PREPARING FOR FUTURE CONFLICT

Origins of the Institute for Future Conflict – A Conversation with the Founding Thinkers

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Conversations about a United States Air Force Academy (USAFA) center or institute focused on preparing cadets to be ready for the rapidly changing nature of future war began in earnest after a short white paper written by Dr. Paul Kaminski (USAFA, Class of 1964) began circulating amongst distinguished USAFA graduates and senior USAFA leaders. Kaminski's original paper, dated September 2016, was simply titled "The Big Idea". The paper opened with a statement attributed to Hall of Fame hockey player Wayne Gretzky. When asked what made him great, Gretzky replied, "I don't skate to where the puck is, I skate to where the puck is going to be." Kaminski went on to praise Air Force General Hap Arnold with possessing that same spirit by engaging with Dr. Theodore Von Karman to map out future Air Force technology and the creation of the RAND Corporation to map out a policy

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Dr. Paul G. Kaminski (USAFA 1964) served a 20-year Air Force career where he was a foundational thinker of stealth, precision-guided munitions, space, aircraft, and missile system technology. After retiring, he has served as Under Secretary of Defense for Acquisition and Technology, in multiple advisory and board positions, and as a CEO. He is committed to giving back to his nation by serving and chairing several large public and private company boards, and several government advisory boards. He continues his passion for game-changing technology by consulting with the senior leadership at two large defense and commercial technology firms.

framework. Many graduates of the Academy will recall a similar sentiment from a quote they memorized from Italian Air Marshall Giulio Douhet in The Command of the Air (1921), "Victory smiles upon those who anticipate the changes in the character of war, not upon those who wait to adapt themselves after the changes occur."

Kaminski's paper challenged USAFA to create a culture where cadets and faculty would embrace the spirit of Gretzky, Arnold, Von Karman, and Douhet and project their thinking years into the future. His warning was simple, "I believe it's time for the Air Force and the Air Force Academy to chart a course to where 'the puck' is going to be." Dr. Kaminski's proposal mapped out possible activities USAFA could undertake to expose cadets to new technologies, policies, laws, and ways of thinking that would prepare them for their future. He envisioned an integrated culture at USAFA with mutual benefit to cadets, faculty, and staff that would embrace a mindset of anticipating, rather than reacting to the dizzying pace of change impacting the character of war in the 21st Century.

Kaminski's vison gained momentum from 2017 through 2019 as it was embraced by other distinguished USAFA alums such as Gen (ret) Greg "Speedy" Martin (USAFA, Class of 1970), Lt Gen (ret) Erv Rokke (USAFA, Class of 1962), and Mr. John Fox (USAFA, Class of 1962). It also grabbed the attention of the Dean of the Faculty, Brig Gen (ret) Andy Armacost (Northwestern, Class of 1985), and the Vice Dean, Brig Gen (ret) Gary Packard (USAFA, Class of 1982). This team developed a series of dinner meetings over the next two years with senior USAFA academic leaders and Permanent Professors, to include the current Dean, Brig Gen Linell Letendre (USAFA, Class of 1996). Through these meetings, the Big Idea of "skating to where the puck is going to be" took root, leading to the Superintendent establishing the Institute for Future Conflict (IFC) in November of 2019 to "connect cadets, faculty, and staff with cutting-edge research and innovation through exposure to the individuals and organizations shaping the future fight."

The IFC will primarily focus on the emerging technologies highlighted in the Summary of the 2018 National Defense Strategy (advanced computing, "big data" analytics, artificial intelligence, autonomy, robotics, directed energy, hypersonics, and biotechnology). The IFC's vision is to create a learning culture at USAFA that produces leaders not only versed in these technologies but also to be able to think critically about their social, historical, ethical and legal implications. The Superintendent's direction makes clear the IFC's "one overarching objective: support the mission of the Air Force Academy." To achieve that, the IFC will integrate and enable the academic, military, and athletic mission elements to produce leaders of character who demonstrate the mastery of

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Lieutenant General (ret) Ervin Rokke (USAFA 1962). After graduating from USAFA, Lt Gen Rokke completed a graduate degree in international relations from Harvard University before becoming an Intelligence Officer. After tours in Japan and Hawaii, he returned to USAFA as a Political Sciences Instructor. He eventually became the first USAFA graduate selected as a Permanent Professor. He was selected as the Dean then returned to the intelligence career field. He retired from the Air Force as President of the National Defense University. After retirement, he became the President of Moravian College and Theological Seminary in Bethlehem, PA. He then served as a senior advisor to the USAFA Superintendent and continues to positively influence USAFA today.

technological and military competencies necessary to win in a complex world.

