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Creating Capability for Future Air Force Innovation: Proceedings of a Workshop in Brief

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Proceedings of a Workshop

IN BRIEF

August 2018

Creating Capability for Future Air Force Innovation Proceedings of a Workshop—in Brief

The Air Force Studies Board (AFSB) of the National Academies of Science, Engineering, and Medicine convened a workshop on March 12-14, 2018 at the behest of the U.S. Air Force Vice Chief of Staff (VCSAF). The goal of the workshop was to address the challenge of innovation adoption within the organization with a focus on understanding how complex organizations envision their future state, embrace innovation, and overcome impediments to change. Against this backdrop, workshop participants explored high-impact actions that the Air Force could quickly adopt that would unleash a culture of innovation.

Following welcoming remarks and introductions, Workshop Co-Chair Deborah Westphal (managing director at Toffler Associates) summarized for the workshop participants a series of discussions that took place leading up to the workshop that included members of the AFSB and VCSAF General Stephen Wilson. Her remarks highlighted that many senior leaders within the Air Force have realized that the challenges facing the Air Force's discovery or adoption of new and disruptive technology are not technical in nature, but instead revolve around leadership, culture, and organizational structure. Workshop Co-Chair Ray Johns (Gen., USAF, Ret., and executive vice president at FlightSafety International) followed up by saying that when Lt. General Arnold Bunch (military deputy to the Office of the Assistant Secretary of the Air Force for Acquisition) last spoke to the AFSB, he was concerned about transforming the Air Force organization to allow for greater flexibility and agility. AFSB Chair Doug Fraser (Gen., USAF, Ret.) expanded on this point by offering that in his subsequent discussions with General Wilson, the emphasis was on how the Air Force could become more agile by speeding up the product-development cycle. He suggested that the Air Force does not have an innovation problem; it has an innovation *adoption* problem. Of particular interest, Fraser noted, is the "how" of navigating a bureaucratically encumbered organization to its ideal destination state—overcoming impediments along the way and innovating and inventing to outpace adversaries.

General Bunch began by thanking the participants for supporting this critically important effort. He explained that, looking ahead, the Air Force is striving to compete, deter, and win as it focuses on higher-end conflicts in non-permissive environments. He described an extensive list of initiatives under way to improve Air Force acquisition, including a resurgence in experimentation and prototyping; revitalizing development planning; exploring options to process data at an enterprise level; delegating authorities to lower levels; reducing bureaucracies, reviews, and redundant regulations; challenging and empowering smaller teams to explore more risky ventures; seeking rapid capability development and agile software development; "pushing" innovation out to the field (e.g., innovation hubs such as

AFWERX¹); and re-examining the Air Force’s research and development portfolio to accommodate the needs of operations in the 2030 time-frame and beyond. In response to a question about the destination of such initiatives, General Bunch outlined a vision in which authorities and resources aligned at the appropriate program levels so the Air Force can be more timely and responsive to fielding new capabilities to establish an environment in which the rapid injection of new technologies and capabilities for warfighters occurs with greater regularity. While he believes the current initiatives support this vision, he noted the challenge posed by “initiative exhaustion” as the workforce is pushing aggressively to implement all of the new ideas. This initiated a discussion on the diversity of the workforce—specifically the challenge posed by several generations working together who think and work differently—and how this diversity will shape the future of the Air Force. During this discussion, the topic of risk-taking was brought up by one participant, and General Bunch acknowledged that this is a challenge for the Air Force. He said the first question he often receives is, Who are you holding accountable? He observed that this question is not reflective of a culture that embraces data-informed risk-taking and is illustrative of the challenge facing the Air Force as it tries to adapt to an accelerating technology environment that will necessitate some level of “smart risk” if the United States is to keep pace with its adversaries.

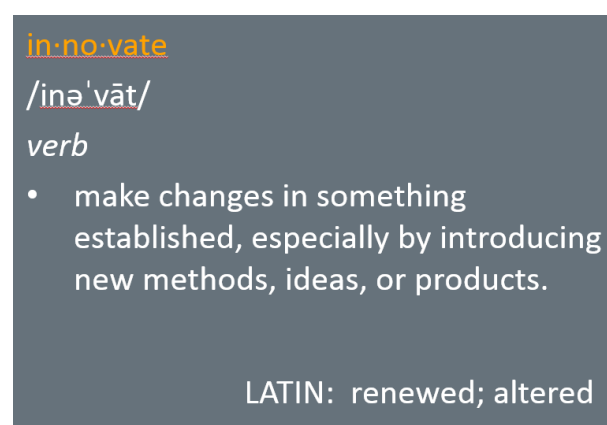


FIGURE 1 The definition of “innovation” that workshop participants accepted was that “innovations” can be both incremental and disruptive depending on their level of impact. SOURCE: Matt Whiat, Barry-Wehmiller Leadership Institute, presentation to the workshop, March 14, 2018.

