

# Future of Army Sensors

AN EXCLUSIVE INTERVIEW WITH MARY J. MILLER, DEPUTY ASSISTANT SECRETARY OF THE ARMY (RESEARCH AND TECHNOLOGY)

Since February 2013, Mary J. Miller has served as the Deputy Assistant Secretary of the Army for Research and Technology. She is responsible for the entirety of Army research and technology programs, spanning 16 laboratories and research, development and engineering Centers, with more than 12,000 scientists and engineers and a yearly budget of more than \$2 billion dedicated to empowering, unburdening and protecting Soldiers. She earned an Army Research and Development Achievement Award in 1988 for her technical achievement in the "Development of Nonlinear Materials for Sensor Protection." She has been awarded four patents for sensor protection designs, with two additional patents pending. Miller has published more than 50 papers and has addressed over 30 major commands and international groups with technical presentations. She holds master of science degrees in business administration from the University of Tennessee and in electrical engineering, electro-physics from the George Washington University. Her undergraduate degree is a bachelor of science in electrical engineering from the University of Washington in Seattle. The Army selected her for the Senior Executive Service in August 2005.



## Army Technology: What is the Army's vision for sensors research?

**Miller:** From my perspective, I think that Army S&T is looking at a broad number of approaches for what sensor capabilities we will need to meet future challenges. We're looking to improve situational awareness, mobility, lethality and even improve the maintainability and effectiveness of our systems.

To achieve these capabilities, we are conducting research in areas such as networked Soldier helmet sensors. For mobility, we have a large effort in establishing Degraded Visual Environment capabilities that will ensure our rotorcraft can fly in any environment such as brownout, snow or just low-light levels. We're also looking at ways to increase lethality. We just recently transitioned the third generation FLIR [short for Forward Looking Infrared], to the Program Executive Office for Intelligence Electronic Warfare and Sensors. This system gives us the ability to do identification at longer ranges than we have ever before. Identification is required for our rules of engagement in the Army. This is an example of a capability that was transitioned from the S&T community and has been very successful in early operational demonstrations.

Regarding maintainability and effectiveness, we've been researching sensors that can be put in the skins of platforms to understand the environment they've been in—measuring vibration, ballistic impact or even thermal cycling. We can even determine battle damage assessment with embedded sensors. We put sensors in our missiles as well to better assess their status. By understanding what they have experienced, we can determine what capacity they have going forward or

whether they have been degraded. Finally, sensors can enable better power management by telling us when we need to have more power in a particular sub-system and less in another. We can then divert energy to improve effectiveness overall.

## Army Technology: What's the value in this research? How does it empower Soldiers?

**Miller:** Sensors and situational awareness are the keys to our Soldiers being effective. I think we've all seen the reports that have come out of Afghanistan where unfortunately a majority of the engagements our Soldiers (at the squad and team level) had with the enemy is because they were surprised. That is a situation in which we do not want to put any of our Soldiers. Holistically the work we have been doing in our sensor technology areas is to help ensure that never happens.

Whether the Soldier is dismounted in a squad fighting in Afghanistan, or is a helicopter pilot having to land and pick up Soldiers in an austere environment, or even a ground platform driver traveling unfamiliar roads at night, we want to provide all of these Soldiers the best capabilities that we can—the capability to conduct their mission with full situational awareness in any situation.

## Army Technology: In realizing the Army's vision of the future, how critical are S&T investments?

**Miller:** The Chief of Staff of the Army and the Secretary of the Army have looked at science and technology (S&T) and our portfolios of investments as the enablers for the future.

The Army has been facing significant fiscal challenges and we have had to make tough trades between operational readiness, force structure and modernization. Unfortunately given those three, modernization is the one that suffers.

Since 2012, our modernization accounts have gone down about 40 percent, and that is significant. Modernization accounts are what create the future capability for the Army. The Army stood up and decided to protect its investments in the science and technology world. Why? Because the Army is now looking to us [the S&T Enterprise] to underpin what will become future capability for the Soldier. They have expanded our mission. They've challenged us to go farther than we've gone before, to develop prototypes of new capabilities and do experimentation in conjunction with Soldiers to ensure that's what the Army needs. We're doing this hand-in-hand with our Training and Doctrine Command. It's a collaborative effort where we are aligned more than ever with our program executive offices, with TRADOC—our requirements team—and also the S&T community, to make sure we are doing the right things for the Army of the future.

**Army Technology: What about partnerships between Army S&T, industry and academia?**

**Miller:** We need to do more. As our budget reduces, we have to leverage other's technology development. This is both a challenge and an opportunity. It's a challenge because frankly we don't do that very well. It's an opportunity because there are folks out there with good ideas that we should be trying to leverage. We do better with academia because our labs are experienced in working with basic and applied research and we have many opportunities to engage with Universities. If you listen to our Defense Acquisition Executive, Mr. Kendall, and read Better Buying Power 3.0, he talks about the need to better leverage Industry IR&D, or Independent Research and Development, investments. Those are investments that industry makes in what they see as the next technology breakthroughs. Industry focuses their R&D investments on those technologies they believe will provide future returns. By informing industry of Army needs, we hope to encourage industry to align the IR&D to meet these needs. I think there is more to be done there to align and leverage as much as we can out of industry.

It's not just industry and academia [that we need to leverage]. It's also our foreign partners as well. From my office, in conjunction with the Deputy Assistant Secretary of the Army for Defense Exports and Cooperation (who is responsible for international engagement and foreign military sales), we've done a more strategic outreach to our partner nations to figure out the technologies that are out there in our global economy. Other nations may have a slight edge on us or a different approach in certain technology areas. We hope to leverage their expertise by making strategic alliances. Very often in the past our international engagements were bottom-up driven. Our laboratory experts would be talking with fellow foreign laboratory experts and they would come up with a project they wanted to do together. The compliment to this approach is where we are making alliances that are strategically driven—where we go out and target technology areas where we know foreign countries have expertise and bring that expertise in to help the Army go forward.

**Army Technology: What's your message to Army researchers and engineers?**

**Miller:** I am optimistic about the future. Those of us that have been in the Army for a while know that we always have budget downfalls and then increases. It's always going to be a roller coaster ride, but at the end of the day the reason we work for the Army is that there are some unique challenges and opportunities for our researchers.

The Army is really relying on our scientists and engineers throughout the S&T Enterprise to step into the breach and basically plot what will be the future for the Army. We are being asked to stand up and deliver, and I fully expect that we will. I have yet to see us fail at being able to solve a problem.

We have some of the world's best scientists and engineers here within the Army and the Department of Defense dedicated to the work they do in helping the Soldier. It is so clear that the Soldier is our customer. We have a good track record of bringing folks in from the outside, not for the pay, not for the great hours, but because we have such a unique problem and the ability to help and to make a difference.

It is a critical role that the S&T Enterprise plays. As I said, the Chief of Staff and the Secretary of the Army have protected the S&T community through the last couple of years of budget downsizing for this very reason. They see us as a key enabler of the future going forward. ■

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