The IFC concept is built to leverage a unique partnership between USAFA and the Air Force Academy Foundation (AFAF). This partnership will enable the AFAF to raise funds and build networks committed to supporting USAFA that leverage the thinking and resources from the graduate community and civil sector in order to bring future-oriented commercial and operational thinking to cadets, faculty, and staff. The USAFA IFC, in partnership with the AFAF, will bring the best and brightest thinkers, operators, and researchers from civilian universities, corporate America, and the military ranks to USAFA to expose cadets, faculty, and staff to diverse thinking about the technological advancements changing the character of war. The IFC's endowment campaign is seeking to raise $100M to create a sustainable, transformational experience at USAFA in pursuit of the next military offsets. These funds will be used to endow world-class visiting professors who will shape the culture of how the Air Force conceptualizes future defense in air, space, and cyberspace. The funds will also endow game-changing undergraduate research and develop scholarships related to anticipating rather than reacting to threats to our way of life well into the future. The IFC is a transformational idea that will create a return on investment in the security of our nation that far exceeds the financial support.

The Superintendent, in his memo announcing the IFC, stated, "Where some see a daunting challenge, we see an opportunity to redouble our efforts to produce agile and relevant officers, ready to lead the fight, regardless of location or adversary. The Institute for Future Conflict allows us to align our energy and ideas, focus on enhancing and integrating ongoing efforts, and bolster our position as a world-class academic institution." The unique value proposition of the IFC is not its focus on a singular problem or technology. Instead, the IFC is designed to influence culture across USAFA to prepare the new Second Lieutenants who graduate each year for their roles as the future leaders of our nation, in an uncertain environment where the nation's preeminence is not guaranteed.

In the conversation that follows, Brigadier General (ret) Gary Packard interviews four founding thinkers whose passion, commitment, and wisdom are most responsible for the establishment of the IFC conversation. Without these voices, the IFC would have been just a good idea. But their passion and persistence ensured the idea would not wane. Not surprisingly, all four are recipients of the USAF Academy's Distinguished Graduate Award that recognizes exceptional graduates who have set themselves apart by making extraordinarily significant contributions to our nation and/or their communities.

General (ret) Gregory S. "Speedy" Martin (USAFA 1970). The son of a WWII bomber pilot, Gen Martin was infatuated with flying from a young age. After graduating from the Academy as the national collegiate parachuting champion, he excelled at pilot training and flew the F-4 in Vietnam. Gen Martin would go on to command at all levels of the Air Force and finished his career as Commander of the U.S. Air Forces in Europe and Allied Air Forces Northern Europe. In retirement, he has remained active as a mentor with the Joint Forces Command's Capstone, Keystone and Pinnacle courses. He also serves as a consultant and board member for multiple aerospace and defense corporations as well as supporting the development of future leaders as a mentor and advisor with several universities.

Brigadier General (ret) Gary Packard: Gentlemen, thank you for your investment in the establishment of the Institute for Future Conflict (IFC) at the Air Force Academy. Also, thank you for taking the time to share your thoughts about the IFC, the Academy, and the development of our future Air Force leaders. What motivates you to be a part of this initiative at this time in the Academy's history? Dr. Kaminski, as the author of the "Big Idea" white paper, let's start with you.

Dr. Paul G. Kaminski (USAFA '64): I have been in my fourth career since 1997, and I began a fifth career when I joined the Board of the Air Force Academy Foundation (AFAF). This 5th career is about philanthropy – donating my time and money to issues and institutions that I believe to be important, with a focus on those where I can have an impact and make a difference. The combination of importance and the ability to make a difference are the two elements that drive me to engage. The Air Force Academy is an institution that I believe is especially important, and the AFAF provides opportunities for me to make a difference.

Lieutenant General (ret) Ervin Rokke (USAFA '62): Our Academy prepared me very well for a professional career of nearly 60 years, most of which has been associated with the United States Air Force. For this I am deeply indebted to the Academy and anxious to see that cadet development programs continue to prepare graduates for the increasingly complex challenges they will face in the 21st Century, particularly as they relate to the Profession of Arms. We are at an inflection point in the evolution of the military profession. Our graduates must be prepared to make decisions and take actions that maintain our status as the finest Air Force in the world. The Institute for Future Conflict initiative focuses directly on this objective and I am honored to participate in its creation and implementation.

General (ret) Gregory S. "Speedy" Martin (USAFA '70): There are two considerations that influence my involvement. First, I have observed for

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John M. Fox (USAFA 1963) joined the Academy after a year at the University of Washington. After graduation, he attended pilot training at Williams AFB and was assigned as a T-38 Instructor Pilot at Laughlin AFB upon graduation. After leaving the Air Force, he obtained his MBA from the University of Denver then started two public natural resource companies with colleagues – Western Gas Processors and later Markwest Energy Partners. He retired as Chairman of Markwest in 2010, and is now focused on USAFA and other philanthropic and business pursuits.

