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MARY LOUISE KELLY, host:

And now we're going to hear about an audience that is extremely interested in al-Qaida and its online magazine – government security agencies. They're increasingly concerned about cyber attacks and are scrambling to improve their defenses against hackers. But here's the challenge: a severe shortage of cyber technicians and engineers. NPR's Tom Gjelten reports.

TOM GJELTEN: The United States and other countries know the next war will have a cyber dimension. Adversaries are constantly finding ways to penetrate each other's computer defenses. So, in the years ahead, the United States will need an army of cyber warriors, people like Jim Gosler, who has worked for the CIA, the National Security Agency, and currently, the Energy Department.

Mr. JIM GOSLER: We don't have sufficiently bright people moving into this field to support those national security objectives as we move forward in time.

GJELTEN: Gosler is now a fellow at the Sandia National Laboratory, where he works on ways to counter efforts to penetrate U.S. networks. He says the protection of those systems is an ever-increasing challenge.

Mr. GOSLER: You can have vulnerabilities in the fundamentals of the technology. You can have vulnerabilities introduced, based on how that technology is implemented. And you can have vulnerabilities introduced based on the artificial applications that are built on that fundamental technology. It takes a very skilled person to operate at that level, and we don't have enough of them

GJELTEN: Gosler says there are, right now, only about 1,000 people in the entire United States with the skills needed for that frontline cyber defense. He thinks 20 or 30 times that many are needed.

Alan Paller agrees. He's research director for the SANS Cybersecurity Training Institute.

Mr. ALAN PALLER (Research Director, SANS Cybersecurity Training Institute): You go looking for those people, but everybody else is looking for the same thousand

people. So they're just being pushed around from NSA to CIA to DHS to Boeing. It's a mess.

GJELTEN: The Center for Strategic and International Studies highlights the problem in a forthcoming report titled "A Human Capital Crisis in Cybersecurity." The CSIS report says the cyber manpower shortage is now desperate. The SANS Institute's Alan Paller says the United States is actually losing ground, right now, to China, where the training of cyber warriors is a top national priority.

Mr. PALLER: Every military district of the People's Liberation Army, the PLA, runs a competition every spring and they search for kids who might have gotten caught hacking.

GJELTEN: Paller says one of the Chinese kids who won that competition, had earlier been caught hacking into a Japanese computer. He was rewarded with extra training.

Mr. PALLER: Later that year, we found him hacking into the Pentagon. So they find them, they train them, and they get them into operation very, very fast.

GJELTEN: Some members of Congress want the U.S. to follow China's example. They're promoting the 25x25 Program, a national talent search to find up to 10,000 potential cyber warriors, ready to play both offense and defense.

Senator Thomas Carper of Delaware.

Senator THOMAS CARPER (Democrat, Delaware): The idea is for schools around the country to field teams, and the teams would compete against one another – not only for them to hone their skills on being able to hack into other systems, particularly those of folks we may not be fond of – but also to use what they learn to strengthen our defenses.

GJELTEN: In order to protect a computer system, one needs to know how someone might attack it. Last year's preliminary Cyber Challenge game was won by a 17-year-old from Connecticut, Michael Coppola, who was smart enough to hack into the game computer and add points to his own score.

Mr. MICHAEL COPPOLA (Champion, Cyber Challenge): There's actually a flaw within that web application, and using that, I was able to execute commands on

the computer running the scoring software. And I was able to add points and basically do whatever I wanted.

GJELTEN: Was that fair? In his case, the judges were so impressed by Michael's ability to hack into the computer game, that they actually rewarded him for changing his score.

Mr. COPPOLA: It's cheating, but it's like the entire game is cheating, I guess you could say.

GJELTEN: People who know how to cheat will soon be on the front lines of cyber defense, because the best way to defend a computer system from attack is to figure out how an adversary would hack into it.

Michael Coppola, now 18, is himself looking to a career in cybersecurity.

Tom Gjelten, NPR News, Washington.