. Brett Giroir, MD, the US assistant secretary for health at the US Department of Health and Human Services, leads development of US public health policy and oversees 11 core public health offices—including the Office of the Surgeon General and the 6,500-member US Public Health Service Commissioned Corps—to promote, protect, and advance the health and safety of our nation and the world. He presented a sweeping overview of health and health challenges in the United States.<sup>7</sup> He first noted the important public health and medical achievements in the United States over the past 200 years but tempered these with a detailed discussion on our current challenges. Adm. Giroir echoed other speakers' financial concerns, noting

the recent official projection that the United States will spend \$6 trillion, or 19% of the gross domestic product, on health by the year 2027. He then discussed strategies to address our challenges, with an emphasis on the utility of applying principles similar to those of the US Defense Advanced Research Projects Agency. He concluded with a detailed discussion on the priorities for public health innovation, led by the need for “orthogonal technologies and paradigms for the current most costly medical issues (for example hemodialysis, falls, sepsis, addiction, suicide, pain).”

Rear Adm. (Ret) Scott Deitchman, MD, MPH, served for 30 years as a commissioned officer in the US Public Health Service. His last assignment was as the associate director for environmental health emergencies in the National Center for Environmental Health at the Centers for Disease Control and Prevention. Leading off the second day's theme of “Delivering Health Everywhere,” Rear Adm. Deitchman spoke on “Cross-Disciplinary Health Response Challenges for Nuclear Detonation (NUDET) and Other Catastrophes.” He identified the need for fast, robust, two-way communication as the key to disaster response.<sup>8</sup> Rear Adm. Deitchman discussed various platforms and the use of new technologies to deliver general and individualized messages during disaster response. For example, customized messages could be tailored to each individual's needs based on their medical history and local environment. He described FEMA's Integrated Public Alert and Warning System (IPAWS), which agencies at all levels can use in disaster response. Interestingly, he also identified short-wave “ham” radio operators as a particularly useful platform after disasters.<sup>9</sup> Concerning saving the greatest number of lives in the aftermath of a NUDET, he bluntly stated that effective communication about how and where to seek shelter far outweighs the traditional notion of immediate first responder “boots on the ground.” Lastly, he discussed the challenges of integrating multidisciplinary data into a platform for situational awareness during disaster response.

## OVERVIEW OF PANEL DISCUSSIONS

The panel on “Realizing the Promise of Health Sciences” was moderated by Jessica Dymond, PhD, of APL, and the discussion was led by Jennifer Gardy, PhD, now of the Bill & Melinda

Gates Foundation (formerly of BC Centre for Disease Control); Georg Duenstl, PhD, of LEO Pharma; and Michael Boyle, MD, of the Cystic Fibrosis Foundation. Dr. Gardy spoke briefly about using genomics as a tool for public health policy and practice. Dr. Boyle described successes and challenges in the fight against cystic fibrosis. Dr. Duenstl led the group into the general discussion with his remarks on an industry perspective on external innovation. Strategies to realize the promise of the health sciences identified during the panel discussion included (1) emphasizing “team” science and interdisciplinary training; (2) the use of “venture philanthropy” to de-risk exploratory research while also requiring cross-disciplinary collaboration; (3) ensuring credit and funding for those who share data and resources; and (4) requiring well-developed, standardized information technology templates for data collection and analysis.

The panel on “Engineering the Future of Medicine” was moderated by Jonathan Thornhill, of APL, and the discussion was led by Russell Kohl, MD, of the TMF Health Quality Institute; Oliver Harrison, MD, MPH, of Alpha Health; and Christianne Roumie, MD, MPH, of Vanderbilt University. To begin the panel, Dr. Harrison discussed the “challenges of combining the best of science and technology to rapidly improve system-level outcomes in health care.” Dr. Kohl then discussed lessons from aviation quality assurance that could be applied to health care. Dr. Roumie transitioned into the panel discussion with her talk on interdisciplinary approaches to accelerate both the pace of research discoveries and their translation to common use. Strategies discussed to improve health and health care included (1) moving beyond historical patterns to embrace a systems approach to health; (2) collection of large amounts of “ground-truth data” to drive decisions; (3) realizing that our current vectors to disseminate information (journals, conferences, and symposia) are inefficient; and (4) using anthropologic and multidisciplinary methods, such as the Observe–Orient–Decide–Act (OODA) loop, to determine the most receptive ways to influence behavior of all participants in the health care system.