Brigadier General (ret) Gary Packard, Jr. is Program Manager for the Institute for Future Conflict (IFC) at the AF Academy. He advises the Academy on IFC implementation planning and assists the Air Force Academy Foundation with fund raising and communications. He served at the Academy as Vice Dean and as the Permanent Professor and Department Head of the Behavioral Sciences and Leadership Department. He commanded the 32nd Flying Training Squadron at Vance AFB, OK, was lead Air Force writer on the Secretary of Defense's study of the repeal of Don't Ask, Don't Tell, and deployed as Director of Staff, 379th Air Expeditionary Wing, Southwest Asia. He has a BS in Behavioral Sciences from the Air Force Academy, master's degrees from Embry Riddle Aeronautical University and Michigan State University, and a Ph.D. in Developmental Psychology from the University of North Carolina at Chapel Hill. He is a command pilot with 3,900 flying hours.

some time, that while we have been engaged in the Global War on Terrorism, and to a lesser degree dealing with transnational criminal threats, our focus and resource allocation process have been heavily invested in the current challenges with much less focus on the future threats presented by the re-emergence of a Great Power Competition. But for me, Dr. Kaminski's articulation of The Big Idea and the existential need to arrest our deterioration in the competitive advantages we have enjoyed since WW II was a defining moment. Although those capabilities were heavily based on the most advanced scientific and technological innovations, they brought with them the need to also lead the world in diplomatic, legal, environmental, and social initiatives.

Timing is important because we are losing our lead as a nation in key technology areas that affect our economic security as well as our national security. These are areas that will be particularly important to our nation's security during our cadets' military career, and to their subsequent careers.

Second, and equally important, I have observed for decades the continuing media and congressionally based questions regarding the need and efficacy for Service Academies. In my view, the nation is best served when its Service Academies offer its cadets a curriculum and menu of learning, teamwork and leadership opportunities that will develop leaders of character who have both the educational and practical experiences to serve in the Profession of Arms. Service Academies are not universities or colleges, they are institutions that should prepare young men and women who understand the exigencies of national security. I believe the Institute for Future Conflict will help converge each of the many offerings available to each cadet toward their service in our armed forces.

John M. Fox (USAFA '63): I believe the Academy is the right place to develop our future leaders to think about the threats that have been described by my colleagues. However, it seems to me that the Academy has fallen behind the curve on helping cadets understand the threat environment they will be facing as young officers. What motivates me is perhaps I can provide both money and leadership experience in trying to make USAFA a truly effective training ground for Big Air Force.

Packard: Dr. Kaminski, you mentioned in your answer that you believe the Air Force Academy is "very important" to the Nation's future defense at this time. You speak with a sense of urgency that we must work on this now. Why is this important at this time?

Kaminski: Timing is important because we are losing our lead as a nation in key technology areas that affect our economic security as well as our national security. These are areas that will be particularly important to our nation's security during our cadets' military career, and to their subsequent careers. The areas were explicitly addressed in our National Defense Strategy. An excerpt from that strategy, "The security environment is also affected by *rapid technological advancements and the changing character of war*. The drive to develop new technologies is relentless, expanding to more actors with lower

barriers of entry, and moving at accelerating speed."[1] We are losing our lead because our near peers are relentless in developing these new technologies, and these new technologies are not sufficiently represented in the current Academy curriculum. This is an area that is personally important to me, and it is an area where I can make an impact. I recommended this initiative in a paper that I called "The Big Idea", and time is of the essence for us to become relentless in the development and application of these technologies to our mission needs. Speed will continue to be important because these technologies will change, and new technologies will be developed. So, our academic program must be structured to respond to rapid changes.

Packard: Let us discuss why this is this important to each of you and to the Academy. The IFC Objective, simply stated, is to "provide cadets, USAFA Permanent Party and Partners with the insights and tools to better anticipate and prepare to drive the changes in the character of conflict needed to sustain and advance our national security in the 21st Century." Lt Gen Rokke, you spent a good portion of your career, in and out of uniform, in intelligence and other national security initiatives. Can I start with you on this question? Why is this way of thinking important to you and to our Academy?

Rokke: As a Lieutenant in graduate school, I was fortunate to have a nationally recognized professor as my academic advisor and international relations instructor. He asserted that new answers to three simple questions could "turn the profession of arms upside down." The questions were: 1. Who are the actors?; 2. What can they do to one another?; and 3. What do they wish to do to one another? I didn't understand the importance of his assertion then, but as I reflect on the last decade, it is clear that we have new actors on the international scene, new weapons systems as a result of the revolution in technology, and horrible new intentions on the part of nation-state and non-nation state actors in the international arena. Traditional notions about our profession which emerged in the mid-1950's from distinguished scholars like Henry Kissinger, Sam Huntington, and Tom Schelling served us well during the Cold War, but are not sufficient to accommodate new security domains such as cyber and space; new technologies such as quanta, artificial intelligence, and hypersonics; and a host of ethical and moral issues associated with non-kinetic weapons. The fundamental thrust of the IFC is to influence cadet development programs in all Academy mission elements with thinking in traditional as well as emerging dimensions of the Profession of Arms. As we are reminded in current National Security and National Defense Strategy documents, we can neither deter nor prevail in future military conflicts if we remain hostage to defense thinking characteristic of the 20th Century.

