



AIR FORCE  
**CYBERWORX™**

**AIR FORCE CYBERWORX REPORT 19-001**

**Air Force Cyber Talent Management**

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## Introduction to AF CyberWorx

Air Force CyberWorx is a dynamic organization partnering airmen, industry, and academia to reimagine how technology might enrich and protect our nation, businesses, and lives. As a human-centered design center, we seek out unique ways to connect the Air Force's warfighters with current and future technology in meaningful ways. We look to transfer, license, and share promising prototypes, solutions, and knowledge with our partners; to create value for both the warfighter and the economy as this is the best way toward operational advantages.

## Human-Centered Design at AF CyberWorx

Human-centered design is a common sense problem-solving method embraced by innovative leaders in industry; but, it's often overlooked in the government sector. The AF CyberWorx design process is a multidisciplinary method that breaks down silos of standard organizational structures. Organizations naturally form structures based on their specializations which often impede creativity, collaboration, and knowledge sharing that is vital to innovation. AF CyberWorx deliberately reaches across specialties to bring diverse perspectives to a problem in a non-threatening environment. This evokes ideas that would otherwise be missed or stifled. The multidisciplinary design approach teases out meaningful solutions that are intuitive and desirable to airmen.

Air Force CyberWorx offers facilitated design sessions that provide stakeholders the opportunity to hear developed solutions to their difficult problems by airmen and experts from industry and academia. The sessions are tailored to best meet Air Force needs with various lengths based on time sensitivity and CyberWorx capability. One method is to offer a design sprint where the week-long project answers a challenge being worked on by Air Force stakeholders. Design sprints provide warfighters and industry partners the ability to develop multiple solutions for one problem while learning a new problem-solving technique. The goal of a design sprint is to develop low-risk prototypes that clearly convey a desired airman experience. Participants will also examine the necessary technical and policy developments which bring that experience to fruition.

## Background: Hiring and Retaining Cyber Talent within the Air Force

The inability to hire and retain top cyber talent within the Air Force was brought to light during a previous sprint, the 21st Century Training Model for Cyber Warriors. The Air Force's cyber "talent bleed" comes from more than just lack of salary compared to the corporate world. Many cyber professionals find that they are not challenged in the Air Force and are discouraged from taking risks that might better meet mission needs.



Under the current promotion system, officers are required to promote after certain years of service and, if not promoted, they are forced to retire or separate. Officers in this "up or out" system are expected to follow a predetermined job path to maximize promotability. This job path is not necessarily set up to support and develop officers; nor does it account for an officer's career desires. Unfortunately, competent cyber airmen not

promoted within the system or not happy with their options can easily find work outside of the service, often at significantly higher salaries.

Commercial companies tend to do a better job cultivating, recruiting and retaining top cyber talent. Their employees have more development options and potential career paths. Their employees value both technical acumen and leadership; the companies are willing to pay for both, and they will not force employees into jobs they do not want.

## Participants

AF CyberWorx brought together 40 military and industry partners to investigate ways in which we might attract, recruit, manage, reward, and retain cyber talent for the US Air Force. Industry participants included Polco, Deloitte, CT Cubed, Los Alamos National Laboratory, CyberWinter Studios, Root9B, The Pokemon Company International, Microsoft, Boecore, the Aerospace Corporation, and Booz Allen Hamilton. This particular sprint had government and military participants from the 92nd Cyberspace Operations Squadron, Air War College (Cyber College), Career Field Management Office, Intelligence Support Squadron, Non-rated Operations Management Branch, USAF Academy Computer & Cyber Science Department, 24th Air Force, 10th Intelligence Squadron, Air Force Reserve Command Cyber Operations Division, Space & Missile Systems Center, Defense Digital Services, 90th Cyberspace Operations Squadron, US Cyber Command, Office of the Secretary of Defense, 7th Intelligence Squadron, 2nd Weather Systems Squadron, Air Force Personnel (HAF/AF1), and the 835th Cyberspace Operations Squadron.



Attendees brought a broad range of insight and experience to the sprint, informing their ability to uncover strategic solutions to the complex challenge. The CyberWorx approach aided the solution-oriented process and allowed participants to run through a variety of scenarios to achieve the best possible prototypes. This cognitive diversity of the group provided unique value, breaking down traditional military hierarchical barriers to allow all viewpoints to be heard and considered. Furthermore, key insights from industry partners helped shape the team's design efforts, expanding the realm of the possibilities beyond the current Air Force's standards.