The panel on “Delivering Health Everywhere” was moderated by Jeffrey Freeman, PhD, of APL, and the discussion was led by Matt Bonds, MD, of Harvard Medical School; Lt. Col. Jon Earles, RN, US Air

Force; and Capt. Paul Reed, MD, of the National Center for Disaster Medicine and Public Health. To initiate the discussion, Dr. Bonds discussed public health, medical care, and disaster response in Madagascar, one of the poorest nations on earth. Lt. Col. Earles followed with a discussion of the challenges and recent advances in health care in combat environments. Capt. Reed led the audience into the general discussion with his talk describing recent US disaster responses, with a focus on the Ebola outbreak in West Africa in 2014. Important points from this discussion included the following: (1) there is often reluctance and negligible funding to collect data in austere environments; (2) this data is needed for individual care and, in aggregate, for evaluating policies and driving technological advances; (3) this data needs to be multidisciplinary and include anthropological data; and (4) telehealth and/or AI solutions can be useful but may be limited by bandwidth in austere environments. In the question and answer portion of the panel discussion, the need for data-driven insights to address political obstacles was a common theme.



## LEAVING IN ACTION

The symposium culminated in a group discussion led by Sezin Palmer, National Health Mission Area executive at APL; Geoff L. Ling, MD, PhD, SunQ, LLC; Dr. Rosen; Dr. Miller; Dr. Harrison; and Dr. Deitchman. Dr. Ling began the discussion by stating that to get where we want to be, we must specifically articulate our goal—our ideal health system. He termed this our “moonshot” moment. Once that goal is defined, the “value proposition” of our ideal system must be widely and effectively



transmitted not only to policy makers but also to all affected populations. Dr. Ling gave the example of the HIV epidemic, which began while he was in training. In its early years, the HIV epidemic was perceived to be a disease only of homosexual white men and, then later, Haitians, but not a mainstream political issue. Through the actions of grassroots activists such as the AIDS Coalition to Unleash Power (ACT UP), which successfully articulated the value proposition of AIDS research, HIV research was adequately funded and currently receives annual funding from the US government in the neighborhood of \$7.5 billion.<sup>10</sup> Dr. Rosen then echoed Dr. Giroir's recommendation that we should focus first on important, expensive problems plagued with obvious waste. In doing so, he continued, the support of all concerned—the patients, the providers, the payers, and society—will all align. Dr. Miller agreed, noting, “What people buy are superior outcomes. They don't care how we do what we do.” Dr. Miller commented that our greatest technological achievements, such as the Apollo program or the Manhattan Project, did not derive from a consensus, but rather from unmistakable acts of bold leadership. Dr. Miller summarized this discussion with the following points: (1) we must articulate our superior value proposition; (2) we must define our core competencies that serve as our point of differentiation; (3) we must identify our first superior outcomes to be delivered; (4) we must define the heuristics that support our logic; and most importantly, (5) we must identify who will stand up and provide the leadership to achieve our goals.

The discussion then turned to how we could effect change as we left the symposium—in other words, what we should do before next year's National Health Symposium. Dr. Rosen remarked that to get from where we are to where we want to be, the collaboration between Johns Hopkins Medicine and APL “is profound and really important,” noting that “in the academic world, people tend to focus on a problem that interests them . . . while APL is focused *ruthlessly* on problems the world needs solving.” A suggestion to create an online forum for symposium attendees was met with warm approval. Topics named for continued, immediate discussion were how to best message the need for the changes identified at the symposium and how to target the most efficient architects of change. Dr. Harrison went back to Dr. Ling's comments about the HIV epidemic

and said he believed the entertainment industry and the use of social media were instrumental in the HIV community's success in increasing public awareness and obtaining funding. Dr. Harrison said we need to reach out not only to the health care and political communities but also to every member of the beneficiary population. Dr. Harrison made a third, and crucial, point that no matter how much we spend on health care research, the roots of health lie in other areas of the economy such as nutrition, education, and urban planning. Evidence-driven decisions in these areas can effect enormous positive change in population health. The multidisciplinary audience left the symposium energized by the promise of a new, systems engineering-based health system driven by evidence from collaborative, synergistic research.

The inaugural Johns Hopkins APL National Health Symposium was video recorded. Videos are available to the public on APL's YouTube channel: <https://www.youtube.com/user/jhuapl>.

