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CYBER SUPERHEROES



U.S. AIR FORCE

Lauren Knausenberger, CTO, on cybersecurity strategies and a superhero culture



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U.S. AIR FORCE

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A SUPER CULTURE T CYBER

APRIL 2020



WRITTEN BY
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PRODUCED BY
MIKE SADR

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RHERO HAT FIGHTS R THREATS

IN OUR SECOND VISIT TO WASHINGTON DC, LAUREN KNAUSENBERGER, CHIEF TRANSFORMATION OFFICER AT THE US AIR FORCE, DISCUSSES CYBERSECURITY STRATEGIES AND A SUPERHERO CULTURE IN THE FEDERAL GOVERNMENT

Lauren Knausenberger is the U.S. Air Force's Chief Transformation Officer (CTO). Having initially joined as Director of Cyberspace Innovation in 2017, she assumed her current position in June 2019, stepping into a newly-created role that reaches across the entire Air Force to drive digital transformation. A Wharton graduate who left her work in the entrepreneurial and investment industry to take on this new challenge in government, she is one of very few senior officials under the age of 40, and is no stranger to the digital space.

Upon joining the US Air Force, Knausenberger was primed to drive change at the federal government. "Everyone fails...until they don't!" she quips. "I think I told you that I joined the Air Force quite by accident. I became so intrigued with one of their problem sets and the next thing I knew a few persuasive generals had me signing up. The thing is – I missed the mission and didn't realize it until these





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IT STARTED WITH A QUESTION: HOW COULD WE IMPROVE DATA DELIVERY FOR SEARCH AND RESCUE MISSION TEAMS OR COMBATANTS IN COMPLEX THEATRES?

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This question is part of a much larger question about how to get military, auxiliary and humanitarian teams the information they need, exactly when they need it. A large amount of military failures happen not because of readiness or support issues but rather because of incorrect or incomplete data.

The solution we developed at Hypergiant Industries is part of our Project Orion initiative to improve data delivery for people who need it to critically safeguard human lives. Our delivery is a next generation augmented reality helmet that can overlay multiple data streams to deliver cutting edge solutions exactly when and where you need them. The active display is a full closed helmet. It passes video in front of your eyes which helps to reduce previous ocular overload issues with combined natural visual processing and mission data overlays.

“In times of stress and when lives are on the line, more data is not helpful. What is most helpful is decision-quality integrated information presented at the right place, at the right time. The results could mean more lives saved and the mission accomplished!” said retired four star general and Hypergiant Industries advisory board member, Lance Lord. “Hypergiant Industries’ system will match integrated situational information to a decision-maker’s cognitive framework needs. This type of leading-edge technology is what we need to continue to push safety and innovation boundaries.”

The helmet features 5k resolution with 200 degree field of vision (FOV), high resolution binocular optical input, multiple spectrum sensor arrays including infrared, AR style informational overlay,

multiple display modes, hand tracking and gesture based input and automated data aggregation from mounted sensors and networked data sources. Additionally, the technology can integrate external data sources to bring in information from outside the system. This can include:

- GPS data
- Mission briefing
- Technical information from other teams/location of team members
- Ability to view and access another helms information
- Task updates that come from command operations
- Display point cloud mesh for known areas.

Hypergiant Industries focuses on solving humanity’s most challenging problems and leading the way in data intelligence as humanity enters the Fourth Industrial Revolution. To accomplish this mission, we create emerging AI-driven technologies and develop world-changing commercial products and solutions for Fortune 500 and government clients. As the parent corporation over a roster of divisions, Hypergiant Industries serves verticals that include space science and exploration, satellite communications, aviation, defense, healthcare, transportation and municipal infrastructure, food and beverage, retail and more.



