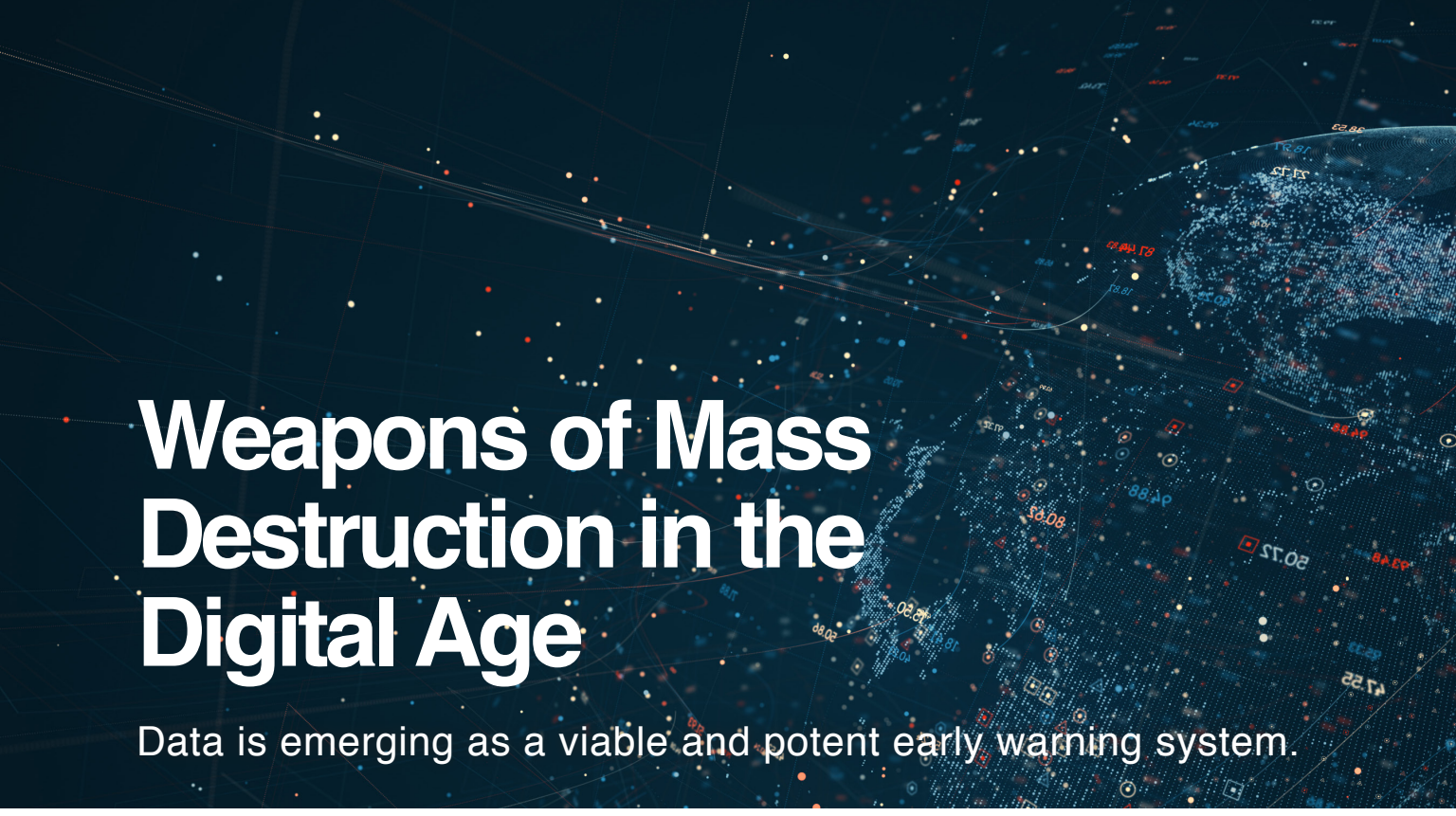

Weapons of Mass Destruction in the Digital Age

Data is emerging as a viable and potent early warning system.

Across government – from the Department of Homeland Security to defense and the intelligence community – professionals charged with keeping our country safe are striving to combat adversaries armed with deadly and increasingly sophisticated weapons: chemical, biological, radiological, nuclear and explosive. Thwarting the threat posed by weapons of mass destruction is a complex undertaking. More and more, success relies on the ability to extract and act on critical, timely and actionable intel mined from mountains of information.

"As a nation, we are getting better at collecting data. We are getting better at monitoring sensors, we are getting better at developing countermeasures. Tying all these together and shortening the time between detection and response and ensuring a coordinated action is clearly our next challenge," said Jordin Cohen, Ph.D., vice president, Defense and Homeland Security, Noblis, a nonprofit organization with expertise in science, technology and strategy. Noblis uses its technological proficiency to help government agencies solve complex problems for the benefit of the public good.