LESSONS LEARNED FROM PRIOR AFSB STUDIES AND WORKSHOPS

AFSB Chair Doug Fraser facilitated Session 1, which was aimed at highlighting common themes—leadership, culture, strategic planning, and workforce—from past AFSB studies and workshops that had focused on acquisition and how these observations might help to envision a different path forward for the Air Force. Former chairs of these past efforts participated.²

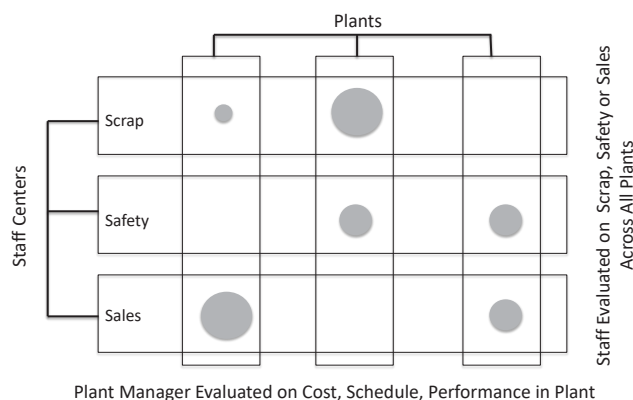
The Honorable Paul Kaminski (president and CEO, Technovation Inc.) opened by discussing the “Development Planning (DP)”³ study and noted that many of the report’s recommendations are currently being implemented by the Air Force. He noted that to be successful, the Air Force must focus on people (the best and brightest, given every chance to succeed) and partnerships (working together toward a common objective). He suggested starting the DP process by thinking about what the Air Force wants to do, then evaluating what capability gaps needed to be filled, and then what new opportunities from the science and technology base could be brought to bear on the problem to accelerate its adoption. However, he stressed not to forget about the other inputs necessary for effective DP, including long-term strategy, assessment of the threat, current programs of record, concepts

¹ From the AFWERX website on August 13, 2018: “Established in 2017 by the SECAF and reporting to the Vice Chief of Staff of the Air Force, AFWERX is a catalyst for agile Air Force engagement across industry, academia, and non-traditional contributors to create transformative opportunities and foster an Air Force culture of innovation.” See <http://afwerxdc.org/>.

² The studies chosen to be represented on the panel were selected because of their inclusion in “*Opportunities to Excel: Collected Advice and Dialogues on U.S. Air Force Acquisition*,” a derivative product of the Air Force Studies Board which is a collection of the key messages of a selection of past reports related to the Air Force acquisition system and highlights the cross-cutting themes among them. The key messages of these reports are directly applicable to the challenges discussed during the workshop (available at <http://www.nationalacademies.org/afsb>).

³ National Research Council, *Development Planning: A Strategic Approach to Future Air Force Capabilities*, The National Academies Press, Washington, DC, 2014, <https://doi.org/10.17226/18971>.

ALCOA's Approach to Matrix Alignment



Misaligned Matrix in USAF

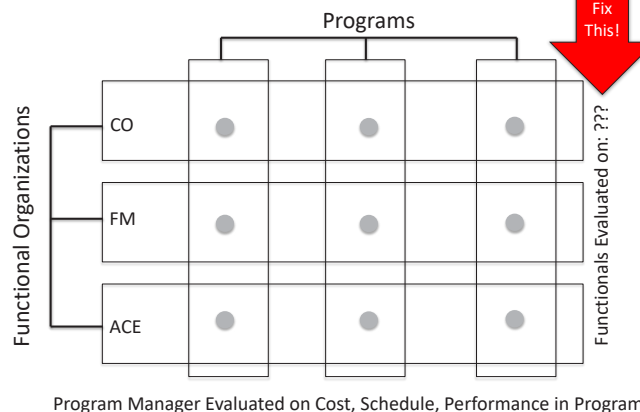


FIGURE 2 Program Manager Evaluated on Cost, Schedule, and Performance in Program. SOURCE: Alex Miller, University of Tennessee, presentation to workshop, March 12, 2018.

of operation, and cost over the life cycle of the system. He stated that he believes the Air Force needs the DP process perhaps now more than ever because it will foster innovation with the right people and with the right incentives.

Trey Obering (Lt. Gen., USAF, Ret.; executive vice president, Booz Allen Hamilton), chair of the AFSB “Owning the Technical Baseline”⁴ study, highlighted that the bottom line of the study was that program offices needed to have the data and technical knowledge to manage programs effectively. However, rather than the Air Force being a “gold standard” of technical excellence in acquisition (a reputation it previously held), the study committee discovered that the Air Force had lost the capability to assess the technical baseline of its programs. This loss stemmed from a devaluing of the acquisition staff and rotating experienced personnel out, a loss of STEM (science, technology, engineering, and mathematics)-educated personnel who used to hold program manager positions, and a vacancy rate in the Air Force Senior Acquisition Executive position of nearly half from 2000 to 2016. Obering said his committee believed the Air Force would benefit by transitioning people with both technical backgrounds and operations experience at the midcareer point into the acquisition programs.