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CONTACT



**“KESSEL RUN
WAS BORN OUT
OF THAT PROBLEM
– WE TURNED A
WHITEBOARD INTO
AN ALGORITHM”**

Lauren Knausenberger,
Chief Transformation Officer,
U.S. Air Force

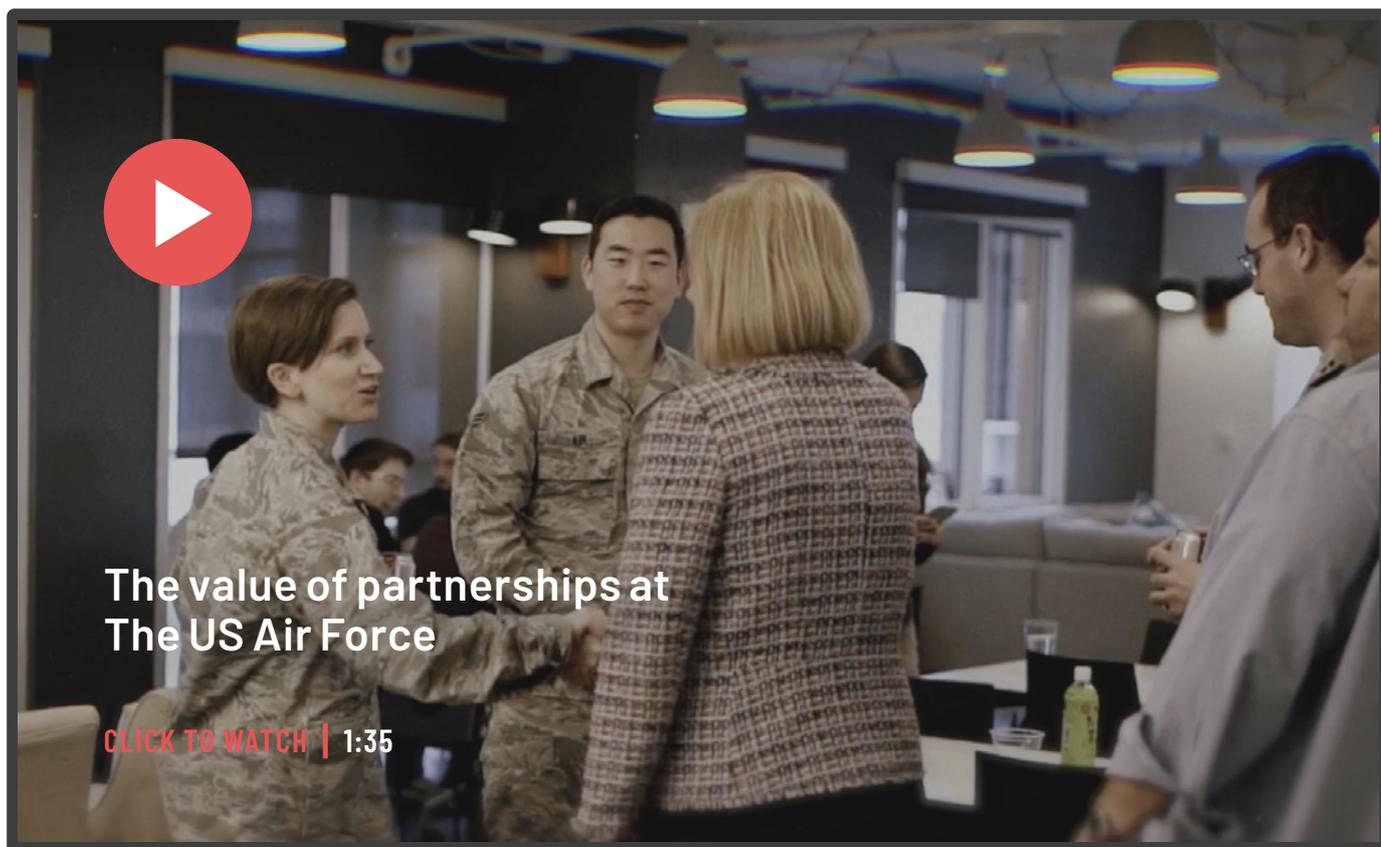
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generals reminded me. I was so honored that they saw something in me and thought my ideas could really move the needle on some big problems.”

Few people know that Knausenberger began her career at NSA, being recruited as a High School student, so joining the Air Force was bringing her full circle. “It was refreshing to jump into this role, blissfully unaware of all of the ways that many efforts had failed in the past. I wasn’t worried about upsetting anyone, and I knew that if I could accomplish even a tenth of what I saw could be done, it would make a big difference.”

As an outsider trying to drive change, Knausenberger understood the challenge of becoming part of an organization still entrenched in a traditional approach. “What the Air Force was really looking for was someone who thought differently and was passionate about the problem space, and who could convince people that we could really do it,” she explains. “At the end of the day, I simply calculate risk differently. Most people say the military is risk averse, but from my perspective, we were taking crazy risks everywhere – by not





innovating fast enough we were passing that risk to the warfighter every day. I've seen that way of thinking about risk change dramatically over the past three years, but we still have some work to do.”