## Design Problem

***How might we best attract, manage, reward, and retain the most effective cyber talent (priority given to offensive ops, defensive ops and programming) for the US Air Force?***

The challenge of improving the Air Force's Cyber Talent Management was endorsed by the Air Force Chief Information Officer (SAF-CIO) as a critical need for the Air Force. The challenge was an unexpected but natural follow-on to AF CyberWorx's 21st Century Training Model project which highlighted the need for talent management to facilitate better cyber workforce development.

## Human Needs

In a human-centered design approach to problem-solving, each proposed solution articulates how it will address the core human need at the center of the problem. In other words, how will the solution improve the ability for specific individuals to perform operations or make decisions that will make war-fighters more effective? A complete solution accounts for organizational outcomes and technical needs; but, to be effective it must be centered on human needs. Understanding and empathizing with the points of view, environments, motivations, wants, needs, and constraints of the people central to the problem is the most valuable component to providing a solution that will fit their needs.

## Theme Discovery

The design sprint broke into six different groups pre-determined by the CyberWorx team to create a variety of knowledge from different parts of both the military and industry. The teams concentrated on solving the problem with the design-thinking process: discover (empathy); define (human needs); ideate (solutions); prototype, test, & iterate (test assumptions); and impact of implementation (measurement). Their vision of the solution focused on what an ideal Cyber Talent Management System would be and how it might impact specific user personas is explained more below.

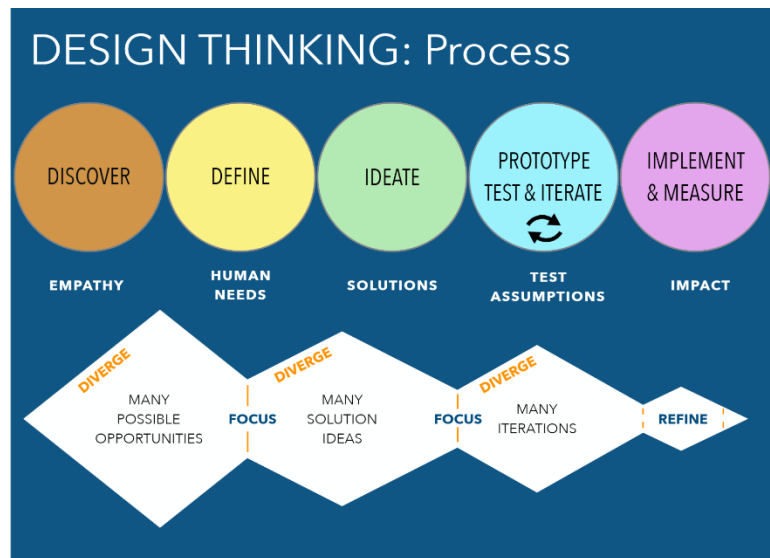


Figure 1: Design Thinking

After concentrating on barriers, the teams began to develop personas, which are representations based on shared characteristics of multiple people, understood through interviews, observations, or other user research. Once personas were defined, the teams walked the crafted character through the current system from the persona's point of view to discover the barriers they faced. As the persona's barriers were identified, the team was then able to translate the barriers into needs, which led to solution ideation. Solutions were then categorized into four selections: passionate, impactful, plausible, and most innovative.

At the end of the second day, they presented their favorite solution to the entire group for feedback and possible holes that the team had overlooked during ideation. After presenting, they broke back into their smaller groups and worked on their presentations for the next morning which would include details about their chosen persona, their problem, and what the solution is for that person.

## Personas and Solutions

### Concept 1: Level Up

Lilly, Junior Cyber Operator - Experienced DCO operator, now an Intel Flight Commander, is on track to become a staff officer. Lilly has no desire to be on staff and is afraid her technical skills will atrophy if she does so. Lilly feels she is unable to make her the best contribution to the Air

Force as an experienced cyber operator; however, she currently has no ability to forecast her career development and no ability to stay on the technical operational path which she loves.