Instead of discussing his study on experimentation, which was subsequently covered by Lester Lyles, Alex Miller (professor and William B. Stoke-

ly Chair of Management, University of Tennessee) described the results of a survey conducted in his class, comprised of program managers and contracting officers. He said program managers listed cost, schedule, and performance among their career-success factors, but contracting officers instead listed compliance with acquisition regulations, professional military education coursework, and resume building activities. Miller showed charts (see Figure 2) depicting differences in how functionals are evaluated in an Air Force acquisition-organization matrix versus a similar matrix in the private sector. The charts showed mission-oriented criteria being used to evaluate private-sector functionals compared to unknown criteria being used to evaluate Air Force functionals, thus demonstrating an acquisition-organization structure in which appraisals for the functionals are not tied to the program manager’s mission. When he asked the question, as part of the aforementioned survey, If you could only change one thing?, the response was to change how the functionals are evaluated by assessing their performance against the same criteria as the program manager so as to build the sense that everyone is on the same team.

⁴ National Academies of Sciences, Engineering, and Medicine, *Owning the Technical Baseline for Acquisition Programs in the U.S. Air Force*, The National Academies Press, Washington, DC, 2016, <https://doi.org/10.17226/23631>.

Lester Lyles (Gen., USAF Ret.), chair of the AFSB study on “Experimentation Campaigns in the Air Force Innovation Life Cycle”⁵ and the workshop on “Assessment to Enhance Air Force and Department of Defense Prototyping for the New Defense Strategy,”⁶ indicated that the current program environment is different from the past—program directors previously had the funding to support learning via prototyping and experimentation. Now, there are few opportunities and a lack of funding for experiments that might provide a disruptive innovation to the status quo. The experimentation study was broader than the prototyping workshop and covered the role of experimentation campaigns in the Air Force life cycle along with the Air Force’s need for driving innovation. After receiving industry perspectives on stoking innovation, the committee favored the adoption of an Air Force “innovation catalyst”—an advocate for innovation who holds the ear of top-level leadership who can “make something happen” in the Air Force and exhibit the right “tone from the top.”⁷

Rand Fisher (RADM, U.S. Navy, Ret.), chair of the AFSB study on “Optimizing U.S. Air Force and Department of Defense Review of Air Force Acquisitions Programs,”⁸ finished the panel discussion by sharing his committee’s realization that program managers often had 50 separate reviews, which did not include informal review methods and were not used to inform any level of the decision process, but rather were simply compliance-based reviews. His team believed the Air Force could accelerate innovation by eliminating unnecessary reviews by ensuring those with proper authority to make program decisions attended reviews and follow-up reviews were based on the findings of previous reviews. He noted that the acquisition goal is to deliver effective weapon systems, but specified some troubled programs try to recover by acquiring funding and staff from other programs. He advocated the adoption of a holistic view of acquisition with a systems-engineering perspective, where all steps in the process are optimized as a system to create a more agile enterprise.

After these presentations, Todd Jick (professor of management, Columbia University) made the point that the Air Force is not alone in facing the aforementioned problems. Private sec-

tor firms also struggle with workforce issues and resistant bureaucracies suffering from too many initiatives. Industry is constantly searching for more effective organizational structures and methods of communication. The Air Force is not unique in its predicament, but joins a community of organizations experimenting with how to envision change for the future. Elizabeth Altman (assistant professor at the Manning School of Business) added that during General Bunch’s remarks she heard the urgent need for speed to be able to respond to the world outside of the Air Force. She also observed that many of the initiatives that were highlighted were very much internal process activities and suggested there are lots of opportunities to expand boundaries outside the organization for innovation.

LAYING THE FOUNDATION

Workshop Co-Chair Ray Johns, facilitating Session 2, opened Day 2 by introducing VCSAF General Wilson, the keynote speaker. General Wilson began by referring to the U.S. National Security Strategy’s renewed emphasis on great-power competition. He described a formula in which “TOO x TWO does not equal one.” The first TOO refers to the fact that the Air Force has become too complex, too bureaucratic, too regulated, too risk averse, too stove-piped, and too analog for a digital world. The other TWO refers to the fact that the United States is no longer number one in all capability areas and the-

⁵ National Academies of Sciences, Engineering, and Medicine, *The Role of Experimentation Campaigns in the Air Force Innovation Life Cycle*, The National Academies Press, Washington, DC, 2016, <https://doi.org/10.17226/23676>.

⁶ National Research Council, *Assessment to Enhance Air Force and Department of Defense Prototyping for the New Defense Strategy: A Workshop Summary*, The National Academies Press, Washington, DC, 2013, <https://doi.org/10.17226/18580>.