From the very beginning, Knausenberger felt that her own ‘crazy’ ideas were embraced and that people were open and direct if they felt that one of her suggestions couldn’t work.

“One of my favorite moments was when a general told me that she knew she had to think differently when I was in a meeting,” she notes. “Just six months later, that same general told me I didn’t need to be there anymore for her to push forward and not accept the old way of thinking.”

The barriers to speed in the Department of Defense are well documented and she completed her own assessment of these in her first 90 days.





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“There were certainly many routes to go down. I wanted to solve a problem where there was clear pain and frustration across a diverse group of people,” she states. “Equally important, I picked one where I felt I was uniquely poised to help – in terms of my own strengths as well as my position in the CIO organization. Starting with cybersecurity accreditation just made too much sense. There was so much pain in the process and I was confident we could do better. So many people wanted to help make this happen I almost had to turn

champions away. I was able to form partnerships with smart, passionate people all focused on a common goal – including full support from Air Force Deputy Chief Information Officer, Bill Marion - and that allowed us to do some great work. Our Chief Information Security Officer, Wanda Jones-Heath, had her team roll up their sleeves to help make sure the new constructs would stick, and consultants like Lonye Ford at Arlo Solutions helped make sure we filled in execution details in a way that traditional assessors could relate and adopt new practices.”

EXECUTIVE PROFILE

Lauren Knausenberger

Lauren Knausenberger joined the U.S. Air Force to drive innovation across the Department of Defense, speed adoption of emerging technologies, and create stronger partnerships between the DoD, startups, and the venture community.

In her role as Chief Transformation Officer, she has actively fought to bust traditional barriers to capability development, including shifting the risk equation for cybersecurity accreditation to incentivise the rapid adoption of modern, secure systems. In partnership with Kessel Run, Lauren generated the Continuous ATO concept, which helped set the bar for excellence in DevSecOps and enables Air Force software factories to accredit and deploy systems at commercial speed. She was also a major contributor to the recent Fast Track ATO, which emphasises pen testing and threat/vulnerability assessment over compliance. Through her work with the DevSecOps community, Lauren saw a major gap in the way of training and retaining the most technologically savvy Airmen and has become a driving force behind the Computer Language Initiative and Digital University.

Lauren also acts as an champion for AFWERX and a connector across the Air Force community to enable projects, remove barriers to entry for best-in-class businesses, test innovative concepts, and bring new voices and capabilities to the table.



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The US Air Force has been in the software business for some time, but until the past few years was almost solely leveraging legacy, waterfall software development practices. “Even as we adopted agile development, we were still stymied by a ridiculously arduous cybersecurity accreditation process that was ultimately not relevant to the modern technologies in use. How could we ensure the code being delivered was safe and secure, but could at the same time be delivered at the speed of relevance?” She credits the importance

of partners such as Pivotal and others who had already found the solution to part of that conundrum. “We were fortunate to have such great partners, who had already figured out how to develop safe and secure code rapidly. We joined forces to create a secure Continuous Integration/Continuous Deployment (CI/CD) pipeline and adopted the best practices of the DevOps Research Assessment. Our teams worked hard to constantly improve and we used penetration testing to assess our code in production as well. The premise is

that if you design secure software, use a secure process, bake security into everything you do, and have a robust way to test and validate your code continuously, that accreditation should be done by the time the code is complete. So, the continuous authority to operate (cATO) was born. This was revolutionary in the department, and really incentivized people to adopt modern DevSecOps practices. And it all started with a group of insurgents at Kessel Run.”

Kessel Run was the first true implementation of agile DevSecOps in the Air Force, and represented a departure from the standard way of doing development. “We joked we had to ‘smuggle’ agile development and cybersecurity accreditation into the Air Force to make it happen,” says Knausenberger. “Kessel Run first got started with refueling operations in the Middle East. Eric Schmidt and the Defense Innovation Board flew over to Qatar and Schmidt asked one of the commanders what kept him up at night. The commander said ‘I’m just terrified someone’s going to erase my

whiteboard’. Why? ‘Because the whiteboard is how they planned all of their refueling operations. We had pilots flying all over the Middle East, refueling in mid-air at 350mph, while someone hangs out the back of an airplane...and it could be defeated by a whiteboard eraser!’”

