



Homeland
Security

Science and Technology

WELCOME TO DHS @ SXSW 2021

THE ROAD TO REOPENING

Recovery through Research



At DHS, when we talk about reopening and recovery efforts, our research and development (R&D) investments must account for the economic, health and security needs of our country. Our SXSU '21 theme, "The Road to Reopening: Recovery through Research," answers the call about what is needed from a governmental R&D organization to improve security, restore public confidence and keep our front-line workforce safe and protected.

S&T is at SXSU to enhance relationships with the innovation community and help the tech community get more connected to federal government-led, COVID-response R&D initiatives. We know we cannot fully recover from the pandemic until our people are protected from the virus and feel safe enough to resume their normal lives.

On the following pages you will learn how our whole-of-government research investments are working for you and producing cross-cutting solutions, so no community is left behind. By working with cross-disciplinary leaders, we are scaling solutions across numerous communities in the areas of public transit, virus detection in wastewater, drone operations, airport security, and COVID-19 threat characterization and assessment.

By leveraging our expansive body of knowledge and strategic partnerships, S&T is pushing the boundaries of science and research and improving the quality of life for our citizens. Don't miss our virtual panel: **"Getting Life Back - Making Research Work for You!"** **on March 18 at 7:00pm EST.** By focusing on real-time problems, such as climate, public health, food security and access to clean water during disasters, S&T is mobilizing research to ensure communities emerge from the pandemic stronger and more resilient.

Please visit our [SXSU Resource Hub](#) on the [S&T website](#) for more information about S&T's whole-of-government R&D investments that are helping to save lives and 'Build Back Better!'

"THE RAPID INNOVATIONS WE HAVE WITNESSED DURING THIS PANDEMIC ARE PART OF THE SPILL-OVER EFFECTS AND SOCIETAL BENEFITS THAT COME FROM COLLABORATIVE INVESTMENTS IN SCIENCE AND TECHNOLOGY"

WILLIAM BRYAN
UNDER SECRETARY (ACTING), DHS S&T

SARS-CoV-2 Detection in the Wastewater

S&T researchers are working to develop standards development teams to help communities nationwide detect the SARS-Cov-2 virus in wastewater. This approach called Wastewater-Based Epidemiology (WBE) provides real-time monitoring capabilities to predict the potential spread of COVID-19. WBE makes it possible to detect the virus in wastewater 4 to 10 days before people start to show symptoms of exposure to COVID-19. This is key because with COVID-19, people may be contagious before they exhibit any symptoms. Using data science, technology, and infrastructure, WBE serves as an early warning system by mining sewage samples for clues about public health.

Through WBE, COVID-19 can be monitored in target populations, including university and correctional facilities, at an early stage, enabling state and local governments to better understand the severity and location of the virus and then direct resources and communications.

Going forward, WBE will play an important role for gathering health data to direct testing and vaccine distributions. S&T is working with whole-of-government partners, including Louisville, KY and the National Institute of Standards and Technology to develop standards teams, to improve the effectiveness of WBE in the COVID-era and beyond.



“IN COLLABORATION WITH PUBLIC AND PRIVATE PARTNERS, S&T IS DEVELOPING STANDARDS TEAMS FOR WBE DATA COLLECTION AND ANALYSIS, WHICH WILL ENHANCE PUBLIC HEALTH SECURITY.”

PHIL MATTSON
DHS S&T

Safeguarding the Nation's Public Transit

S&T is partnering with federal and state agencies to leverage new science and technology, modeling and data analytics to better assess the risk of COVID-19 aerosols in buses, subway train and passenger rail cars. Providing safe public transportation is vital to economic recovery by making it possible for the workforce to return to the office and in bringing our cities back to life.



With a goal of safe and resilient public transit systems, S&T's collaboration with the Metropolitan Transportation Authority (MTA) in New York City, Massachusetts Institute of Technology Lincoln Laboratory and the U.S. Department of Energy Argonne National Laboratory, is studying how air moves through trains and buses. This research is tracking the route of particles expelled from riders by breathing, coughing and sneezing under a variety of conditions—including: wearing a mask vs. no mask, windows and doors open vs. closed, and heating/air conditioning (HVAC) system settings and filter type.

Science-based data will enable NYC-MTA to mitigate airborne virus transmission while protecting passenger health and safety. This initiative will also help improve protections for the transit workforce – the brave men and women who face risk on the job but continue to show up every day to keep our country going. S&T's whole-of-government R&D models are helping communities build resilience and make informed decisions to keep citizens safe on the road to reopening our economy.

“WHOLE-OF-GOVERNMENT R&D INITIATIVES TARGETED AT IMPROVING PUBLIC HEALTH SECURITY AND MITIGATING THE RISK OF COVID-19 REPRESENT UNPRECEDENTED COORDINATION BETWEEN STATE AND FEDERAL GOVERNMENTS.”