Kaminski: This is important to me because it will have a significant impact on our National Security, and on our Economic Security. It is important to the Academy because we need to expose cadets to these technologies. We are not expecting all cadets to become experts in these fields. Some cadets will become experts via post-graduate education and field experience, but all cadets must gain some familiarity with the impact these technologies will have on future missions when employed by us against potential adversaries, and when they employ it against us. We also want the faculty at the Academy to be exposed to these technologies, so they can adapt courses they are teaching in the social sciences and humanities to address the impacts that may be expected on society, and also the impact

1 https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf

of society on the application of the technology, and on the character of warfare. We also need to leverage the facilities that we have already provided with our philanthropy. The Center for Character and Leadership Development (CCLD) will be well equipped to address ethical issues that will arise with applications of these new technologies. Our future Cyber facilities will also provide the ability to assess the robustness of new technologies in a hostile cyber environment. The National Defense Strategy provides a representative list of these important enabling technologies: "New technologies include advanced computing, "big data" analytics, artificial intelligence, autonomy, robotics, directed energy, hypersonics, and biotechnology—the very technologies that ensure we will be able to fight and win the wars of the future."

The IFC is all about making the cadet experience an integral part of each cadet's professional education and training process which is exactly the way they will be treated once commissioned.

Fox: It is important to me because U.S. national security is of utmost concern to me. We have threats from both state actors and unconventional forces around the world who are increasingly becoming more sophisticated in causing harm to our country. Big Air Force needs equal or preferably greater sophistication from its USAFA graduates, and I just do not think USAFA is performing up to its potential. The IFC concept is a game changer if our leadership at USAFA and Big Air Force can grasp its potential.

Martin: Over the years, including my time at the Academy, I sensed kind of a "we vs. they" environment among many cadets. In other words, the Academy was preparing cadets to graduate with the best education and experiences available, but not necessarily relating how those subjects and experiences would apply when they were commissioned. Thankfully, though, I did observe that many of the cadets I knew who weren't happy about some of the Academy requirements and demands which seemed to get in the way of their "college" experience, flipped once commissioned and became some of the most courageous and competent officers I served with. The IFC is all about making the cadet experience an integral part of each cadet's professional education and training process which is exactly the way they will be treated once commissioned.

Packard: Based on your comments so far, it appears your time as a cadet continues to influence you today. Could you talk a little more about your Academy experience? How did it help you prepare for your future and what could have been better? Mr. Fox, would you start us off on this one?

Fox: My experience at USAFA was totally outside my world of experience. I came from a small town in eastern Washington, and no one in my family had any experience in the military. I was selected after one year at the University of Washington and could have gone to the Naval Academy or USAFA. I originally thought it would be Annapolis (which I thought I wanted to do as a young boy) but the lure of skiing in Colorado made USAFA a better choice. Basic Cadet Training (BCT) was an eye opener when my roommate had a nervous breakdown and I spent the rest of BCT by myself. Even though it was uncomfortable, that experience alone gave me the confidence that I could survive in tough conditions. Then and later, I experienced many different leadership styles which has

helped me immensely in my short career in the AF, and more particularly, in my civilian career. What could have been better was some sort of mentoring effort on helping me sort out was what the AF wanted in its officers, what career fields were available, and how I fit into the big picture. I had virtually zero contact with my Air Officer Commanding (AOC), and in only a few instances in academics, did I ever really get to know an Air Force officer. My main source of information about my future came from other cadets as we speculated about how it would be after graduation. Most of them, of course, were as clueless as me about what the Air Force really wanted from us.

Rokke: My Academy experience was challenging regarding mind, body, and spirit. I had been a good student in a small high school, but the curriculum was limited. The Academy exposed me to a wider variety of academic disciplines and to a much higher level of academic sophistication. I worked extremely hard to match my high school grades, but soon realized that my classmates were doing the same and earning "A" grades was difficult. Similarly, I found the Academy physical education experience to be challenging. I was not a prize athlete and had real difficulties with boxing in particular. I was more comfortable with the spiritual dimension of cadet life. Mandatory chapel was a positive experience for me as was life under the Cadet Honor System. I enjoyed the pride and comradery that emerged in my class as we worked together in meeting the Academy's development program demands. I was selected for a graduate degree program at an Ivy League university immediately following graduation and realized quickly that the disciplined life I had led as a cadet was helpful in meeting the challenges at graduate school. Arriving at the library at 0730 hours each morning gave me an advantage over my classmates, many of whom came in much later in the morning and found themselves studying well into the nighttime hours. For them, so-called "all nighters" were common before exams and research paper deadlines. For me, the graduate-level challenge turned out to be less severe than my cadet academic experience and I am convinced it was a result of my time management skills acquired as a cadet.