After hearing this, Schmidt was certain there could be an algorithm created to combat the problem. “And he was absolutely right,” Knausenberger confirms. “Kessel Run was born out of that problem – we turned a whiteboard into an algorithm, and amongst many other successes we’re now saving over \$250k a week in fuel. This team of incredibly motivated, and relatively junior, personnel was creating such innovative software, and an Air Force cultural revolution to go with it. We have developed such an incredible insurgency and have gained support by a broad part of the organization that I don’t think we can call it an insurgency anymore. We’ve won. It’s reached irreversible momentum. And that’s incredible,” she adds. “Since Kessel Run got its start, the Air Force has



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**TOP
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2019**

The Washington Post

Dark Wolf leads the pack

Dark Wolf Solutions, founded in 2013, has emerged as a leader in the Federal Government for Agile software development, DevSecOps implementation and execution, and cybersecurity expertise and thought leadership. We partner with federal and commercial customers to: deliver software, tools, and services that support mission needs; develop and integrate secure, resilient, and scalable solutions tailored to our customers' operational environments; and instill technical best practices, processes, and policies. Among these efforts is our ongoing support to current and forthcoming software factories and solution centers, where we support a gamut of activities to include cybersecurity assessment, cloud adoption, and rapid development and deployment.

As trusted partners to our customers, our personnel bring technology agnostic expertise and experience. We write software using modern programming languages and frameworks and configure and use a variety of industry-standard tools to achieve security and automation. We deploy to public cloud resources and private cloud infrastructure as well as to on-premise hardware, and we leverage Platform as a Service products to reduce dependence on specific cloud providers. Our efforts often extend across security boundaries and require cross-domain strategies and approaches. We employ security and penetration testing techniques to assess vulnerabilities on-premise and on cloud platforms and to include enterprise hardware as well as mobile and IoT devices.

To fully support this wide array of technologies and environments, we focus heavily on: partnerships with commercial vendors to learn about new products and technologies; training tailored towards concepts and mindsets that apply across technology stacks; frequent evaluation of new products supporting development and Continuous Integration/Continuous Delivery (CI/ CD); and Communities of Interest, internally called Practice Packs, around different technical topics and trends. Whereas many in our industry get married to a particular technology or methodology, we encourage our employees to explore and embrace the rapid pace of innovation and technological evolution.

Among our experiences, Dark Wolf is proud to have supported Secretary of Air Force/Office of Information

Dominance and Chief Information Officer "SAF/CIO A6" in assisting the Kessel Run and SpaceCAMP DevSecOps software factories with achieving Continuous Authority to Operate (C-ATO). Our testing revealed three important considerations when assessing security for modern software factories:

Privilege is key

Starting design and development efforts from a secure base and adding from there is a much more effective strategy for security than taking a flawed product and attempting to identify and resolve all issues. This is particularly true for container security, where less is more should be the defining theme in building images.

Know your enemy

A security strategy should be modeled against the malicious entities most interested in a product. At the same time, know who isn't your enemy. Security teams and penetration testers are on your side; giving them maximum support helps an organization in the long term.

Technical controls without supporting administrative controls are a ticking time bomb

Cybersecurity strategies are guaranteed to fall out of effectiveness without human elements of an organization's security policy like version control and change management.

We have developed a high-level C-ATO playbook in cooperation with and informed by Authorizing Officials within the Air Force, DoD, and Intelligence Community. We would like to share this with your organization and work together to explore a tailored playbook based upon your mission and needs. We can establish your CI/CD pipeline, safeguard your network, penetration test your infrastructure, and train your teams to rapidly develop secure, enterprise scale applications for your environment. Contact us today - we're here to help!

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The Strategic Studies Group demonstrates the super hero pose



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stood up a number of agile development capabilities - Platform One, Kobayashi Maru, LevelUp, BESPIN, SoniKube, Tron, Ski Camp, and others who are doing amazing work and reaching across the community to share best practices. Finally, we have hired a Chief Software Officer, Nicolas Chaillan, who has been a great partner to drive forward so many of these initiatives.”