## LIGHTNING TALKS

The lightning talks presented by APL scientists were:

- Dr. Briana Vecchio-Pagán, “Realizing the Promise of Health Sciences—Integrating Next-Generation Technologies to Combat Health Care Acquired Infections”
- Mr. Matthew Sawicki, “Engineering the Future of Medicine—Implementing a Valued-Based Care Model in Medicine”
- Mr. Ryan Mukherjee, “Delivering Health Everywhere—Artificial Intelligence for Displaced Population Assessment”

## NOTES

- 1 OECD, *Fiscal Sustainability of Health Systems: Bridging Health and Finance Perspectives*, Paris: OCED Publishing, 2015.
- 2 Gearhart R, “The robustness of cross-country healthcare rankings among homogenous OCED countries,” *J Applied Economics* 2016, 19:113–143, [https://doi.org/10.1016/S1514-0326\(16\)30005-8](https://doi.org/10.1016/S1514-0326(16)30005-8).
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  - 6 Rosen A, Zeger SL, "Precision medicine: discovering clinically relevant and mechanistically anchored disease subgroups at scale," J Clin Invest 2019, 129(3):944–945. <https://doi.org/10.1172/JCI126120>.
  - 7 Haskins J, "Q&A with new HHS Assistant Secretary for Health Brett Giroir: health for all, by all and in all: new head of Commissioned Corps calls for changes to service," The Nation's Health 2018, 48(4):6, <http://thenationshealth.aphapublications.org/content/48/4/6>.
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  - 9 Cid VH, Mitz AR, Arnesen SJ, "Keeping communications flowing during large-scale disasters: leveraging amateur radio innovations for disaster medicine," Disaster Med Public Health Prep 2018, 12(2):257–264, <https://doi.org/10.1017/dmp.2017.62>.
  - 10 Piot P, Russell S, Larson H, "Good politics, bad politics: the experience of AIDS," Am J Public Health 2007, 97(11): 1934–1936, <https://doi.org/10.2105/AJPH.2007.121418>.



# AGENDA

**TUESDAY, MARCH 5**

8:00 a.m.–5:00 p.m. **REGISTRATION**

8:00–9:00 a.m. **NETWORKING BREAKFAST**

8:00 a.m.–6:00 p.m. **TABLETOP EXHIBITS AND DEMONSTRATIONS**

9:00–9:15 a.m. **WELCOME AND INTRODUCTORY REMARKS**

**Sezin Palmer**

Mission Area Executive, National Health Mission Area, Johns Hopkins University Applied Physics Laboratory

9:15–10:00 a.m. **KEYNOTE ADDRESS**

**Vice Adm. Raquel Bono, MD, USN**

Director, Defense Health Agency

10:00–10:30 a.m. **NETWORKING BREAK**

10:30–10:50 a.m. **INVITED SPEAKER**

**Dr. Antony Rosen, MB, ChB**

Vice Dean for Research, Professor of Medicine, Johns Hopkins Medicine

10:50–10:55 a.m. **LIGHTNING TALK: REALIZING THE PROMISE OF HEALTH SCIENCES—  
INTEGRATING NEXT-GENERATION TECHNOLOGIES TO COMBAT  
HEALTH CARE ACQUIRED INFECTIONS**

**Dr. Briana Vecchio-Pagán, PhD**

Bioinformatics Scientist, Johns Hopkins University Applied Physics Laboratory

10:55 a.m.–12:15 p.m. **PANEL: REALIZING THE PROMISE OF HEALTH SCIENCES**

**Dr. Jennifer Gardy, PhD**

Senior Scientist, BC Centre for Disease Control

**Dr. Georg Duenstl, PhD**

Chief Scientist Pharmacology, LEO Science & Technology Hub

**Dr. Michael Boyle, MD**

Senior Vice President of Therapeutics Development, Cystic Fibrosis Foundation

**Dr. Antony Rosen, MB, ChB**

Vice Dean for Research, Professor of Medicine, Johns Hopkins Medicine

12:15–2:00 p.m. **NETWORKING LUNCH AND FUTURIST PRESENTATION**

1:00–2:00 p.m. **FUTURIST**

**Dr. Guy Miller, MD, PhD**

Founder, Atomix Bioworks

- 2:00–2:15 p.m.      **TRANSITION TO GENERAL SESSION**
- 2:15–3:00 p.m.      **KEYNOTE ADDRESS**  
Adm. Brett Giroir, MD  
Assistant Secretary for Health, US Department of Health and Human Services
- 3:00–3:05 p.m.      **LIGHTNING TALK: ENGINEERING THE FUTURE OF MEDICINE—  
IMPLEMENTING A VALUE-BASED CARE MODEL IN MEDICINE**  
Matthew Sawicki  
Health Systems Analyst, Johns Hopkins University Applied Physics Laboratory
- 3:05–4:30 p.m.      **PANEL: ENGINEERING THE FUTURE OF MEDICINE**  
Dr. Russell Kohl, MD, FAAFP  
Chief Medical Officer, TMF Health Quality Institute  
  
Dr. Oliver Harrison, MD, MPH  
Chief Executive Officer, Health Moonshot, Telefónica Innovation Alpha, Telefonica  
  