I have also profited from maintaining a physical fitness program throughout my adult life, something I would not have done without my Academy experience. Finally, I have come to realize the importance of the spiritual dimension of our lives. In its broadest sense, this has involved my approaches to professional challenges as well as friends, family, and colleagues. When I left my position as a college president many years after graduation from USAFA, I was presented with a beautiful piece of glass sculpture on which was written "Body, Mind and Spirit." These three words, which came to life for me during my cadet years, have served as touchstones for me throughout my professional assignments in the Air Force as well as civilian contexts. I should also add that they continue to facilitate close friendships with cadet classmates whose Academy experiences some 60 years ago were like mine.

Martin: My cadet experience was greatly enhanced by an early desire, based on some upperclassmen's mentoring, to become a member of the Wings of Blue parachuting team. As a result, I became a member of a team that not only developed professional parachuting skills but also allowed us to become instructors, competitors and achieve leadership positions within the team. So, on top of academics, intramurals, and cadet leadership opportunities, we were performing an "operational-like" mission which was immensely rewarding. When I graduated and went to pilot training, then F-4 training, and then to my first operational unit in Southeast Asia, it was a certification

path with which I had already become intimately familiar. But the downside of that track, for me, was that I did not apply myself academically as well as I should have, and I will always regret that shortfall.

Kaminski: My Academy experience was extremely helpful in all four of my careers. My first career spanned 20 years on active duty in the Air Force. While on active duty I benefited from Air Force funding and a scholarship to attend a university on the East Coast (Massachusetts Institute of Technology), and later one on the West coast (Stanford University). The combination gave me a network with Academy graduates, another with East coast research & development experts, and another on the West coast. These networks were critical in initiating and managing the three pillars of what became our Offset 2 Strategy to bring a close to the cold war. The Offset 2 Strategy involved precision guided munitions (PGM's); Intelligence, Reconnaissance & Surveillance (ISR); and Stealth. The ISR enabled us to find and track targets, the PGMs to use one weapon for most targets, and Stealth to deliver the PGMs and perform ISR in the face of advanced air defenses with limited casualties. I was privileged to have responsible positions working in each of these areas during my Air Force career.

The Academy helped me in my Air Force career to create a bridge between technologists and operators. It also gave me the foundation to recognize and apply the four P's of People, Partnerships, Probity, and Persistence. These four P's were extremely helpful in my 10-year second career involving investment banking and strategic technology consulting for both large and small businesses. I was privileged to join Bill Perry (a former Tech company CEO, Under Secretary of Defense, and Secretary of Defense who was my boss in three careers) as a partner in a small firm named Technology Strategy & Alliances. I eventually succeeded him in the firm when he left to become Deputy Secretary of Defense (SECDEF). I later agreed to join him as Under Secretary of Defense for Acquisition & Technology (at that time #3 civilian in the DOD) when he became SECDEF (my third career).

In this third career, the networks I had formed in my first two careers along with the four P's allowed me again to bridge the gap between technologists and operators to develop and field many new systems that made a difference (e.g., C-17, Predator, Global Hawk, F-35, JDAM, and VA class sub). I was able to obtain a good understanding of the mission for a new system by flying, riding, sailing, or submerging in the old system. This, and my experience in technology, industry, and large program management, was a great help in making key acquisition decisions about the new systems that would replace the old one. Finally, my fourth career has involved serving and chairing several large public and private company boards, serving on, and chairing several government advisory boards, and consulting with the senior leadership at two large defense and commercial technology firms. The networks, the four P's, and relationships that began at the Academy have continued to serve me well.

The shortfall in my Academy experience was the absence of mentoring and sense of the engineering and technology work performed in the Air Force. The Academy provided a reasonable sense of what a flying career would be like. But not so for the career that I had chosen. I later tried to address this deficiency with a donation to the Associate Of Graduates (before the Endowment was formed) that would bring graduates and non-graduate officers who had significant career accomplishments in research & development positions back to the Academy to conduct seminars describing

their work and doing some mentoring. But I found that the funds were not being used effectively and redirected them to the IFC last year.

Packard: Dr. Kaminski, could you tell us more about your "four P's"? How did they influence your leadership across your four careers?

Kaminski: I found these four P's to be the keys to success. The first P is for People. People are the foundation for all major programs. We need the best and brightest, supported by education and training programs. Just like pilot training, we need classroom time, and we need the analog of a flight instructor who allows the student to get in trouble, allows the student to realize they are in trouble, and gives the student the opportunity to recover before they and the instructor are both are in trouble. I applied this approach to create a constructive learning environment along with the fundamental principles of leadership I learned at the Academy. The second P stands for Partnerships. A major program needs a team working together – a team that can elevate the common objective of team above their individual objectives. I certainly learned about that at the Academy. I still remember "cooperate and graduate". The third P stands for Probity – the quality of having strong moral principles, honesty, and integrity. I learned about probity from the Honor Code. Without probity there will be no trust, and with no trust, there will be no real partnerships. The fourth P stands for Persistence. I learned about that beginning with BCT. I was amazed about how much more I could do if I really put my mind to it.