“The revolution didn’t stop at just software development though, it was actually much broader. Spark Tank is an excellent example of that,” Knausenberger continues. Established in 2017, Spark



Tank acts as a catalyst for agile US Air Force engagement across the industry and encourages innovation and entrepreneurship. A partnership between AFWERX and Airmen Powered by Innovation, Spark Tank allows Airmen to submit their ideas in a pitch competition format directly to their most senior leaders. Airmen share their ideas and the roadblocks they face to making them real.

“It brings together three key elements: a powerful network of innovators within the Air Force, a group of people who are doing everything to empower those

innovators with tools and connections, and the senior-level support needed to break down policy barriers,” she comments. “Airmen submit hundreds of ideas and we whittle them down to just six finalists for the live show. Many of these Airmen joined at 18 and don’t have college degrees, and they are some of the smartest, hardest-working problem solvers around. They know their mission, and have unique insight into how it can be done better. This competition showcases their awesome ideas and also gives our senior leaders a chance to really model how we should be supporting innovators. Our Secretary, Chief of Staff, and Chief Master Sergeant of the Air Force are inspiring leaders and never disappoint in their support and advice for these Airmen. And we have leaders like Darlene Costello and Rich Lombardi as senior advisors who really know how to get things done in the Air Force and help ensure projects can grow to appropriate scale.”

Knausenberger recognizes the talent at the US Air Force’s disposal and believes her organization is doing things that you simply won’t see anywhere else. “We have incredible people that have





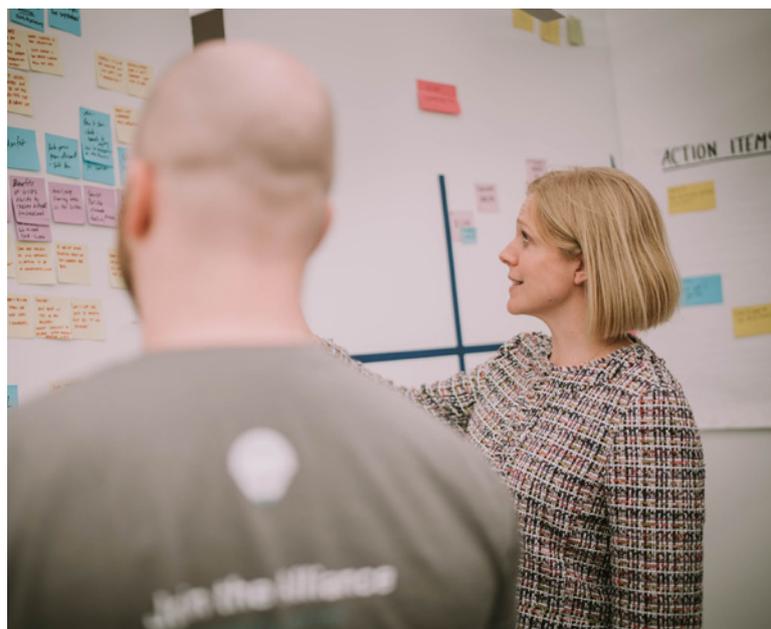
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**“THERE ARE THINGS
THAT YOU CAN DO
IN THE AIR FORCE
THAT YOU CAN'T DO
ANYWHERE ELSE”**

Lauren Knausenberger,
Chief Transformation Officer,
U.S. Air Force

brought lots of intellectual firepower and who all work very hard,” she says. “We are doing some of the coolest things in the world, with software, airplanes, satellites, and technology that would blow your mind. There are things that you can do in the Air Force that you can't do anywhere else. But one of the biggest lessons from Spark Tank was the value of collaborators - the new superheroes in our Air Force.”

Knausenberger devised a ‘superhero chart’ to lightheartedly convey how



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Data Lake



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important it is to support warfighters. “The Air Force has a hero culture. People join to make a real difference and put their lives on the line every day to keep us safe,” she explains. “Captain Marvel is our superhero - she’s off saving lives and on the frontline of the mission. There are also the sidekicks (think Morgan Freeman as Lucius Fox) - the unsung heroes that support the superheroes to deliver those incredible mission effects. Then there are the supervillains (Megamind) and henchmen (Wormtail)! In the world of innovation, the supervillains are those that sometimes get in the way of others trying to do good things – they are undoubtedly trying to keep people safe, but can get overly diligent in enforcing rules that no longer make sense and are often misunderstood. I joke that we have a supervillain-to-superhero conversion program. By harnessing all of that policy knowledge and enabling innovative warfighters, you can be a hero too.”