Lilly is trapped in the current system of promoting into a staff position. She needs a deliberate technical career path so that she can continue to serve in the Air Force where she feels she is most impactful and personally fulfilled.

If the Air Force wishes to avoid perpetual amateurism and losing Lilly to better career opportunities that allow for professional growth, a gamification of the promotion process should be implemented. Participating in “Level Up” could help Lilly feel more impactful within the Air Force because she can achieve points and view her future career path from the beginning of her service. As she accomplishes training and increases her technical depth, she would receive points which would eventually lead to her ranking up or being promoted. Furthermore, the point system could be used to incentivize needed technical skills for the AF as the cyber landscape changes. When Level Up is successful, Lilly remains in the Air Force with a new-found fulfillment knowing how her training is advancing the mission and growing her career skill set.

As an additional benefit, a scoring-based promotion system will allow for the establishment of easier off/on ramps for civilian hires from industry. If the AF wanted to hire a forensic analyst from Verizon, a simple assessment of technical skills (via test or certifications) would provide a mapping toward initial rank at hiring.

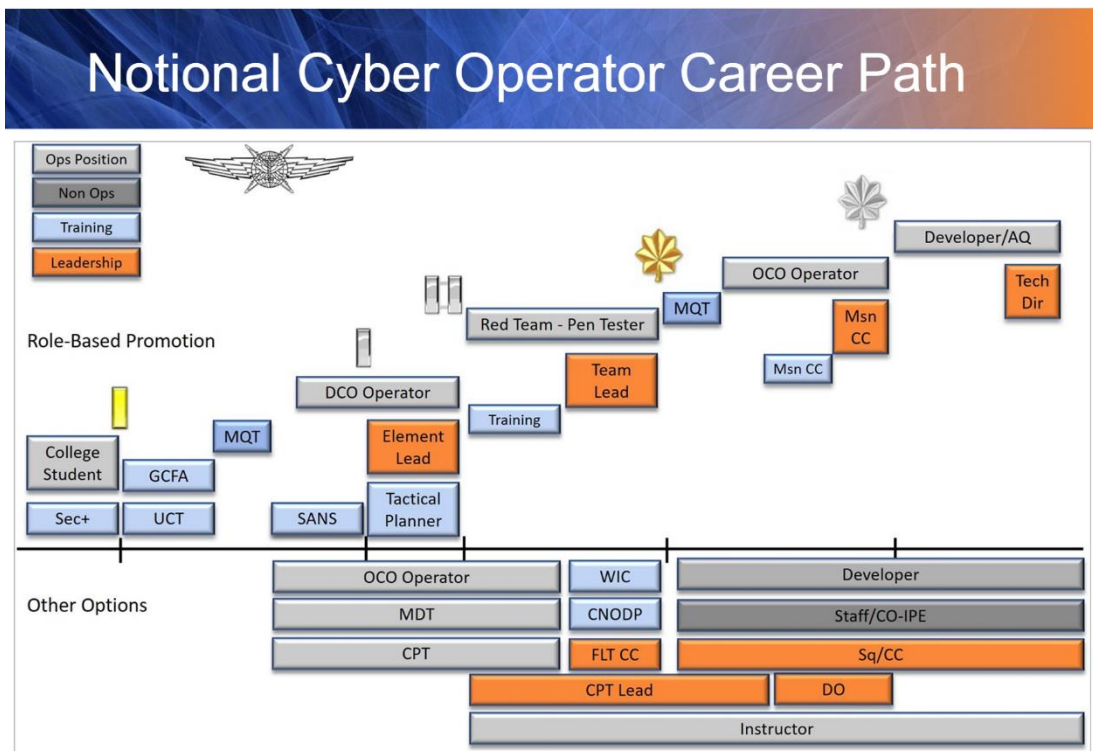


Figure 2: Notional Cyber Operator Career Path

**Concept 2: A Modern Talent Management System (TMS):**

**TMS Part 2: Implementation of Policy Changes**

SSgt Julie, a Technical Leader working as NCOIC of Network Ops, is motivated most when her work impacts the mission and she helps airmen achieve their goals. Her biggest frustration is the inability to put her training or strengths to good use for the mission. She recently completed six months at Kessel Run as a software programmer. Julie heard about a software programmer opportunity opening at the 595 SCS at Offutt and would like to occupy the position. Unfortunately, she holds the wrong AFSC and does not want to take part in cross-training because she already has six months of industry service at Kessel Run.

