APL COVID-19 Response Activities

The Johns Hopkins University Applied Physics Laboratory (APL) has provided solutions to national security and scientific challenges for more than 75 years. As a university affiliated research center, APL supports the Department of Defense (DoD) and a wide array of U.S. government agencies, maintaining core capabilities underlying missions ranging from cyber operations to homeland protection and strategic security, and most recently in the critical mission area of national health. Our National Health Mission Area, in partnership with the broader APL enterprise, is uniquely positioned to revolutionize health through science and engineering.

CAPABILITIES

APL is leveraging cutting-edge capabilities, drawing on the full expertise of the Laboratory in the COVID-19 response. Areas of expertise range from systems engineering to experimental science, including:

» **Artificial Intelligence (AI):** Applying advanced data analysis and AI to experimental characterization, and novel and disparate health surveillance data within decision support tools.

» **Disease Surveillance:** Leveraging a greater than 20-year history designing and deploying electronic disease surveillance capabilities, including ESSENCE (Electronic Surveillance System for the Early Notification of Community-based Epidemics) and SAGES (Suite for Automated Global Electronic bioSurveillance), to incorporate nontraditional data sources, track disinformation, and implement mobile data collection.

» **Rapid Prototyping:** Combining research and development, engineering, and systems integration expertise with contemporary collaboration methods to explore solutions for critical medical supplies and device shortages, addressing design elements through manufacturing.

» **Modeling and Simulation:** Developing and applying models to anticipate disease spread and countermeasure efficacy, enabling assessment of interventions and outcomes to inform resource allocation and course of action development.

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» **Genomics:** Employing genomics capabilities and custom user-friendly analytic software developed by APL to monitor viral evolution and spread; promoting democratizating and capacity building through training.

» **Experimental Characterization:** Leveraging biological research laboratories, aerosol/environmental facilities, and multidisciplinary expertise for characterization and evaluation of medical countermeasures, equipment, and devices.

» **Systems Engineering:** Applying systems approaches, including System Dynamics Analysis and analytic frameworks, to ensure comprehensive optimization of complex health and response systems.

RESPONSE

APL is now applying its broad technical expertise to work alongside military and civilian partners in support of the COVID-19 response. Efforts include:

» **National Response Operations:** Enabling national response through decision support in planning, operations, and logistics, emphasizing real-time data analysis, prescriptive modeling, and forecasting.

» **DoD Operation Support:** Enhancing real-time awareness to inform senior-level DoD operations via application of nontraditional data, analysis, and modeling and simulation.

» **Public Health/Dashboards:** Partnering with federal, state, and local public health officials to process, understand, acquire, and assess large and disparate data streams through development and enhancement of AI-based decision support dashboards and systems.

» **Patient Care/Health System Operations:** Applying systems engineering principles to health systems, complemented by tactical efforts in rapid equipment development and prototyping to formulate solutions to enhance patient outcomes, preparedness, and response.

» **Biological R&D:** Developing, evaluating, and deploying medical countermeasures and next-generation sequencing technologies, including user-friendly analytics and training to increase distributed capacity for real-time outbreak assessment and response.

» **Cyber Analysis:** Developing and implementing analytical tools to identify misinformation and influence confounding response; identifying high-confidence reporting data; and enabling automation of acquisition and analysis of diverse health data sources to facilitate real-time situational awareness, allowing informed decision-making and targeted resource allocation for high-risk populations.

ADDITIONAL INFORMATION:
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