Dr. Christianne Roumie, MD, MPH  
Department of Medicine, Vanderbilt University
- 4:30–4:45 p.m.      **CLOSING REMARKS**
- 4:45–6:00 p.m.      **NETWORKING RECEPTION AND EXHIBITION**

## WEDNESDAY, MARCH 6

- 8:00 a.m.–2:00 p.m.      **REGISTRATION**
- 8:00 a.m.–2:00 p.m.      **TABLETOP EXHIBITS AND DEMONSTRATIONS**
- 8:00–9:00 a.m.      **NETWORKING BREAKFAST**
- 9:00–9:15 a.m.      **WELCOME AND INTRODUCTORY REMARKS**  
Dr. Ralph Semmel  
Director, Johns Hopkins University Applied Physics Laboratory  
  
Sezin Palmer  
Mission Area Executive, National Health Mission Area, Johns Hopkins University Applied Physics Laboratory
- 9:15–10:00 a.m.      **KEYNOTE ADDRESS**  
Dr. Scott Deitchman, MD, MPH, RADM, USPHS (Ret)  
Adjunct Associate Professor, Uniformed Services University of the Health Sciences

- 10:00–10:30 a.m.      **NETWORKING BREAK**
- 10:30–10:35 a.m.      **LIGHTNING TALK: DELIVERING HEALTH EVERYWHERE—ARTIFICIAL INTELLIGENCE FOR DISPLACED POPULATION ASSESSMENT**  
 Ryan Mukherjee  
 Senior Research Engineer, Intelligent Systems, Johns Hopkins University Applied Physics Laboratory
- 10:35 a.m.–12:00 p.m.      **PANEL: DELIVERING HEALTH EVERYWHERE**  
**Dr. Matt Bonds, MD**  
 Assistant Professor of Global Health and Social Medicine, Harvard Medical School
- Lt. Col. Jon Earles, RN, USAF**  
 Director, Medical Operations Division, Air Force Special Operations Command
- Capt. Paul Reed, MD**  
 Deputy Director, National Center for Disaster Medicine and Public Health
- 12:00–1:00 p.m.      **NETWORKING LUNCH**
- 1:00–2:00 p.m.      **PANEL: LEAVING IN ACTION**  
**Dr. Geoff Ling, MD, PhD**  
 CEO, SunQ, LLC
- Sezin Palmer**  
 Mission Area Executive, National Health Mission Area, Johns Hopkins University Applied Physics Laboratory
- Dr. Antony Rosen, MB, ChB**  
 Vice Dean for Research, Professor of Medicine, Johns Hopkins Medicine
- Dr. Guy Miller, MD, PhD**  
 Founder, Atomix Bioworks
- Dr. Oliver Harrison, MD, MPH**  
 Chief Executive Officer, Health Moonshot, Telefónica Innovation Alpha, Telefonica
- Dr. Scott Deitchman, MD, MPH, RADM, USPHS (Ret)**  
 Adjunct Associate Professor, Uniformed Services University of the Health Sciences
- 2:00 p.m.      **SYMPOSIUM ADJOURNS**

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## TABLETOP DISPLAYS

- |   |  |
|---|--|
| <a href="#">Master of Health Care Delivery Science, Dartmouth College</a> | <a href="#">Modular Prosthetic Limb, APL</a>         |
| <a href="#">Connected Corpsman Overview, APL</a>                          | <a href="#">SAGES Demo, APL</a>                      |
| <a href="#">DNA Sequencing Demo, APL</a>                                  | <a href="#">Essence Demo, APL</a>                    |
| <a href="#">JHU Brain Imaging Overview, APL</a>                           | <a href="#">Virtual Reality Prosthetic Limb, APL</a> |

# BIOGRAPHIES



## VICE ADM. RAQUEL BONO, MD, USN

### *Director*

#### Defense Health Agency

Vice Adm. Raquel C. Bono is the director, Defense Health Agency (DHA),

Defense Health Headquarters, Falls Church, Virginia. She leads a joint, integrated Combat Support Agency enabling the Army, Navy, Air Force, and Marine Corps medical services to provide a medically ready force and ready medical force to combatant commands in both peacetime and wartime. In support of an integrated, affordable, and high-quality military health service, the DHA directs the execution of 10 joint shared services to include the health plan (TRICARE), pharmacy, health information technology, research and acquisition, education and training, public health, medical logistics, facility management, budget resource management, and contracting. The DHA administers the TRICARE Health Plan providing worldwide medical, dental, and pharmacy programs to more than 9.4 million uniformed service members, retirees, and their families.