In order for SSgt Julie to be placed in the right role, she needs to be recognized by leadership and hiring authorities for her unique industry skill sets, regardless of AFSC constraints. SSgt Julie is on the cusp of reenlistment and knows she would need to cross-train to receive the promotion she is already prepared for thanks to the time and experience gained at Kessel Run. She will most likely opt to leave the service and find a more rewarding career path in the commercial world. At this point, the Air Force has lost SSgt Julie and her experience and must start from scratch with a new "Julie."

If the Air Force were to implement changes to the policies that affect not only SSgt Julie, but also Lilly from the above concept and personas provided in concept three and four below, we would be able to retain our top cyber talent while providing them the ability to grow and succeed. The talent management platform will implement the following proposals to keep SSgt Julie, Lilly, and others from leaving the Air Force:

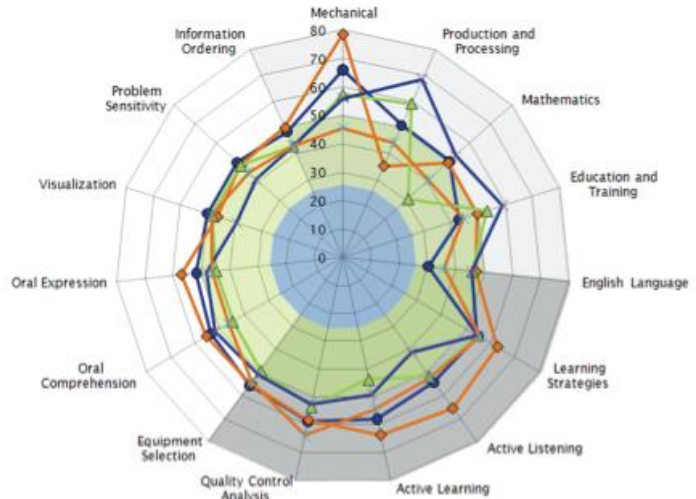
- 1.) Create a more uniform approach (officer, enlisted, civilian)
- 2.) Standardize skill and experience descriptors
- 3.) Decouple rank/level and skill set during assignment matching
- 4.) Relax the constraints for TOS, DEROS, special programs, etc.
- 5.) Allow for choice, but always account for mission and unit entitlement requirements

These policy changes will enable the implementation of a more useful talent management platform, enhance their success, and allow for new workforce development processes like the Level Up concept. Modern talent management is critical to improving retention rates and avoiding capital expenses and mission risks related to personnel turnover.

#### TMS Part 2: Billet/Airman Qualification Radar Profile

Future high school graduate, Zeke, has an idea of who he would like to become in his future but not "how" he will become that person. Knowing he would like to work in the cyber field, he browses the US Air Force's LinkedIn page for possible job postings and to learn how he could work for them in the future. He becomes frustrated when there are no job postings on the social media site and moves on elsewhere.

While on the Air Force's side, Lt Col Rock, 33 NWS/CC, is about to lose a crew commander within the next month. He has a difficult time advertising the upcoming available position to potential hires as the current systems fail to adequately advertise or capture experience and personality requirements for the position. He needs a solution that will help the right candidate find out about the job and a way to review possible candidates and their skill levels and talents.

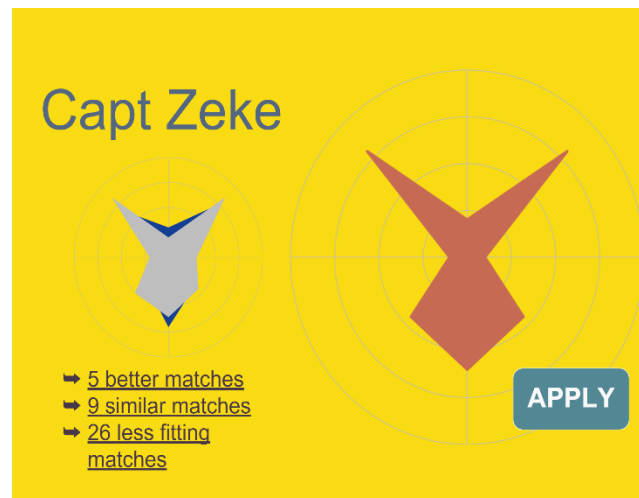


**Figure 3: Example skill set map that overlays current skills with desired traits**

Zeke could become the future airman that Lt Col Rock needs, but how can Rock inform Zeke of the position?