DON BANSLEBEN
DHS S&T

Integrating Drones in the Airspace

The future of drones and the advancement of new applications in areas of healthcare, security and commerce, call for the safe integration of drones into the national airspace. The development of an unmanned aircraft system (UAS) traffic management (UTM) system for low-altitude airspace is needed to unleash innovation and enhance security for our country.

S&T is working with NASA, Department of Defense, the Federal Aviation Administration and others to develop an automated UTM, which will safely and securely integrate Unmanned Aircraft Systems (UAS) into national airspace systems (NAS), regardless of where those operators reside and where those flights take place.

In ways we could only imagine a couple years ago, UTM systems will enable DHS to more effectively identify the good and bad drones in the sky, those piloted by humans or machine. By leveraging best practices from the aviation community, UTM will establish airspace flight corridors, geo-fencing, route planning, terrain avoidance guidance, and weather alerts, among other capabilities. With UTM, drone delivery of goods and services is coming one day, but if it's not safe and secure, this vision will not become reality anytime soon. S&T is following the science and building whole-of-government innovation teams to prepare the country and stay at the front of breakthrough advances and future R&D curves.



**“WHEN YOU CONSIDER METRICS OF
“TIME, RISK, AND ABILITY,” UTM
WILL BE A GAME CHANGER FOR DHS
DRONE OPERATIONS, INCLUDING THE
DELIVERY OF MEDICAL SUPPLIES
AND RESPONDING TO “9-1-1” CALLS
OF HAZARDOUS MATERIALS, BOMB
THREATS, SUSPICIOUS PACKAGES,
AND LOCATING
LOST PERSONS.”**

TIMOTHY BENNETT
DHS S&T

Securing the Future of Travel

DHS recognizes how important travel is to our global economy and quality of life. S&T's Biometric research is evaluating how technologies can reliably verify the identities of travelers who are wearing face masks. This research is a great example of how we are innovating the growing demands for “speed and security” in operational settings. Investing in new capabilities and improvements for securely verifying peoples' identities without requiring the removal of protective equipment, e.g., masks, will not only reduce the risk for both members of the public and frontline security personnel—it will also help our communities reopen and recover.

This timely research applies to other sectors updating workforce policies for 2021 and various public-private organizations that are charged with keeping citizens safe and protected.

S&T is constantly refining its research agenda by asking: are we on the right path for developing future-proof capabilities that better prepare the country for the next crisis and lower risks to the public and frontline workforce? S&T's biometric initiatives are making it easier for industry innovators to work with government and for DHS to leverage technological advances that accelerate the delivery of solutions.



“S&T’S BIOMETRIC RESEARCH SUPPORTS MULTIPLE DHS MISSIONS AND OUR INTERAGENCY AND INTERNATIONAL PARTNERS WHO SHARE COMMON CHALLENGES AND SEEK TO LEVERAGE THE SPEED OF PRIVATE SECTOR INNOVATION.”

ARUN VEMURY
DHS S&T

Following the Science During the Pandemic

When a once-in-a-lifetime public health crisis sweeps the globe, how do you know what you don't know? Answer: you follow the science. S&T's Probabilistic Analysis for National Threats Hazards and Risks (PANTHR) program is building a database of timely knowledge—the weekly Master Question List—to shape the nation's pandemic response. Collating data on how SARS-CoV-2 is transmitted, how long the virus can live in the air and on surfaces, or which PPE is best to use has led to groundbreaking steps in our fight against COVID-19.

The laboratory studies and applied research led by PANTHR, the Hazard Awareness & Characterization Technology Center, and the National Biodefense Analysis and Countermeasures Center have produced novel insights about the virus' environmental stability and transmission, as well as actionable information for surface decontamination. The research has been adapted into interactive calculators to determine the half-life of the virus in aerosols and on surfaces, as well as methods for using common household technologies to disinfect N95 masks. These tools can arm decision-makers with additional critical tools to keep our communities and citizens safer.

With the deployment of vaccinations underway, we are starting to see light at the end of the dark tunnel, but there is still a way to go to get our nation, economy, and lives back to “normal.” S&T continues to work alongside academia, labs, and industry to deliver scientific solutions to the biggest crisis of our lifetime.



“THIS IS A SCARY, CHALLENGING TIME. WE OWE IT TO THE ESSENTIAL WORKERS, THE OVERWHELMED PARENTS, THE UNEMPLOYED, AND MOST OF ALL, THOSE WHO HAVE FALLEN PREY TO THIS INSIDIOUS DISEASE TO DO ALL THAT WE CAN TO BE RESPONSIBLE MEMBERS OF OUR COMMUNITIES.”

DR. LLOYD HOUGH
DHS S&T

S&T @ SXSW 2021

For more information, please visit the
S&T SXSW Resource Hub.

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