⁷ The study committee refrained from identifying a specific individual or position that might fill the role of “innovation catalyst.” Instead they suggest that the Air Force determine this and to allow for multiple “innovation catalyst” positions across the organization.

⁸ National Research Council, *Optimizing U.S. Air Force and Department of Defense Review of Air Force Acquisition Programs*, The National Academies Press, Washington, DC, 2009, <https://doi.org/10.17226/12673>.

atres of operations. He said the nation needs to fix the equation if it wants to be number one again. Noting DP's importance, he once again returned to the TOOs concept—the front-end requirement takes too long, acquisition takes too long—combined with the budget-cycle reality, which leads to the delivery of obsolete technology. Instead, he wants the Air Force to build something quickly and put it into the hands of an operator. He gave examples of the United States rapidly developing, acquiring, and producing military systems for World War II and the subsequent space race, which required only 8 years to get to the Moon. Using China as a current data point, he said Eric Schmidt, CEO of Google, thought the United States had a 6- to 12-month advantage in artificial intelligence (AI), but even this gap was closing. General Wilson and other workshop participants believed that China—working on AI as a nation with huge resource investments—will eventually surpass the United States with devastating results. In contrast to the layers of bureaucracy and budget instabilities the Air Force must contend with, he pointed to China's defined “mega projects” (the ones we know about)—space, AI, and hypersonics—and their large and direct resource investments. So, he asked rhetorically, “Where do we focus and how do we build a process that accelerates the adoption of new technology?”

General Wilson continued with a discussion on the difficulties he faced pulling a small group of junior level officers free from the bureaucracy and risk aversion in the organization so they could work on an innovative project that otherwise would have been crushed. He also discussed the prospect of expanding AFWERX; about trying things fast to see if they work and, if not, discarding them and moving on; about looking across the Air Force enterprise as opposed to looking at individual commands (e.g., the air-superiority-2030 effort—great, but implementation is lacking); about shifting from a platform business to a network form of business as the Internet of Things explodes and connecting that with cloud computing, machine learning, AI; and about the overall digital transformation moving forward, connecting Air Force assets widely across domains to increase the speed of operations. He said the Air Force organizational structure and presentation is the next big move,

away from the fight of the last 27 years and toward the fight ahead. He discussed ways to institutionalize organizational change so it becomes permanent (emphasizing urgency to change and common vision, removing roadblocks, etc.) and dealing with the “frozen” middle. He closed by noting that ISIS, a technologically unsophisticated adversary, is adopting drone technologies and rapidly innovating new concepts of operation as the technology advances, and thus one can only imagine what a sophisticated adversary may be doing in this area.

Richard Joseph (Air Force Chief Scientist) commented that he believed the choices are as follows: Do nothing, speed up our development, or slow down our adversary. The first isn't an option, so we must go with the others (e.g., give our adversaries a bad day, every day). He said the Air Force's technologies are tools, not ends in themselves. Joseph posed the issues as follows: How do we plan to effectively use these tools, how do we strip our adversaries of the advantages, what are our advantages, and how do we construct a program to exploit them? Joseph believed the research and development organizations should pay more attention to the operators. In earlier jobs, he preferred to talk to operators; they are clear about the capabilities necessary to achieve their mission. He then described a program years ago that was on a 5-year plan, but after being challenged by an Air Force leader to do it in a few weeks, managed to deliver on the new schedule despite resistance from the “frozen middle”. Joseph used this episode to bolster his point that it is all about people and leaders challenging people to overcome and accomplish. He asserted that we, the Air Force, do not need a great deal of innovation in organizations, and we do not need a chief innovation officer. Instead, we need leaders who say, “Can you do it in 30 days, and what do you need to do it?” His view of the teams was that they should not all be highly innovative people; rather, a mix of innovators and meticulous implementers provides appropriate diversity. With respect to “fear of failure”, a major driver at times in Air Force acquisition, Joseph believed the leadership needs to provide top cover for risk takers. Regarding plans, he argued that they should start simple and later, after buy-in, then add the details specific to the program. On the issue of the “frozen

middle,” the middle layers of a bureaucracy often stuck in the morass of procedure and policy, Joseph suggested relying on the flexibility provided by reassignment waivers.

Turning from the Air Force to the private sector, Loretta Penn (president, Penn Executive Coaching and Consulting LLC) said she engaged with some of her clients to validate her thinking against their experiences as they looked at transforming their own organizations (e.g., Coca Cola, CVS, Time Warner, Microsoft, Nike, United Healthcare Group, and Wells Fargo). Referring to Microsoft’s new CEO and their firm’s transformation, she said the following were important leadership lessons: Putting passion behind your initiatives, making employees like a real part of the change, communicating leadership’s cognizance of what is happening, and expressing concern for your employees and the outcome of the organization’s mission. Also, she noted that there needs to be energy and excitement among personnel, pointing to the example of Microsoft’s acquisition of LinkedIn and the focus on the “cloud,” which led to a new sense of excitement, collaboration, and purpose among their employees.