Given that Zeke is not yet in the AF, Lt Col Rock needs a way to advertise the position without divulging much detail to the public. Rock does not have access to a proper program that assesses the future skills, goals, and motivations needed to hire Zeke or an existing Airman into the position. Rock is also unable to inform Zeke of the skill set that would be needed to be hired for the position. When an Airman Skill/Billet Radar Program is implemented, Lt Col Rock will have access to the appropriate information about recruits and learn what is needed to fill the soon-to-be empty role. The radar map would break down the personality traits and skill set of any position. This would then provide Lt Col Rock the ability to provide future candidates like Zeke a list of requirements and classes to accomplish to become a prime candidate for a position in cybersecurity.

Lt Col Rock will have a new airman available to place in the open position with the aid of the Billet Radar Program that helped shape Zeke from the years when he began as a cadet. But, this solution would not be possible without the aid of the needed policy changes or without clean data that provides the knowledge behind the radar maps. The collected data about Zeke must be kept updated in the system in order to benefit Lt Col Rock and cadet Zeke, this additional concept is examined below in *Cleaning Dirty Data*.



**Figure 4: Captain Zeke**

TMS Part 3: Cleaning Dirty Data

Assignment Officer, Data Dave, is in control of maximizing mission success and personal desires for the Air Force by placing the talent in proper service jobs. His strengths lie in data science and analytics but he has frustrations with managing too many people with what is known as “dirty data.” Dirty data is limited or incorrect data on both the individuals and the job/billet to which they may be assigned. Decisions made off of this data is always flawed, irritates airmen and hinders mission success rates.

Data Dave’s solution comes in two parts and would directly influence the success of the above concept of a Billet Radar Program. First, the comprehensive data about individual airmen and jobs needs to be collected and “cleaned.” This is an important first step as a lack of comprehensive details creates a gap in the ability to hire proper talent who will better fulfill mission requirements.

Next, the clean data is fed into a “Machine Learning Model” that compares the talent profile to the billet profile, helping Dave make better informed decisions about job matches. The machine sorts the profiles and find which airman matches the available jobs. Dave will be informed of these matches, and then notify Lt Col Rock that Zeke’s profile matches with Rock’s available job position.

The Machine Learning Model works hand in hand with the Billet Radar Program that aids future airmen like Zeke find the proper position that is both effective and satisfying. Zeke can now make personal development decisions that impact future jobs within the service and is matched to a career that values him and utilizes his skills. Lt Col Rock is now happy and successfully hiring members like Zeke with the appropriate skill sets. He is provided with the unit’s talent shortfalls and can mentor members thanks to the hard work of Data Dave feeding the Machine Learning Model with clean data.