Packard: Each of you has been successful in both your military and civilian careers. I imagine this is not the first time you have been concerned with "skating to where the puck will be." How did anticipating rather than reacting to change help you as a leader?

Martin: Because I did not apply myself as strongly as should have in the academic environment, and because I recognized that shortfall, I have tried to make up for that deficit ever since. Shortly after graduating, I developed a professional reading program to stretch my knowledge and understanding of everything from current events to the latest technological innovations so that I could be in the business of anticipating likely events and not being surprised by things I had never considered. Just as important, I have tried to think at my boss's, boss's level and higher. That means I have tried to understand the environment in which my boss is operating and then offer proposed courses of action that consider the concerns and challenges they wrestle with each day.

Fox: Looking back at my experience at USAFA what I now realize is that my 19 to 23-year-old brain was very immature and as opposed to some of my more advanced classmates. I really drifted through the institution. Since I was good at academics, I did not really feel challenged and a career in the AF was really a hazy mirage. Being an instructor pilot in T-38s was really the first time I grasped how anticipating change was crucial to doing a good job. Again, in my civilian career and after a lot of self-education (a trait I picked up at USAFA), I found one has to think two or three steps ahead to stay ahead of the problem sets you are facing.

Rokke: As a career military intelligence officer, it is not surprising to note that I spent much of my time in operational assignments attempting to anticipate changes among our military opponents regarding the threats they presented to our national security. At the tactical and operational levels, I focused on numbers, quality, and locations of ships, planes, tanks, and missiles. My guidance was to "stick with facts"

and get them to warfighters as rapidly as possible. This was essentially a linear challenge, and with the sophisticated intelligence collection platforms we had, it was possible to develop quite accurate assessments of opponent capabilities, both current and projected. Over time, I found myself faced with the requirement for projections at more strategic levels. What are the Soviet intentions regarding the Crimea and Ukraine? What role does China seek in the Asian geographic area? Does the United States face a serious threat from terrorists? These were much more difficult questions with non-linear dimensions. Our answers were less crisp and, quite frankly, sometimes wrong. The incredible advance of technology, with resultant weapon systems involving quantum physics, cyber, hypersonics, artificial (augmented) intelligence, etc. has introduced non-linearity to the tactical and operational levels of conflict as well. In sum, while the importance of prediction in virtually all professions continues, the challenge of "getting it right" is far more difficult in our increasingly complex, nonlinear world. Our Academy must produce graduates who can thrive in a world of "black swans."[2]

Kaminski: I was always skating to where the puck was going to be because I was fortunate to have a series of visionary bosses who assigned me to the newest technology enabled programs. In my first Air Force field assignment at the Air Force Missile Development Center in New Mexico, I started with testing guidance systems for Intercontinental Ballistic Missiles (ICBMs), but was quickly assigned to start the first Air Force program to use a TV camera to guide an air-launched missile. This led to our first Precision Guided Munition (PGM), the Maverick. In my next assignment at the National Reconnaissance Office (NRO), I worked on highly classified (now declassified) space sensors to define, demonstrate, and develop our first operational synthetic aperture radar in space.

My next assignment was as Special Assistant to Under Secretary of Defense for Research & Engineering, William Perry. Because of my previous experience on radar systems, I worked on the Offset 2 Strategy and several advanced technology programs to provide an assessment of whether we could really make stealth work operationally. This work was especially important to me because I saw the loss and suffering of so many of my classmates and friends at the Academy in Vietnam. It was clear to me that stealth technology could have a major impact on saving American lives if we could make it work. I carefully studied the many known unknowns about what we could really achieve in stealth operationally. I saw significant risks, but huge rewards. That work led to my next assignment as the Director of the entire stealth program. This was clearly skating to where the puck was going to be in 1981.

Packard: As I hear your stories, I hear a mix of both early recognition of the importance of where the puck will be as well as a couple of stories of learning this lesson later in life. However, I also hear you saying current cadets cannot wait to learn these lessons later in life. General Martin, you once shared a quote with me from the Chairman of the Joint Chiefs of Staff (CJCS, see inset) about challenging the status quo. Given the pace of change in the CJCS's warning about the status quo, is it more important that we steep this in today's cadets early in their careers?