Cohen welcomed attendees to a recent symposium, Weapons of Mass Destruction in the Digital Age. Sponsored by FCW, Defense Systems and Noblis, the event featured speakers from organizations across the security, defense and intelligence communities. Those experts spoke to the challenges of preventing attacks and the complexity of harnessing data to neutralize those threats.

"We understand that developing leading edge capabilities to detect, attribute, deter, respond and prevent terrorist attacks is key to the security of our nation's future," Cohen said. "We rely on our forward thinking and sustainable solutions to help improve threat awareness, enhance surveillance and detection and deploy effective countermeasures."

Gary Rasicot, acting assistant secretary of the Countering Weapons of Mass Destruction office at DHS, agreed that securing the homeland isn't easy – not only from an IT perspective but also as a matter of uniting people from disparate organizations and cultures. The CWMD office came into existence in its present form to improve detection of terrorist activity and planned attacks. Congress permanently created it a year ago as an entity within the Department of Homeland Security.

"We're trying to enhance and coordinate the federal effort towards CWMD … to make our government as effective and efficient as possible by bringing strengths together while still honoring the uniqueness" of the component organizations, Rasicot said.

Initially, the offices comprising CWMD "were not in love," Rasicot said. "It was a forced marriage. There's been some bumps in the road, and we're working through the cultural issues, and I think we're

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starting to really move forward as we start to gain our sea legs."

The necessity of working together to defeat WMD should outweigh cultural differences and other impediments that would hamper cooperation toward attaining a common goal, Rasicot suggested.

"A lot of people are doing WMD, and a lot of people are doing a lot of good work in WMD, but I'm not seeing that holistic approach where we're sort of all pulling together on WMD. And I think that's why Congress and the DHS leadership put this office together. They were thinking: 'How do we get to a more holistic effort for countering weapons of mass destruction?'"

"One of our jobs is to bring science forward to the operators, to our operating components. We take deep science, turn it into applied science and give it to operators so they can do their jobs better."

Instead of burying operators in an avalanche of meaningless data, Rasicot wants to give them a tool that erases confusion and delivers clarity. "There is a lot of data out there, but no one can turn that data into knowledge. And you're a little overwhelmed by the data. So you're struggling to understand what's the anomaly and when should you respond, and we have to figure out how do we best integrate all the data we're getting."

An ideal solution might resemble science fiction's universal translator, from the Star Trek television show, that allows flawless communication despite language differences. "You can talk to anybody. That's what we're looking for. How do we get a universal translator? How do we get the best of the best of the ideas and equipment into the hands of the operators?"

"What we're trying to accomplish here is quicker, better, faster, more accurate detection," Rasicot said. "The sooner we detect, the sooner we can respond."

Sterling Thomas, Ph.D., fellow and chief scientist, Defense and Homeland Security, Noblis, presented an overview of biological weapons and the technologies Noblis is developing to detect and defend against them. "We're trying to figure out what the heck people are doing," he said, referring to the use of CRISPR and other new technologies that can genetically engineer

microbes for multiple purposes.

This is not new. Use of biological weapons dates to at least 400 B.C., Thomas said, making them the oldest known weapon of mass destruction. Long before someone weaponized the Unites States Postal Service by sending ricin-laden letters to government officials, ancient archers shot at enemies with pathogen-laced arrows. Dumping the carcasses of dead animals into an enemy's water supply was a surefire means of rendering it unfit to drink. And when all else failed, smuggling a contagious sick person into an enemy's camp could produce more casualties than a skilled swordsman's midnight raid.

The ability to produce pathogens in a laboratory has advanced considerably since then. "It's very easy to grow these types of things," said Thomas, who as a high school student built a bacterial incubator in his closet out of a lightbulb and a toy tub. It was undetected for a year. "My parents never knew until I went to the science fair, and they asked, well, who at school helped you? And I said, 'no one, I have an incubator in my closet.' This was in the early nineties. So imagine what you can do today."

Today, scientists can manipulate the DNA of microbes. A small genetic snip can make a virus more contagious or more deadly. Viruses that are deadly to a particular species can be changed to infect another species. The challenge for scientists is determining whether a mutation has occurred naturally or as the result of laboratory manipulation.

"The biggest example of this is the bird flu. It is super infectious and very lethal to birds. Right now it doesn't jump to humans that often, but there's a scientist in Europe who developed a version of the bird flu that can infect humans through genetic engineering.

Noblis has developed a technology called BioVelocity, a genomic analysis, to map genetic changes. "This is a technology that allows us to look very closely at the genome of a bacteria or a virus or a host," Thomas said.

"Think of a book with three and a half million letters and one letter changed. You have to find it," Thomas said. "You need to know what that change is." ■