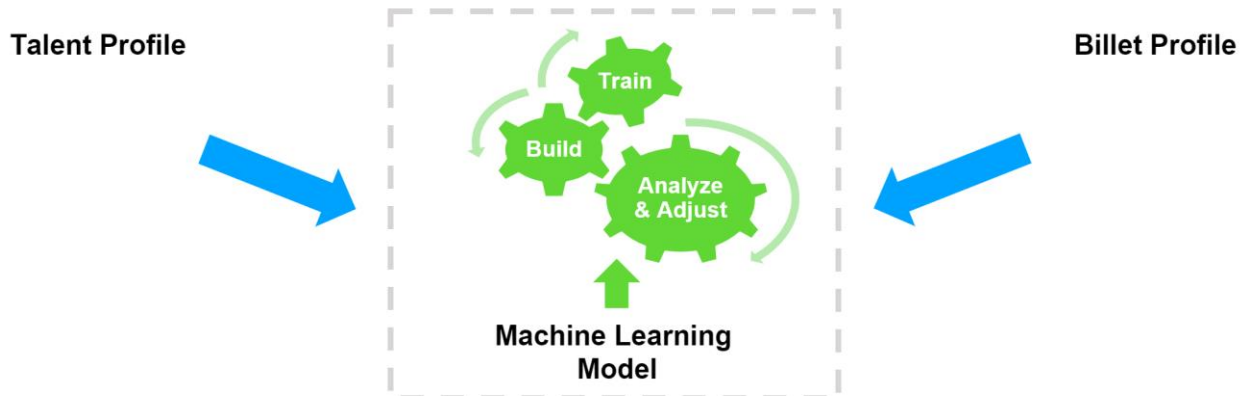


Figure 5: Machine Learning Model

**Concept 3: Centralized DevOps Organization**

SSgt 3D074 Koby has experience as a C/C++, Python, 90 COS Certified Developer, who attended Kessel Run’s programming innovation center. Upon his return from the completed project with Kessel Run, he is notified of a permanent change of station to another unit where he would be in charge of SharePoint development. Koby is frustrated because his new set of skills are not being utilized to support his missions. This career path is inflexible and he does not receive relevant or effective training.

The Air Force is not adequately developing, training, or utilizing Koby to meet mission requirements. Koby does

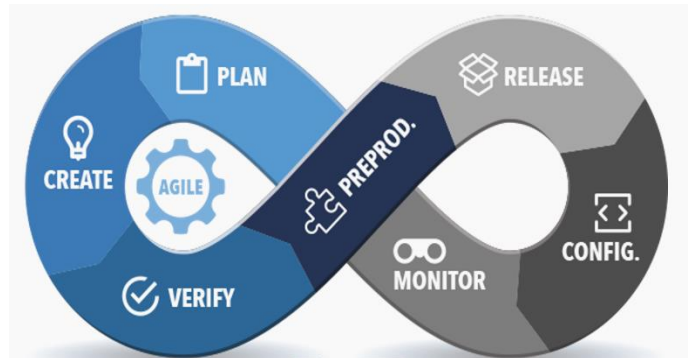


Figure 6: Centralized DevOps Organizational Process



not wish to move away from his skill set of programming and feels that his ability to support the mission will lessen in the new, forced position. Koby is feeling undervalued and fears his new programming skill set will atrophy in the SharePoint role. Koby considers leaving the service which leads to the Air Force losing a highly-trained programmer due to the forced career shift.

The current lack of defined purpose and chain of command can be overcome with a “Centralized Development Operations Organization” that consolidates all programmers under a single organization. This organization would organize, train, and equip programmers and the formally mismanaged Koby will have a clear and defined career path that incorporated industry and academic experts. The organization is reflected below in Figure 5 and 6.

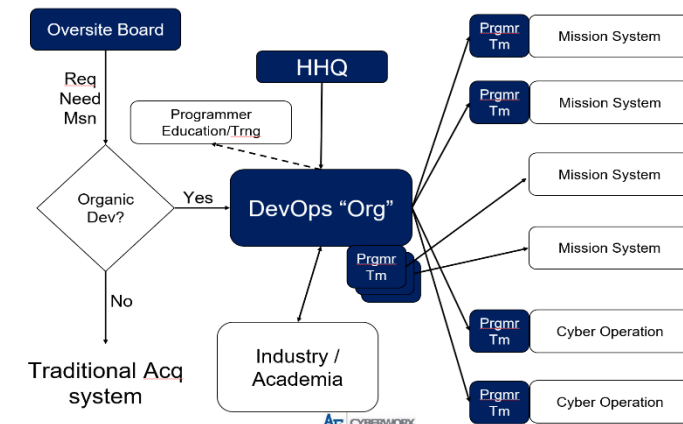


Figure 7: Centralized DevOps Layout

This new organization will ensure the Air Force effectively employs modern programming practices by setting standards, ensuring skilled developers are not placed into organizations that misuse their skills or refuse to modernize their development methods. With the programming workforce standardized on modern and relevant development methods their retention will increase as they are not misused and will have much more significant mission impacts.

**Concept 4: Back to School**

The final solution from #AFCTM design sprint was also a direct finding from the previous Cyber 21st Century Training Model, that spurred the development of AFIT Cyber Education Hub, established in August 2018. As it appears to be an extension of the previous sprint, we do not feel that it is a valid solution to the talent bleed that the Air Force experiences within the cyber talent field.