We asked if she had a favorite real life super hero. “I have to say one of my favorite unsung heroes is Air Force Vice Chief Gen. Stephen “Seve” Wilson. He works very hard to perpetuate a culture



of innovation and put in place the constructs to support innovative Airmen. He inspires me too.”

Knausenberger values how people can ‘earn their capes’ and understands the importance of collaboration to help make others stand out and succeed. “A lot of the time it isn’t because you had a great idea, it’s because you found someone who had an awesome idea and you used all of your knowledge, connections, and abilities to help make that

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**“ANY CHANGE
I MAKE MUST BE
SOMETHING THAT
CAN LAST AFTER
I’M GONE”**

**Lauren Knausenberger,
Chief Transformation Officer,
U.S. Air Force**

person shine,” she explains. “That’s actually even more important.”

Over the past few years, the US Air Force has made a concerted effort to widen its partnerships with the defense industrial base, having previously worked solely with a small stable of very large, long-standing partners. “Our Head of Acquisition, Dr. Will Roper, regularly talks about our desire to expand our defense industrial base to organizations that have never done business with the Department of Defense, and even to drive deeper partnerships with the investor community,” she says. “In the United



A superhero culture at the US Air Force

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“THE AIR FORCE HAS
A HERO CULTURE.
PEOPLE JOIN TO MAKE
A REAL DIFFERENCE”

Lauren Knausenberger,
Chief Transformation Officer,
U.S. Air Force



US Air Force: Harnessing the true value of DevSecOps

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States, we have some of the largest, most well-respected tech companies in the world, and they didn't work with the military for a long time. Now, all of the household names are working with us. For the most part, I think that people within the tech companies realize that we're on the same team and all want to be safe. And, of course, we want to continue to partner with our large defense contractors and appreciate their efforts to transform with us. The other cool trend is that more tech savvy outsiders

are jumping into government to support the mission for three to five years. A few years ago, there were very few outside of DDS, and now we have a growing club and even a few alumni who have done their stint in government and have now returned to the commercial world with a new perspective to bring to the mission. One notable alum is Chris Lynch, who founded DDS, and has now launched Rebellion Defense to bring together the best of the valley with super smart engineers who really know DOD systems



Top 6 Reasons DevSecOps is Now for the Federal Government

Underpinning all modern technology — software and hardware — is a supply chain. The reality however, is that software is much easier to pollute than hardware. For federal agencies to better protect themselves and the American citizenry, they need to start shifting security practices left and playing better offense at the beginning of their digital supply chain.

1 Open Source is Powering Federal Software Development

85% of an application is comprised of free, readily available open source components.

2 Not All Open Source Components are Created Equal

Research shows that within the Java ecosystem, 1 in 10 contains a known security vulnerability.

3 Agencies Don't Know How Much Open Source They're Using

There is a disconnect between development and security, with little transparency into the parts feeding today's software supply chains.

4 Lack of Open Source Policies Lead to Breaches

According to the DevSecOps Community Survey of 5,500 IT pros, 1 in 4 organizations confirmed or suspected an open source related breach last year.

5 Cost Emphasized Over Security Protocol

An unexpected threat comes from the contractors, inadvertently introducing vulnerabilities into the supply chain with an emphasis on cost over security.

6 Regulations Around Software Development is Coming

Savvy contractors and agencies are prioritizing security in their development process now.

JUN 2018
NTIA launches initiative to improve software component transparency

OCT 2018
FDA releases guidance on cybersecurity management of medical devices

MAR 2019
Internet of Things Cybersecurity Improvement Act of 2019 introduced

AUG 2018
Deliver Uncompromised report published by Mitre Corporation

DEC 2018
U.S. House Energy and Commerce Committee releases its Cybersecurity Strategy Report

JAN 2020
2020 National Defense Authorization Act (NDAA) passed by U.S. Senate

The DoD releases its Cybersecurity Maturity Model Certification (CMMC)

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and are passionate about delivering national security capabilities. This type of cross-pollination is critical to our future success as a military and as a country.”

In a bid to drive innovation, the US Air Force is determined to work more closely with startups. “They innovate at a faster pace than anyone else,” Knausenberger affirms. “We’re working with an increasing number of businesses with a startup mentality that are focused on innovation. It’s hard to survive in the US tech market because every entrepreneur thinks that they’re going to be a unicorn but, in reality, very few succeed. The competition is tough.”