Commissioned in June 1979, Vice Adm. Bono obtained her baccalaureate degree from the University of Texas at Austin and attended medical school at Texas Tech University. She completed a surgical internship and a general surgery residency at Naval Medical Center Portsmouth and a trauma and critical care fellowship at the Eastern Virginia Graduate School of Medicine in Norfolk.

Shortly after training, Bono saw duty in Operations Desert Shield and Desert Storm as head, casualty receiving, Fleet Hospital Five in Saudi Arabia from August 1990 to March 1991. Upon returning, she was stationed at Naval Medical Center Portsmouth as a surgeon in the General Surgery Department, surgical intensivist in the Medical/Surgical Intensive Care Unit, and attending surgeon at the Burn Trauma Unit at Sentara Norfolk General Hospital. Her various appointed duties included division head of trauma; head of the Ambulatory Procedures Department (APD); chair of the Laboratory Animal Care and Use Committee; assistant head of the Clinical Investigations and Research Department; chair of the Medical Records Committee; and command intern coordinator. She has also served as the specialty leader for intern matters to the surgeon general of the Navy.

In September 1999, she was assigned as the director of restorative care at the National Naval Medical Center in Bethesda, Maryland, followed by assignment to the Bureau of Medicine and Surgery from September 2001 to December 2002 as the Medical Corps career planning officer for the chief of the Medical Corps. She returned to the National Naval Medical Center in January 2003 as director for medical–surgical services.

From August 2004 through August 2005, she served as the executive assistant to the 35th Navy surgeon general and

chief, Bureau of Medicine and Surgery. Following that, she reported to Naval Hospital Jacksonville, Florida, as the commanding officer from August 2005 to August 2008. She then served as the chief of staff, deputy director TRICARE Management Activity (TMA) of the Office of the Assistant Secretary of Defense, Health Affairs (OASD(HA)) from September 2008 to June 2010. She later served as deputy director, Medical Resources, Plans and Policy (N093), Chief of Naval Operations. From November 2011 to June 2013, she served as the command surgeon, US Pacific Command, Camp H. M. Smith, Hawaii. From July 2013 to September 2013, she served as acting commander Joint Task Force National Capital Region Medical. From September 2013 to October 2015, she served as director, National Capital Region Medical Directorate of the Defense Health Agency, and as the 11th chief, Navy Medical Corps. She currently serves as director, Defense Health Agency.

In addition to being a diplomat of the American Board of Surgery, Bono is a fellow of the American College of Surgeons and has an executive MBA from the Carson College of Business at Washington State University. Her personal decorations include Defense Superior Service Medal (three), Legion of Merit Medal (four), Meritorious Service Medal (two), and the Navy and Marine Corps Commendation medal (two).



## DR. SCOTT DEITCHMAN, MD, MPH, RADM, USPHS (RET)

### *Adjunct Associate Professor*

#### Uniformed Services University of Health Sciences

Scott Deitchman, MD, MPH, served for 30 years as a commissioned officer

in the US Public Health Service, retiring in May 2017 at the rank of rear admiral. He previously was the associate director for environmental health emergencies in the National Center for Environmental Health at the Centers for Disease Control and Prevention (CDC). He led CDC's responses to the public health challenges of numerous hurricanes, the 2004 Asian tsunami disaster,

the 2010 Deepwater Horizon oil spill, and the 2011 Fukushima Daiichi nuclear reactor emergency. From April 2006 to May 2007 Dr. Deitchman served in the White House as the vice president's medical advisor for homeland security affairs. He currently is a principal with Gordon & Rosenblatt LLC, consulting on prevention and control of waterborne disease outbreaks caused by Legionella and other organisms. Dr. Deitchman also serves as adjunct faculty at the Uniformed Services University of the Health Sciences, with an appointment in

the Department of Preventive Medicine and a particular focus in the National Center for Disaster Medicine and Public Health. He continues to publish and speak on a variety of topics in disaster medicine. Dr. Deitchman is board certified in occupational and environmental medicine and in general preventive medicine. His awards and honors include the Distinguished Service Medal, Meritorious Service Medal, and Outstanding Service Medal. He was inducted as an alumnus member into Alpha Omega Alpha, the medical honorary society.





## ADM. BRETT GIROIR, MD

*Assistant Secretary for Health*  
US Department of Health and Human Services

Adm. Brett P. Giroir, MD, was sworn in as assistant secretary for health

at the US Department of Health and Human Services (HHS) on February 15, 2018.

The assistant secretary for health leads development of HHS-wide public health policy recommendations and oversees 11 core public health offices—including the Office of the Surgeon General and the US Public Health Service Commissioned Corps, which has approximately 6,500 uniformed health officers who serve in nearly 600 locations around the world to promote, protect, and advance the health and safety of our nation and our world. He also oversees 3 presidential and 11 secretarial advisory committees.