Martin: Believe it or not, their career in the United States Air Force will move amazingly fast. Rather than thinking of their cadet experience as a truncated

2 A black swan is an unpredictable event that is beyond what is normally expected of a situation and has potentially severe consequences. Black swan events are characterized by their extreme rarity, their severe impact, and the widespread insistence they were obvious in hindsight. (https://www.investopedia.com/terms/b/blackswan.asp)

If you believe that:

- We are in a great power competition
- We are losing our competitive advantage
- The character of war has changed
- The capacity of our forces is less than needed for future conflict
- The resources allocated to the DoD are likely to decrease in the years ahead...

Then how can you believe that the status quo is an acceptable approach to ensuring our national security?

- CJCS, June 4, 2019

educational experience which prepares them to serve in the Profession of Arms, I would hope the IFC could help establish a seamless evolution from being a civilian student to an apprenticeship at the Academy to a commissioned officer in the Profession of Arms. In other words, their career starts when they enter the Academy, not when they graduate.

Rokke: Our graduates do not have time to "catch up" on understanding the nature of the challenges they will face beginning with their initial assignments. Virtually every Air Force career field is experiencing dramatic increases in complexity which require corresponding increases in the capacity of our graduates to think critically and to make quick decisions about issues for which total information is lacking. They will be operating in an environment that features automated (augmented) intelligence and demands their understanding of complicated equipment as well as foreign cultures. Perhaps the best illustration of this phenomenon is the difference in skills required to fly F-16's and F-15's relative to F-22's and F-35's. Today's F-35's have as much intelligence collection capability as the airborne intelligence platforms that existed during my operational career from 1962 to 1997. Twenty-first century fighter pilots must know how to fly as well as how to manage enormous quantities of information. Learning is a life-long process; the earlier it starts, the better.

Kaminski: Our Air Force was founded by leveraging superior technology, superior people, and superior training to enable a smaller force that could overmatch our adversaries. Gen Arnold gave Theodore von Karman a huge assignment to leverage technology developed by Germany after WW II, and initiated a company named RAND to help set a course (it then stood for R & D). I chaired the RAND board in my fourth career, and observed the important role they played in leveraging our technology. Young officers in our Air and Space Forces need to be leaders in leveraging advanced technology, and our cadets need to be trained to be smart buyers and smart users of advanced technology if they aspire to become future leaders.

Fox: The reason Air Force officers need this ability is the incredible pace of change in the threat environment the U.S. faces. This will not be easy. Based on my experience as a young cadet and watching my children and grandchildren as a father and grandfather, the 18 to 22-year-old brain is not fully developed and is often focused on things other than preparing for the future. This is why integrated programming with the Center for Character and Leadership Development, Athletics, Military Training, Academics, and Airmanship is important to our success. Equally important is establishing better mentoring and decision-making tools for cadets as they think about their majors and their future careers.

Packard: Along those lines, how can the IFC influence how cadets think about their future in a way that will transform their time at the Academy to better prepare them to skate to where the puck will be?

Fox: If the IFC initiative is fully adopted, we will have a platform that informs everything we do at USAFA. To me it would be the glue that would bind the mission elements into a single-minded focus on cadet education and preparation. Currently, we have ships passing in the night as we go about the process. Given the rapid rotation of personnel at the Academy, to include the Superintendent's relatively short tenure, bringing high-level experts to the Academy in advisory and visiting faculty roles is important for the culture change the IFC seeks to establish. This is the value the Academy/Academy Foundation partnership, as it will bring the right resources to the table to forge a long-term leadership role for the IFC at the Academy.

Preparing for excellence in the 21st century military will require graduates capable of leadership across an increasingly broad spectrum of military domains in both kinetic and non-kinetic arenas. Each of these domains requires levels of professional expertise above anything required in the past.

Kaminski: The long-term role of the IFC is critical to the culture of future thinking our cadets must have while at the Academy. Their time at the Academy will require gaining a continuing increase in breadth to encompass the multiple domains that will compose the 21st century Profession of Arms. The definition of "Arms" will expand far beyond kinetic things that explode, and include expertise in domains exploiting directed energy, Big Data, machine learning, cyber offensive and defensive tools, multi-domain command and control, and the list goes on. They will need more time learning about these technologies and their impact on society as well as more agility and efficiency in the learning time they have.

Rokke: If properly applied, IFC thinking will result in cadets having to work harder at the same time as they come to appreciate more fully the expanding opportunities available to them in the Profession of Arms. Preparing for excellence in the 21st century military will require graduates capable of leadership across an increasingly broad spectrum of military domains in both kinetic and non-kinetic arenas. Each of these domains requires levels of professional expertise above anything required in the past. Indeed, it may also involve the Academy rethinking the academic curriculum in particular to ensure that its traditional balance between the basic and engineering sciences on the one hand and social science and humanities on the other accommodates the revolutionary changes technology is bringing to our profession. In addition to broadening the span of core courses, we also may be forced to provide greater depth in emerging arenas such as augmented intelligence, quanta, etc. The good news is that cadets now entering the Academy are coming with backgrounds and skills superior to their predecessors. Like their predecessors, however, they are seeking a quality experience and are willing to work hard if the challenges are realistic and fascinating. The 21st century Profession of Arms, if properly portrayed to cadets, will meet both these challenges. In so

doing, it will transform the cadet experience in such a manner that cadets will find their time at USAFA more interesting and will leave the Academy with a sound grasp of their chosen career fields and an increased enthusiasm about serving as Air Force officers.