Irene the Instructor is a first assignment 1B4 operator and non-volunteer instructor with limited technical expertise and weapon system experience. This impacts her ability to teach a series of Initial Qualification Training (IQT) modules to a diverse group of students. Irene has found that much of the material is outdated, making her feel inadequate as an instructor among her cadets. She needs a better way to grow her technical expertise and weapon system experience in order to provide more relevant training. Otherwise the potentially old, inaccurate slides will stunt the pipeline of education and skill development of future DCO operators.

In order to reach mission ready status, graduated operators require significant on-the-job training, which they are not getting from their instructor Irene. The graduates are being ill-prepared because of the outdated, predetermined curriculum. This leads to significant “training bills” being transferred to operation units because of the graduates' inability to connect their previous courses with their current duties.

In order to improve the IQT pipeline the graduates face, the Air Force should implement “Back To School.” Courseware will be developed and delivered by leveraged industry and academic experts to the inadequately prepared Irene. Back to School can bypass the dated curriculum

that Irene is currently teaching with a research-backed, comprehensive, and flexible IQT program. The new courseware will also remain up-to-date based on user feedback with the aid of the program's identified industry and academic collaborators. Back to School takes advantage of professional education while bringing operators closer to mission-ready status upon arrival.

## Summary of Benefits

The proposals presented in this report correct many underlying issues the Air Force faces in developing better cyber talent management. These issues were raised by participants in the design sprint and by key stakeholders. It is important to note many of these recommendations are extensible to other AFSCs outside of cyber and may represent a desired solution for our broader workforce. The teams of #AFCTM found value in a gamification program, improving our airmen's education and training, and a billet personality program powered by clean data and the implementation of policy changes.

The modernization of the Air Force's recruitment and retention of cyber talent is necessary to become a valid and progressive workplace that remains a viable option for our airmen. We can no longer allow their expectations to be misaligned with poor professional progression that provides them with the inability to lend their talent to the mission. Furthermore, the ability to accurately assess the cyber expertise and aptitude of new recruits facilitates a better understanding of our Airmen's skill set. The Airmen's ability to perform mission and cyber-related tasks will lead to a more experienced and successful Air Force.

## Next Step Recommendations

1. Test with a smaller specialized opt-in promotion category as a trial run for LevelUp or another technical promotion track. Results could support NDAA legislation if needed and evaluate risks to culture that may result from a what may be perceived as a "special" group.
2. Migrate existing cyber workforce data (maybe cyber surf) to a radar format. The pitfalls of "dirty data" creates a ubiquitous, evolving risk. Suggests that stakeholders create and appoint a Mission Liaison who will continuously check the output of the model with Air Force needs
3. Invest in a modern talent management system by furthering the capabilities and usability of the talent market place or bring on a new talent capability like LinkedIn or other technical solution.
4. Modernize the Keesler School House:
  - a. Conduct a gap analysis to verify gaps between Keesler AFB schoolhouse course content and operational needs.
  - b. Provide for a rapid training capability that delivers curated and "approved" content as well as crowd sourced content such as TTPs, and airman or privately developed tutorials. AFIT's Cyber Education Hub may fill the technological gap for this need as it was built to address this issue.
  - c. Staff the school house with highly qualified experts like a university and drive curriculum changes down to the faculty rather than at higher management levels. Recommend reviewing how top-tier cyber education programs manage their curriculum (i.e. CMU, USAFA etc...)
5. Adjust policies to support a modern TMS:
  - a. Update individual data/profiles to include standardization and data currency.
  - b. Suggest AFPC set quotas for hiring authorities based on mission type and size and start with a limited number of flex billets to avoid abuse of the system.

- c. Ensure that once the TMS and data are verified that hiring decisions are validated to be within tolerances on the system. This will prevent hiring actions where the recommendations of the system are completely ignored.
  - d. Set a timeline for use/implementation of this system by commanders and AFPC.
- 6. Create a standardized training pipeline for DevOps involved Airmen. This will begin to create the professionals in AQ, 3D, and 62 AFSCs that can operate as cohesive development teams.
- 7. Formalize ownership of DevOps development under the 3D0X4 career field as the programming AFSC.
- 8. Suggest HAF/A6 create a working group/HPT to conduct a manpower study of 3D0X4 utilization.