Dr. Giroir is a physician, scientist, and innovator. He is a former medical school executive and biotech startup CEO, and has served in a number of leadership positions in the federal government as well as academia.

In addition, Dr. Giroir serves as senior advisor to the secretary for opioid policy. In this capacity, he is responsible for coordinating HHS's efforts across the administration to fight America's opioid crisis. From 2014 to 2015, Dr. Giroir chaired the Veteran's Choice Act Blue Ribbon Panel to reform the US Veterans Health System. During the Ebola emergency, he directed the Texas Task Force on Infectious and Disease Preparedness Response.

He was executive vice president and CEO of Texas A&M's Health Science Center from 2013 to 2015, having earlier served as vice chancellor of strategic initiatives (2011–2013) and vice chancellor for research (2008–2011) for the entire Texas A&M University system. A pediatric critical care physician and a former member of the American Board of Pediatrics, Dr. Giroir cared for critically ill children for 14 years and was the first chief medical officer of Children's Medical Center of Dallas (now Children's Health). He was also a professor at the University of Texas Southwestern Medical Center from 1993 to 2003 and held a number of positions in academic and hospital leadership.

Dr. Giroir has had a significant federal portfolio. He directed the Defense Sciences Office of the Defense Advanced Research Projects Agency (DARPA) from 2006 to 2008. In this capacity, he worked regularly with the White House, Congress, and NIH, CDC, DHS, and CIA leadership on national priorities, strategies, and programs. He joined the office in 2004 as deputy director, and between 1998 and 2004, was a member of the Defense Sciences Research Council.

Dr. Giroir has authored or co-authored almost 100 peer-reviewed scientific publications and holds patents on a number of biomedical inventions. He is the recipient of numerous honors and awards, including the US Secretary of Defense Medal for Outstanding Public Service, the American Heart Association's President Lyndon Baines Johnson Research Award, and the Society of Critical Care Medicine's Annual Scientific Award. He was the nation's high school debate champion in 1978. He received a bachelor's degree in biology from Harvard University in 1982 and a medical degree from the University of Texas Southwestern Medical Center (Dallas) in 1986.



## DR. GUY MILLER, MD, PHD

*Founder*  
Atomix Bioworks

Guy is described by colleagues as a futurist. From his initial University of

Chicago- and DARPA-funded investigations in suspended animation to his current interests in emergent properties of biological systems, he is guided by the notion that understanding how to measure complex

biological systems and processing unique data streams is essential to solving some of the world's most pressing problems. Guy holds a PhD in bio-organic chemistry and an MD with sub-specialization in critical care medicine. In 1995, he left his faculty position at Johns Hopkins on sabbatical to found the first of four biotechnology companies spanning the consumer, pharmaceutical,

and tech commercial sectors. Currently he is focused on building a learning engine based on physical-chemical parameters of biological systems. Guy lives in Silicon Valley with his wife and son and is an avid athlete and philanthropist. The Millers are significant supporters of the Palo Alto Medical Foundation, whose mission is to enhance the well-being of the patients they serve.



## DR. ANTONY ROSEN, MB, CHB

*Vice Dean for Research, Professor of Medicine*  
Johns Hopkins Medicine

Antony Rosen, MB, ChB, BSc (Hons), is the Mary Betty Stevens Professor

of Medicine, professor of pathology and cell biology, director of the Division of

Rheumatology, vice dean for research at the Johns Hopkins School of Medicine, and co-director of inHealth, the Johns Hopkins program in precision medicine and individualized health. Dr. Rosen received his medical degree from the University of

Cape Town in South Africa in 1984. After completing his internship in medicine and surgery, he pursued postdoctoral studies in immunology at the Rockefeller University in New York (1987–1990). Drawn by a desire for a deeper understanding of human

inflammatory diseases, he returned to clinical medicine, and was an Osler resident and rheumatology fellow at Johns Hopkins Hospital (1990–1994). He subsequently joined the faculty at Johns Hopkins in 1995 and rose to the rank of professor in

2002. He has been director of the Division of Rheumatology since then, overseeing a substantial expansion of the division. The division became the #1-ranked rheumatology division by USNWR in 2005 and has remained in that position since. His research

focuses on autoimmunity in the rheumatic diseases, using subgroups of patients with distinct phenotypes, trajectories, and specific autoimmune responses to define molecular mechanisms.