On Wells Fargo, Penn relayed the story of an executive who rigorously assessed the structures and challenges of their organization. This is crucial, she noted, because there is a tendency to avoid reforming specific elements in an organization if there is a perception they have performed well in the past. Previous managers may feel inclined to protect the program, even if it does not integrate into the transformation process. With Time Warner, an executive identified three important pitfalls of transformation: failure to anticipate the end game (i.e., fixing the now instead of the years-ahead end), being unable to pivot in case of changes, and failing to remain nimble.

Next, she used JC Penney as a company exemplifying how one should *not* approach a transformation. JC Penney’s stock tumbled after they brought in a new leader but mishandled the transformation of the organization. The new executive did not demonstrate empathy or gain a holistic understanding of the specific challenges facing JC Penney, but instead blindly applied or-

ganizational and personnel methodologies from their previous place of employment. The transformation was rushed, ill-informed, and did not cater to JC Penney’s specific condition which ultimately precipitated the transformation’s demise.

Penn mentioned GE’s Fast Works, which uses start-up methodologies to get an idea out quickly and avoid bureaucratic red tape. She then spoke on more topics important to transformation. On communication, she said one cannot transform without extraordinary communication; on clarity, she warned of problems when goals and expected outcomes are not clear and people are not accountable; on core values, she said they should either be changed or left alone, not tweaked. She also summarized additional key leadership characteristics: leading from the top (the “major champion”); permission to fail; understanding what comes out of failure (consider that “FAIL” means “From All I Learned”); courage (e.g., to speak up); the need to question everything; empowerment (trust erodes if power is taken back); curiosity; and inspiring your personnel (not just a cheerleader, encourage ideas).

Finally, she noted talent management must include arranging incentives and organizational structures to attract a multi-generational workforce. She noted millennials are highly confident, smart, and ready to save the world. Generally, they want to be empowered and hold companies accountable to their mission statements. She said they will not stay with the military if they don’t feel they are being heard; they want their ideas to be accepted, opportunities to be creative, someone listening to them, and their ideas that make sense implemented. Not only will they leave, the military will stop getting them at all if they believe the Air Force will not value their contributions.

STAYING COMPETITIVE: SUCCESSFUL BEHAVIORS OF LARGE AND COMPLEX ORGANIZATIONS

Elizabeth Altman opened Session 3 by noting that the world is becoming more interdependent and complex, and thus networked and platform-based organizations are becoming

more important—especially in connection with innovation and organizational change. She said there are many definitions of “platforms” and “platform organizations,”⁹ but all platform organizations connect to others, facilitate transactions, and create and manage ecosystems. Illustrative platform businesses include Uber and Airbnb. For example, many top 50 Fortune companies (e.g., GE, Intuit) are adopting platform models to leverage external resources. Altman stated that since the smartest people are not isolated to any one organization, it is imperative that the Air Force take advantage of external resources through platform-based ecosystems. She suggested that AFWERX may be a good example, although she observed that operating platforms require different approaches and managing ecosystems is not the same as managing alliances or partnerships. Furthermore, while based on the successful SOFWERX model, AFWERX has not been in operation long enough for a full assessment of its effectiveness to be determined.

Altman highlighted that younger members of the workforce inherently understand operating in a networked, open-source organization. She next discussed attributes of network-based and platform businesses, challenges for those transitioning to such businesses, and challenges of managing hybrid organizations. She described a range of challenges, including moving to a more external focus, greater openness by enabling interactions, adopting interaction-centric metrics, shifting organizational identities, and managing novel dependencies. In particular, firms must create incentives for developers to develop on their platform. This creates an opportunity to mobilize external resources to accomplish your organization’s objectives; however, balancing legacy structures with new, platform-based activities will become a key challenge.

In summary, Altman proposed that network-based platforms are essential for innovation. The Air Force must understand its role and dependencies in the greater national security ecosystem. This will require constant flexibility as the Air Force shifts roles and priorities within this ecosystem, but Altman cautioned that the challenges are not the same as with traditional hierarchical organizations. Overall, the benefits of

pulling in external resources make it worth the new challenges.

Simon Sinek (author and independent consultant) argued that the Air Force has done itself a disservice by concentrating on a sphere of influence (e.g., the word *air*, which he later termed a “liability”) rather than a mentality of outthinking the enemy with creativity. The way to acquire change is to invite it in and name every airman as an innovator—referencing the Marine motto of “every man, a rifleman.” On sustaining cultural change beyond current leadership, he urged a focus on evolutionary over revolutionary change, starting with a small group of innovators (early adopters). He views the “frozen middle” as the most complicated part of the Air Force because it deals with both strategic and tactical matters simultaneously; thus, the Air Force should make sure to communicate the underlying purpose, cause, and belief of a change—the strategic importance, not just tactics. Given the Air Force’s past culture of pushing the envelope, he applauded the “ability of airmen to question,” which is important for innovation. Noting the Air Force’s high level of technical education, he cautioned against ignoring the marketing component. He returned to the Air Force’s historic culture of being about the “new” and its role in reshaping the battlefield, but emphasized this is not about planes or a simple slogan (“fly, fight, and win”); it is about people. He highlighted that innovation can be wasteful, inefficient, and risky, yet the Air Force needs to accept those conditions and look at them as opportunities for rewards and promotions rather than as career destroyers.

