

# Cybersecurity and Drones: Syeda Sultana Razia Discusses the Importance of Chemical Security in a Globalized World

The Bangladeshi chemical engineer is working to keep chemicals safe from those who would cause harm

In collaboration with **C&EN**

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Chemical safety and chemical security are both parts of risk management, but they're not quite the same thing. While chemical safety might be characterized by storing, handling, and disposing of chemicals to avoid harming human health and the environment, chemical security aims to thwart deliberate chemical attacks by terrorists or hostile nations.

Weaponized chemicals represent a serious threat to national security, as evidenced by the 2018 attempted assassination of former Russian spy Sergei Skripal and his daughter Yulia Skripal in the UK. Although they survived poisoning by a **Novichok nerve agent**, one British citizen died and two others were injured after being exposed to the chemical.

Novichok is not easily synthesized because very few chemists outside of Russia know how to do it. However, a number of fairly standard chemicals that are not especially toxic can be easily modified into potential weapons. Ensuring these materials are properly protected requires supply chains and chemical plants to obey best practices and security protocols.

Syeda Sultana Razia, a chemical engineer at the Bangladesh University of Engineering and Technology (BUET), works on chemical safety and security management. She has served as an expert adviser to several of the Bangladeshi government's policy-making committees dealing with technological issues that chemical industries face, and she is helping to prepare safety and security standards for Bangladesh's chemical industry.

Benjamin Plackett spoke with Syeda (**Figure 1**) about the challenges faced by scientists, engineers, and governments in trying to prevent chemical security breaches. This interview was edited for length and clarity.

## ■ WHY DID YOU GET INTO THIS FIELD? WHY DOES IT INTEREST YOU?

My interest in chemical security was really piqued in 2010 when I participated in the Organisation for the Prohibition of Chemical Weapons' (OPCW) 10-week flagship training program that took place at OPCW headquarters in The Hague and at the University of Surrey. That program also had an industry placement, which for me was at DuPont's site in Dordrecht, The Netherlands.

I realized there's a lot yet to be done in this field in Bangladesh and with my chemical engineering background, I



Courtesy of: Syeda Sultana Razia

**Figure 1.** Benjamin Plackett spoke with Syeda about the challenges faced by scientists, engineers, and governments in trying to prevent chemical security breaches.

can help. It was difficult, however, because the concept of chemical safety and security wasn't that well established here.

My enthusiasm was then furthered by a collaboration established between the Department of Chemical Engineering at BUET and the Mary Kay O'Connor Process Safety Center at Texas A&M University in 2011. I was the leading person on the BUET side.

## ■ WHAT ARE THE MAIN CHEMICAL SECURITY CHALLENGES THE WORLD FACES?

Truth be told, there's a lot of overlap between safety and security, even if they are technically different. I've found that if you take care of chemical safety, 90% or 80% of chemical

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security will also be taken care of. So, it's almost a synergized concept for me. That's the good news.

There are significant security issues, however. Some of them have emerged in recent years. The pandemic has made chemical facilities more vulnerable because more people are working from home. If something goes wrong, and you need to respond or even shut down your facility, this is more challenging if people aren't physically in the plant. Irregularities in the chemical supply chain due to the pandemic have also introduced vulnerabilities with chemicals staying longer in temporary storage facilities.

I also think cybersecurity is a problem because processes are highly automated, and we're using more and more artificial intelligence. Sometimes the software we use is vulnerable. If a hacker can disrupt a control system, a whole facility could potentially explode. We really need to figure out ways to make ourselves more secure against cyberattacks.

Drones are the other thing to consider. Remember the 2019 [drone strike on two Aramco oil facilities](#) in Saudi Arabia? Drones are becoming accessible to almost everyone. That makes me worried, because I don't know if chemical plants and countries are adequately equipped to deal with this threat yet.

#### ■ DO DIFFERENT COUNTRIES HAVE DIFFERENT SECURITY DANGERS, OR ARE WE ALL FACING THE SAME THREATS?

Threats are similar in high-, middle-, and low-income countries. The difference is that low-income countries are more likely to be inadequately prepared for such an event. This should be everyone's concern—no matter where they live—because in a globalized world, a chemical threat in one country can easily have implications for other parts of the world. It comes down to attractiveness and vulnerability. The US is an attractive target, for example, but it's well prepared. Other parts of the world might be less attractive but more vulnerable.

#### ■ WHAT NEEDS TO BE DONE TO IMPROVE PREPAREDNESS AROUND THE WORLD?

Chemicals could fall into the wrong hands in two main areas: chemical transportation and large-scale storage facilities. We need to more carefully plan routes when we're moving chemicals, making sure tankers with potentially dangerous chemicals aren't going through crowded areas. We should train drivers too. These things are often done with chemical safety in mind, anticipating what might happen if a hazardous chemical spilled, but we also need to consider these things from a chemical security perspective. What happens if someone uses a weakness in the chemical transportation system to purposefully inflict harm? If we can tighten things up here, then I think we'll make the world a safer place.

Benjamin Plackett

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#### Notes

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