## DR. JENNIFER GARDY

*Deputy Director of Surveillance, Data, and Epidemiology*  
The Bill & Melinda Gates Foundation

Dr. Jennifer Gardy is the deputy director of surveillance, data, and epidemiology for the Bill & Melinda Gates Foundation, where she is responsible for managing genetic/genomic- and data-driven surveillance across multiple pathogen portfolios. Formerly a senior scientist at the British Columbia Centre for Disease Control, Gardy has made supremely popular contributions to CBC's *The Nature of Things* (her "Myth or Science?" episodes are an edifying delight), as well as

Discovery Channel Canada's *Daily Planet*. On screen and on stage, Gardy communicates the impact that science has on our everyday lives, challenging commonly held beliefs and allowing us to make more informed decisions about how we live.

When not surveilling pathogens or charming TV viewers with her scientific inquiry, Gardy's work spans key areas such as microbiology, evolution, and computer science, as well as the burgeoning field of "genomic epidemiology," the study of how bacterial

and viral genomes can be used to track disease outbreaks and epidemics. In her lab, she uses DNA sequencing to understand how outbreaks start, how they spread, and how we can use this information to stop future outbreaks. And, do we really lose most of our body heat through our head? Gardy tackles these questions—and more—in her engaging talks. She is also the author of children's book *It's Catching: The Infectious World of Germs and Microbes*, a "roll call of germs [that] makes for fascinating reading" (Kirkus Reviews).



## DR. OLIVER HARRISON

*CEO*  
Telefonica Alpha Health

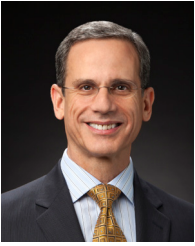
Dr. Oliver Harrison is the CEO of the health moonshot group, Telefonica Alpha Health. He has a life-long passion for health care and technology (since deciding to become a doctor and receiving his first home computer at the age of six). With a first degree in neuroscience at Cambridge, Oliver qualified as a medical doctor and practiced for six years with postgraduate training in psychiatry and public health, plus a research interest in computational neuroscience (at the Functional Imaging Lab, UCL). He first directly combined his interests in health care and technology working in the McKinsey health care practice based in London, where he spent five years working on projects across Europe, Asia, and the United States. In 2006, he was recruited

to help build a modern health care system in Abu Dhabi, UAE. Dr. Harrison spent seven years as director of public health, designing and implementing systems for collecting public health data, for structuring care with evidence-based treatment protocols, and for intervening to improve care in both the clinical and community environments.

Since moving back to Europe in 2013, he has worked as an advisor to the WHO, World Bank, and NHS England. He created two UK-based start-ups in health care data systems. In 2016, Dr. Harrison was recruited by Telefonica to lead Alpha Health, Telefonica Alpha's first moonshot. Working in Barcelona, he has created a team to tackle the root cause of chronic disease—perhaps today's greatest challenge in health care. He has built a team of engineers,

designers, researchers, and strategists, and built a range of partnerships with the best universities, companies, and experts in the United States, Europe, and beyond. Alpha Health's work combines HCI, digital health, and collaboration with end-users and health care practitioners.

Dr. Harrison has a unique track record delivering results in health innovation, tech, and health system reform, and he has contributed more than 50 academic publications and presentations. He has spent two years as a member of the World Economic Forum Global Future Council on Human Enhancement and sits on the commercial board of Guy's and St Thomas's Hospital NHS Foundation Trust. He was awarded Freedom of the City of London in 2012.



## DR. RALPH SEMMEL

### *Director*

Johns Hopkins University Applied Physics Laboratory

Dr. Ralph D. Semmel became the eighth director of the Johns Hopkins University

Applied Physics Laboratory on July 1, 2010. As director, Dr. Semmel leads the nation's largest university affiliated research center, which performs research and development on behalf of the Department of Defense, the intelligence community, NASA, and other federal agencies. The Laboratory has more than 6,700 staff members who are making critical contributions to a wide variety of nationally and globally significant technical and scientific challenges.

Prior to becoming director, Dr. Semmel served as the founding head of APL's Applied Information Sciences Department and Infocentric Operations Business Area, which conducted foundational research and development in the areas of cyber and information operations, information assurance, intelligence systems, and global

information networks. Dr. Semmel also served in a variety of other executive and senior leadership positions at the Laboratory, including business area executive for Infocentric Operations, assistant head of the Power Projection Systems Department, business area executive for Science and Technology, deputy director of the Research and Technology Development Center, and supervisor of the System and Information Sciences Group.

In addition to his APL responsibilities, Dr. Semmel served from 1997 to 2010 as chair of the graduate programs in Computer Science, Information Assurance, and Information Systems Engineering for Johns Hopkins University's Engineering for Professionals. He also has been program co-chair and on the program committees for several major international conferences and served on the editorial board of the *International Journal of Software Engineering and Knowledge Engineering*. He has

published more than 40 papers in the areas of artificial intelligence, database systems, and software engineering. Dr. Semmel also has led and served on a variety of federal government science and technology boards, panels, and committees. He currently is a member of the Defense Science Board and the Council on Foreign Relations.