Mark Johnson (co-founder and senior partner at Innosight) discussed how to make transformation happen, the necessity of recognizing trends, and the vital importance of the CEO and leadership team to drive innovation. He described two types of innovation—sustaining (which strengthens the core) and destructive (which creates the new, different)—that require

⁹ A platform-based organization can be defined here as any organization whose business model is built around the utilization and reliance on a specific technology platform (hardware or software).

investing in the core while determining the new destination. He emphasized the importance of being able to articulate the future vision—not the current state extrapolated forward. To understand the future, he suggested that, even though we cannot create a photo quality image of it, we can create something like an impressionist painting to provide a sense of that uncertain future. This image can guide transformation toward the future state as the organization deals with specifics of the near term. To propel and control this journey, he believes executive leadership must continue refining the painting and delegate “running the trains on time” (core business processes) to lower levels.

THE “HOW” OF MANAGING INNOVATION AND CHANGE

Todd Jick opened Session 4 by discussing research and best practices in change management. His key theme was “Vision is 10%, Implementation the Rest.” There was some push-back from participants noting the importance of vision, and he agreed that a beautifully implemented but ill-conceived vision would not work. Nevertheless, his experience has been that major innovations break down on the implementation side. Assuming a thoughtful starting vision, many companies stumble in implementing that image because they have not managed the necessary changes well. He pointed out that successful implementation occurs when resistance is overcome and there is commitment to change in lieu of compliance. He also noted that implementation requires an arsenal of tools and techniques to align and gain the commitment of key stakeholders to change behaviors. Pointing out that research has shown that only about 25% to 30%, of companies succeed in major changes, he identified several reasons for failure—not communicating well, a frozen layer of middle management that resists change, and failure to identify a complete list of stakeholders. Despite the relatively low success rate, he indicated that there is merit to examining why some companies succeed, and he described a seven-step conceptual model with variables that need to be managed, starting with delineation of the urgency to change and ending with the ability to sustain change. These variables are threaded with the importance of mobilizing commitment, and

time was spent discussing what it takes to gain commitment based on what audiences require to be motivated.

Kinithi Sturtevant (former vice president of transformation, IBM) addressed corporate experience with innovation and culture change. She began by discussing ideas learned from a conference with companies focused on innovation. She relayed that the adage, “It’s the culture, stupid,” is applicable. Regarding the structures of various companies involved in change, she noted that some were centralized and others were decentralized. She next described IBM’s “culture refresh”—a program on preparing for new business challenges and new ways of working—in which innovation was a key element. These examples led to descriptions of the tools and techniques used to drive and guide culture change, such as a values refresh, change-leadership training, and translating lofty values into behavioral actions. She highlighted a thoughtful process, which engaged the entire IBM organization, was not directed from the top, and provided ample time for the workforce members to voice their opinions on the values and behaviors deemed necessary by IBM. She also discussed impediments to realizing those values and behaviors.

George Casey (Gen., US Army, Ret.; former Chief of Staff of the Army) focused his presentation on his experience with transformational change as the senior coalition commander in Iraq and later as Army Chief of Staff in Washington, DC. Regarding Iraq, he noted that leading in what he termed a “VUCA” (volatile, uncertain, complex, and ambiguous) world is very different from leading in a more stable environment. He discovered that prior training had prepared the Army for one type of war (a near-peer conflict with the Soviet Union), but it was fighting a very different type of conflict (a counter-insurgency operation against a non-state actor). Retraining his generals and other key personnel became critical. He also learned that his forces had to work more collaboratively with Iraq’s personnel. He indicated that leadership in a world defined by VUCA at times involves constant re-emphasis on what needs to be accomplished, focusing on a few important matters while not over-reacting

to on-going turbulence, and multiple conversations at organizational levels below his immediate subordinates to gain better understanding of what is really happening. At the Pentagon, he had to confront an internal silo-based mindset, which constrained his ability to formulate an Army-wide budget plan, while contending with an external federal bureaucracy. He had to retrain his people to work as part of the Army as an enterprise rather than in their individual silos—changing processes and culture and recognizing that innovation does not occur readily in silos but rather in a more collaborative environment.