Martin: There can be no substitute for a rigorous, current, and demanding academic curriculum to provide each cadet with the foundational knowledge, intellectual underpinnings and personal discipline to prepare them not only to understand and face the challenges of "world as it is." But equally important is developing the insights, tools and skills necessary to envision and anticipate "what the world could be." That statement really defines the primary objective of the IFC.

Packard: IFC thinking is about changing a culture of how we think about national security in the 21st century. In a culture shaped by IFC thinking, how would you describe the character of a graduating cadet?

Kaminski: The character of a graduating cadet needs to be founded on the base of the four P's. They will need to learn how to create an environment to foster and exploit each of those P's. The first P will need to include people with a great diversity of knowledge and expertise to exploit the technology available, and the other P's to advance, integrate and combine the arms to address the growing number of important domains that will compose the 21st century Profession of Arms. The technologies that I was privileged to work on in the Offset 2 strategy in the 1970's and early 1980's changed the character of warfare, and the new technologies discussed above will enable other major changes. The critical issue is who will be the first to get to the puck. Remember Giulio Douhet, "Victory smiles upon those who anticipate changes in the character of warfare, not upon those who wait to adapt themselves after the changes occur." The IFC is our tool to shape our culture.

Fox: Quite simply it would make all the difference for "Big Air Force" and the security of our country. We would have a chance of graduating highly motivated Air Force officers who are knowledgeable about critical issues facing the Air Force and are ready day one to assume great responsibility. In addition, they would be slotted into Air Force Specialty Codes (AFSCs) that play to their strengths and interests. Finally, USAFA could truly respond to the National Defense Initiative in a competent way rather a mixed and uncoordinated effort.

Rokke: In a culture shaped by IFC thinking, cadets will graduate with a better understanding and a higher level of enthusiasm for the Profession of Arms. This is particularly true, I believe, for those cadets who do not pursue rated careers. As I recall, all members of my class (1962) were pilot-qualified when we arrived and very few chose non-rated career fields. I was among those directed to attend graduate school a month or so before graduation even though I had orders for pilot training. I remember pleading with my academic advisor to allow me to pursue the flying option. His response was that I could always go to pilot training but could not always go to Harvard. He was wrong; my eyes went below flying standards during my first year at graduate school. When the military personnel system asked what my alternative would be, I did not have a clue what other options existed. I chose intelligence because a couple of my favorite graduate school professors talked positively about their intelligence experience during WWII. I told my relatively new wife that our Air Force life would probably be short.

The Academy, as well as the Air Force, have come to recognize that highly qualified Air Force officers are needed for non-rated positions. A bias toward flying continues to exist, but cadets are now free to choose from a wide spectrum of non-rated functional areas, and about one-half of them do. An Academy culture shaped by IFC will continue to acquaint our cadets with the option of pilot training so long as airpower remains vital to our national security. It has done that for over half a century and does it very well. However, an IFC culture at the Academy will also acquaint cadets with the myriad of challenging new career fields brought to us by the technological revolution and by dramatic changes in the international system. In short, cadets will graduate from the Academy with a higher probability of both understanding and appreciating the full spectrum of career fields offered by the Air Force.

What does this mean for the character of our graduates? For starters, it means that they will enter their junior officer training programs with improved attitudes toward, and a positive, if not enthusiastic, outlook on their careers. It means that our graduates will have more confidence in and respect for the Academy experience because it will have adapted to the "real world" of 21st century warfare. Most of all, it will mean that our graduates will be better prepared to pursue excellence in a broader spectrum of Air Force career fields. These fundamentals are the foundation for the character of outstanding officers. They also are important "antibodies" for cynicism in both cadets and officers.

Martin: It has been my impression that based on the technical sophistication of Air Force systems, their costs and our important concern for safety that we can breed a culture of superb operators who can execute operational activities with the skill and effectiveness, second to none. But those actions are usually taken in compliance with well-developed Technical Orders, Tactics Manuals, Air Tasking Orders, and/or other directives. We are doing better in teaching critical thinking skills, but in the end, we really do not inspire our Airmen to deviate from prescribed procedures. I think one of the cultural changes we will be looking for and which could become inherent in the term character, is developing people who will be proactive.

Packard: Gentlemen, thank you for your candid and insightful answers. Your investment in the future of our Academy will be forever captured in the archives of Academy history as a critical contribution that shaped how we think about national security.

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