Before joining the Laboratory in 1986, Dr. Semmel held leadership and technical positions with Wang Laboratories, MITRE Corporation, and the US Army.

Dr. Semmel earned a bachelor of science degree in engineering from the United States Military Academy at West Point, a master of science degree in systems management from the University of Southern California, a master of science degree in computer science from the Johns Hopkins University, and a PhD degree in computer science from the University of Maryland, Baltimore County.



## SEZIN PALMER

*Mission Area Executive, National Health Mission Area*

The Johns Hopkins University Applied Physics Laboratory

Sezin A. Palmer is the first mission area executive for national health at the

Johns Hopkins University Applied Physics Laboratory, which was recognized by Fast Company in 2016 as one of the most innovative companies in health care. The vision of the National Health Mission Area is to revolutionize health through science and engineering—a vision shared with partners at the Johns Hopkins University School of Medicine. The National Health Mission Area takes a systems approach to understanding health determinants to better predict and prevent illness, injury, and disease and applying this knowledge to develop novel capabilities to rapidly detect and respond to changes in health status. As the nation's largest university affiliated research center, APL performs research and development on behalf of the Department of Defense, the

intelligence community, NASA, and other federal agencies. The Laboratory has more than 6,700 staff members who are making critical contributions to a wide variety of nationally and globally significant technical and scientific challenges.

Prior to her current appointment, Ms. Palmer served as the mission area executive for Research and Exploratory Development. Under her leadership, APL made significant contributions to the fields of neuroscience, biomechanics, intelligent systems, and materials science. Previously, Ms. Palmer held leadership positions with increasing responsibility, including program manager and program area manager in the Laboratory's Undersea Warfare Mission Area. Ms. Palmer was responsible for the technical and programmatic oversight of numerous Navy programs in submarine warfare, anti-submarine warfare, and mine-

countermeasures capability development. She also served as the Laboratory's representative to the Commander, Pacific Fleet staff. Additionally, from 2002 to 2005 Ms. Palmer served as a panel member of the Chief of Naval Operations Mine Countermeasures Technical Advisory Group and from 2010 to 2012 as a member of the Chief of Naval Operations Submarine Security Working Group.

Prior to joining the Laboratory in 2000, Ms. Palmer held technical positions at the US Naval Research Laboratory and served as an analyst in the Central Intelligence Agency's Directorate of Intelligence where she led foreign naval systems analyses.

Ms. Palmer earned a bachelor of science degree in electrical engineering from the University of Maryland and a master of science degree in electrical engineering from Johns Hopkins University.

# ORGANIZERS



The National Defense Industrial Association is the trusted leader in defense and national security associations. As a 501(c)(3) corporate and individual membership association, NDIA engages thoughtful and innovative leaders to exchange ideas, information, and capabilities that lead to the development of the best policies, practices, products, and technologies to ensure the safety and security of our nation. NDIA's membership embodies the full spectrum of corporate, government, academic, and individual stakeholders who form a vigorous, responsive, and collaborative community in support of defense and national security. NDIA is proud to celebrate 100 years in support of our warfighters and national security. The technology used by today's modern warfighter was unimaginable 100 years ago. In 1919, BG Benedict Crowell's vision of a collaborative team working at the intersection of science, industry, government, and defense began what was to become the National Defense Industrial Association. For the past century, NDIA and its predecessor organizations have been at the heart of the mission by dedicating their time, expertise, and energy to ensuring our warfighters have the best training, equipment, and support. For more information visit [NDIA.org](http://NDIA.org)



## ABOUT APL:

For more than 75 years, the Johns Hopkins University Applied Physics Laboratory (APL) has provided critical contributions to critical challenges with systems engineering and integration, technology research and development, and analysis. Our scientists, engineers, and analysts serve as trusted advisors and technical experts to the government, ensuring the reliability of complex technologies that safeguard our nation's security and advance the frontiers of space. We also maintain independent research and development programs that pioneer and explore emerging technologies and concepts to address future national priorities. For more information visit [JHUAPL.edu](http://JHUAPL.edu)

## ABOUT THE NATIONAL HEALTH MISSION AREA:

The National Health Mission Area aims to revolutionize health through science and engineering. We focus on programs to predict and prevent illness, injury, and disease; rapidly detect and respond to changes in health status; restore and sustain health; and improve overall health and human performance—leveraging expertise from across Johns Hopkins and the Laboratory to develop solutions that advance health and health care for civilian, military, and veteran populations worldwide.