SPECIFIC CHALLENGES AIR FORCE LEADERSHIP MUST ADDRESS

Ray Johns, facilitating Session 5, opened Day 3 with a video about retired Major General Benjamin Foulois, one of the Army's first aviators. While learning to fly, he crashed his plane and was reprimanded by a commanding general who told him his flying machine was worthless and served no military purpose. Against the backdrop of how an innovative officer like this might progress in today's Air Force, Johns introduced Danny Miller (managing director, CLR Leadership Development) to talk about Air Force promotion profiles. Miller indicated there would be no chance of someone like Foulois being promoted today by the Air Force, unless there was a sponsor in leadership to protect him. Despite much talk about innovation, he questioned whether the Air Force has the leadership and culture to make it happen. His experienced observation was that true innovators and out-of-the-box thinkers will not fit the profile required to succeed in large numbers in the Air Force. He turned to a large data set, which in summary, showed Air Force leadership dominance in the characteristics of sensing, thinking, and judging (versus intuition, feeling, and perceiving) and skewed (left) toward pragmatists and conservers versus originators. Additional charts, which considered four profiles (implementer, supporter, innovator, and visualizer), showed a preference for implementers among Air Force leaders. Miller raised questions about the implications of these results for the future Air Force including what kinds of future leaders are needed and who is leaving (and why and when) before be-

ing promoted to the higher ranks. His last slide asked, Worthy of further study?

Noting that adults learn primarily through experience, Matt Whiat (Barry-Wehmiller Leadership Institute) next examined the definition of the verb *innovate* (see Figure 1). He described his capital goods company as an acquisition company that does not change out people or leadership, but builds culture. To change mindsets and behaviors, he described a four-quadrant template: a compelling story, reinforcement mechanisms, skills required for change, and role modeling. Looking further at culture, which is local and impacted disproportionately by leadership, he discussed building a culture—the total of behaviors—that would feed strategy. Instead of imposing corporate values through vague mission statements, Barry-Wehmiller would learn to listen by providing a forum for collaborative engagement. Using the lessons gained from these listening events, they would assess the health of the organization and its culture. Ultimately, reform efforts would be implemented and tailored to the specific issues affecting the newly acquired organization. The demonstrative process of responding to suggestions and inquires, even simple procedural adjustments in administration, can build trust and align behaviors with your corporate values.

Whiat discussed the downsides to innovation and the factors that inhibit innovation (e.g., risk, failure, funding, time, tradition, hierarchy). He focused on hierarchy with some examples: This workshop room is not setup for innovation; packets include bios to let everyone know how important some people are; those not around the table are excluded. He noted that listening and building trust are top behaviors of great leaders, and he re-emphasized that all culture is local and feeds strategy, which is grounded and linked by values. He said trust only occurs when there is a vulnerability, and trust is the one quality that will overcome risk aversion. According to Whiat, leaders build trust by displaying the following four attributes in order of importance: compassion, character, consistency, and competence. At the end, Johns emphasized that trust is one thing that can overcome risk aversion, and it must be demonstrated time and again.

SOME HIGH-IMPACT ACTIONS FOR AIR FORCE CONSIDERATION

Kevin Bowcutt (chief scientist of hypersonics at Boeing) opened Session 6 by noting that Boeing is undergoing a transformation that seeks to make the organization thrive for another 100 years. He described some of Boeing's current competition (e.g., China's less-expensive version of the 737) and foreshadowed additional elements of Boeing's transformation—specifically Boeing's Horizon X effort—that would be discussed after the next presentation, an explanation of moving companies from incremental to exponential advancement.

Mark Bonchek (chief epiphany officer, Shift Thinking) opened his presentation by arguing that the shift to a new mental model requires unlearning, which is important in times of transformation, and that people hang onto old models until new ones appear within reach. He discussed exponential technologies—described as accelerating, disruptive, non-linear, “10X” growth—as opposed to stable and comfortable incremental (linear) growth. The compounding effect of 10X growth creates a network effect, and he gave several examples (e.g., platforms prompt 10X growth by connecting supply and demand; networks prompt 10X speed by connecting resources and intelligence). He contrasted the exponential mindset with an incremental mindset (e.g., maximize learning replaces minimize risk). He argued that exponential leadership and technology would produce exponential thinking and results. He offered some mental models of leadership (see Figure 3), one being an eagle (illustrating quality of an individual),

a second being geese flying in the traditional V formation (a team in which the leader rotates), and a third the actions of a swarm of birds being attacked by a predator. The swarm is a complex system in which everyone leads instead of an individual leader. The complex behavior of the swarm, trying to avoid an attack, follows simple rules like stick together, move to the center, follow neighbors, and do not collide.