Knausenberger states that a key reason why the US Air Force wants to adopt this approach is to not only support small businesses but also to embrace an alternative type of talent. “It’s important we bring diversity into the defense industry,” she says. “And that’s diversity on every level: mindset, abilities and all aspects of background. It’s important to recognize that we’re not going to be able to achieve what we want if we always work with the same people. It’s also a really great business line for them, and we have really cool, complex problems that can’t be

solved anywhere else. The startup community is often telling us ‘we want the coolest, most wicked problems that you could throw at us’, and we have those in spades! It ultimately makes for a great, synergistic relationship. “The Air Force also finds incredible synergies with our allies,” Knausenberger explains. “Our Air Force’s Strategic Studies Group is a key part of the brain trust for driving innovation across the force, and includes our Exchange Officers from Japan, Germany, the United Kingdom, and France. And through those networks





5,328

Number of manned
aircraft as of 2018

1947

Year founded

tap into much richer perspectives than we may otherwise get by looking at purely American views. We also have a great time working together on big ideas.”

In a bid to counter cyberattacks and increase resilience, the US Air Force has sought collaboration with another non-traditional source. In partnership with the Defense Digital Service, as well as cybersecurity firms such as BugCrowd,

HackerOne, Synack, and Dark Wolf, the organization is embracing the hacker community. Each of those companies has done large scale events, hacking the Air Force Cloud in addition to other public facing websites for the Air Force.

“In the past, hackers looked at the Department of Defense and considered it a great prize to hack. But most people didn’t try it lightly because it’s also a great way to get arrested,” explains Knausenberger. “We’ve started to embrace the hacking community because although we have some great cybersecurity frameworks in place that lots of people benchmark against, we wanted new partners who approach problems in different ways and who could explore new threat vectors in a creative way. It’s been invaluable - we’ve learned a great deal and it’s been a wonderful partnership.”

Knausenberger sees the true value in encouraging hackers to cause as much havoc as possible and believes it is mutually rewarding. “I feel much more comfortable if I’ve had a hacker team come in and see what they can break without any rules, than if someone’s just gone through the security checklist,”

she explains. “Real world hackers don’t follow our checklist. We’d rather have friendly hackers who we’re paying to break systems, and that allows us to fix things as they find it. Our systems are stronger for it, and the hackers love the chance to legally break into national security systems.”

While having much success today, Knausenberger understands how critical it is that any cultural change implemented is built to last. “I’m very aware that any change I make must be something that can last after I’m gone,” she explains. “I didn’t join the Air Force intending to make a career of it – but my intent was to make a huge and lasting impact. Therefore, it’s very important that the things that we do aren’t just personality dependent. Not all software has to be sustainable. There are some things that we use once and we throw away; however, it’s vital that the organizational structures that support an innovation culture have staying power. It’s important that we’re able to do the simple things well and that we put the right processes in place to replicate those early successes at scale. We have a dream team in place right now – from senior



Empowering the Airmen of the US Air Force

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free them to focus on mission innovation. And we'll continue to do the awesome things that the Air Force is known for: maintaining superiority in the air, space, and cyberspace. There's lots of cool stuff happening."

What really excites and drives Knausenberger, however, is making life easier for Airmen. "I joke that we can hit the back end of a fly from half way around the world, but when it comes to deploying new tools – Whew, that's tough! We have a phenomenal workforce that can do incredibly difficult things with ease. I can't wait for them to not have to work so hard on the silly things that we take for granted in the commercial world. We are so close to making that a reality. What really fuels me is seeing the innovative power of these Airmen and the way they come together to accomplish anything they need to do, despite the roadblocks. Our future is in great hands, and I see an inspiring next generation of leaders ready to continue our work as the world's most powerful Air Force, and move beyond to new frontiers."

leadership to key positions throughout the Force to make this happen."

Looking ahead, Knausenberger has a clear vision of what the future will hold for the US Air Force. "I'm very excited and I see us finalizing a lot of the big IT modernization and transformation efforts that we're currently going through, as well as deploying the next generation of mind blowing Air and Space technology," she states. "I expect we'll more aggressively leveraging automation to liberate Airmen from repetitive tasks and