Bonchek said the job of an exponential leader is to build a system such that the “everyone-and-no-one” leadership can happen to create a better network effect. He illustrated gaps (in vision, expectations, accountability, resources) between the incremental curve and the exponential curve, which slows before accelerating above the incremental line. To confront these gaps, the exponential leader requires vision and courage, patience and unlearning, and the ability to empower and connect. He used a 1997 quote from Jeff Bezos, “Because of our emphasis on the long term, we may make decisions and weigh trade-offs differently than some companies,” to emphasize the importance of correct metrics to measure what is happening. At this point, there was a long interchange among participants about operating in both incremental and exponential modes, the types of innovators in these modes, how to keep things on the edge, and bringing things into the core. Bonchek closed with an observation on how to manage all of this—shifting from managing people and processes to managing purpose and principles (the master designer, incentivized by chain reaction and network effects).

MENTAL MODELS OF LEADERSHIP

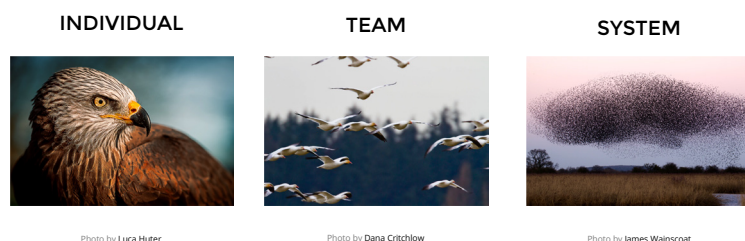


FIGURE 3 Mental models of leadership. SOURCE: Mark Bonchek, Shift Thinking, presentation to the workshop, March 14, 2018.

Michael Hauser (disruptive innovation lead, Boeing HorizonX) presented on Boeing's HorizonX effort, what the company is trying to accomplish with it, and what the company has learned. He explained that Boeing's global services were carved out of Boeing's traditional commercial and defense sectors, and HorizonX exists to bring in disruptive capability, focus on growth, and unlock Boeing's innovation potential. He then discussed a multi-year evolution—from venture capital investments, to events and competitions, to Phantom Works,¹⁰ to emerging business opportunities—and now HorizonX, which has the specific task of doing things that the core company cannot do, can serve as an engine to unlock the exponential, and outside-in innovations can act as a disruptive-innovation shop. Describing the organization in more depth, he showed a graphic depicting Boeing HorizonX Ventures linked with Disruptive Horizons and New Business Horizons, which positioned strategy and operations at the center. He also highlighted a dozen investment focus areas, including autonomy, AI and machine learning, and space, and he noted that Boeing made investments in these areas rather than acquiring the capabilities through mergers or acquisitions.

CLOSING THOUGHTS

Co-chairs Westphal and Johns led a final recap of the workshop. The floor was opened to participants to share their final observations from the workshop. The common themes that emerged among participants included trusting and empowering people; persevering against the resistance to change and pivoting strategically as necessary; challenging and enabling people within the organization; proactively attacking the causes of risk aversion; acknowledging that there is much work to be done; holding optimism about the future of the Air Force; maintaining “outside-in” innovations and nurturing the right kind of “inside-out” innovations; accepting that simplifying and executing are the hard parts; being open to starting small; and realizing that a lot is already happening (AFWERX, for instance).

Johns and Fraser, based on their observations from the workshop, also suggested some areas that the Air Force may wish to examine further in an appropriate venue. First, they noted the

need for evaluating how the promotion and personnel system could be adapted to focus on retaining and promoting with an eye to future leadership skill sets; how personnel should be evaluated as they grow; and most importantly, how the Air Force should define and measure the cultural values it desires for the future. Second, they explained that the future Air Force organization is likely to be a networked organization of some form, but until the Air Force defines its future destination, the details of how the network should be developed (to empower a future organizational structure that embraces the attributes stated in General Wilson's opening comments) are not easily defined.

In closing, one participant commented on the complexity of the Air Force's culture and highlighted that a multifaceted approach, and not a single solution, is necessary for cultural and organizational change. Another participant posited that the Air Force is at a real inflection point. Traditional models of organizational systems and change management theories are outdated. The Air Force is pioneering the creation of a new, agile culture that necessitates adaptive organizational structures and accompanying behavioral norms. This observation was shared by several other participants and serves as a key framing concept to understand the uniqueness of the organization, its mission, and its challenges.

¹⁰ Phantom Works is Boeing's advanced technology and prototyping division.

DISCLAIMER: This Proceedings of a Workshop—in Brief has been prepared by Norman Haller as a factual summary of what occurred at the meeting. He was assisted by Steven Darbes and Kevin Suchernick. The committee's role was limited to planning the event. The statements made are those of the individual workshop participants and do not necessarily represent the views of all participants, the planning committee, or the National Academies. This Proceedings of a Workshop—in Brief was reviewed in draft form by Arnaud Gary, Col., FAF; Douglas M. Fraser, Gen., USAF, Ret.; Lester L. Lyles (NAE), Gen., USAF, Ret.; and Rebecca Winston, Winston Strategic Management Consulting, to ensure that it meets institutional standards for quality and objectivity. The review comments and draft manuscript remain confidential to protect the integrity of the process. All images are courtesy of workshop participants.

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