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USAF Digital Campaign
Think big, start small, scale fast

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ABSTRACT

Industry has realized the benefit of better decision making, agility, and savings by embracing digital transformation. Seeing the realized benefits in industry, the United States Air Force decided to digitally transform to keep up with ever-increasing rates of technical performance advances to stay ahead of its adversaries. The Air Force is a large and complex organization with an acquisition system forged out of the World War II-era Defense Industrial Base with a Vietnam War era-budgeting and resource allocation system. Weapon system acquisition complexity continues to grow and the Air Force is turning to digital transformation to quicken the speed of delivering weapon system capability to the warfighter. The Air Force has created a Digital Campaign to tackle this digital transformation for its acquisition enterprise. This paper advocates a strategy of "think big, start small, and scale fast" for the acquisition enterprise to achieve this transformation and meet the needs of the warfighter.

Keywords: Digital Campaign, Digital Transformation, Air Force, digital strategy, acquisition, digital engineering

1. INTRODUCTION

Faster cycle times, lower modernization costs, and the ability to keep up with ever-increasing rates of technological performance advances are just a few of the factors motivating the Air Force to move onto a digital acquisition footing. As General Brown aptly states the case, "Accelerate Change or Lose."[1] Unfortunately, past attempts at scaling a digital transformation across the United States Air Force's portfolio of acquisition programs have had limited success, yet the imperative for fielding "digital" tools only continues to grow as the Air Force attempts to better manage the complexity of modern weapon systems, focuses the creativity of its workforce on the highest return for mission execution, and resolves the ambiguity of a dynamic threat environment. The purpose of this paper is to lay out the implementation strategy for the Air Force acquisition enterprise that leverages the strength of individual programs while establishing a consistent foundation of digital acquisition resources and standards to accelerate the efficiency, speed and motivation at which digital transformation can be achieved.

2. FRANCHISE OWNER APPROACH

There are literally millions of web results on the digital transformation occurring in the world today. Besides articles, there are also scores of books written to document and help companies embark on the digital journey. The adage, "You get what you pay for," has never been truer. We are seeing the digital revolution unfold before our eyes. Companies making the transition to digital operations are realizing significant advantages in their time to market, supply chain management, sustainment costs, and their ability to pivot product lines based on rapidly changing demand signals.

The Defense Department's acquisition enterprise was forged out of the World War II-era Defense Industrial Base with a Vietnam War era-budgeting and resource allocation system. This "first mover advantage" system can't keep up with current industry trends. In addition, the system does not make it easy to get funding at the enterprise-level to effect enterprise transformations. We must learn from the commercial sector and apply the lessons to the Air Force context.

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One of many articles documenting digital transformation was published by the University of Minnesota in the September 2017 edition of the MIS Quarterly Executive (QE) by MIT Sloan and UT Austin writers. The article is called "How Big Old Companies Navigate Digital Transformation."[2] Although the article is focused on specific commercial businesses, the lessons learned are readily applied to the Air Force. As the article points outs, one of the exciting aspects of digital transformation is that it enables a much more rapid innovation cycle (p. 198). Gen. Bunch, AFMC Commander, chartered a Digital Campaign effort in March 2020 to focus on how the Air Force can incorporate digital practices into its weapon system development and sustainment efforts in part to take advantage of this increase in innovation speed. The Campaign's strategy is a coordinated, parallel attack across six Lines of Effort (LOE) with complementary enterprise level goals as shown in Table 1.

Table 1: Department of Air Force Digital Campaign enterprise-level transformation goals.

Line of Effort	Line of Effort Name	Line of Effort Goal
0	Integrated Environment - IT Infrastructure	Provide overarching guidance to influence corporate IT improvement investments to enable a robust, secure infrastructure for the enterprise-wide Digital Campaign
1	Integrated Environment - Tools and Models	Provide an Integrated Digital Environment (IDE) of models and tools for collaboration, analysis, and visualization across the functional domains of AF users
2	Standards, Data, and Architectures	Provide overarching guidance on the use of Government Reference Architectures (GRA) and related standards and datasets for use in an integrated digital environment for application at the enterprise and system levels
3	Lifecycle Strategies and Processes	Develop Life Cycle Strategies and Processes for Technology Transition, System Acquisition and Product Support using an IDE, supporting lifecycle activities from concept development to disposal
4	Policy and Guidance	Assess and define the required policy and guidance updates/changes to enable full implementation of the Digital Transformation
5	Workforce and Culture	Drive culture change across the AFMC enterprise through training and change management, enabling a workforce well versed in Digital Engineering

The challenge the Air Force faces is primarily one of scaling digital transformation efforts from single program "cottage industries" to an Air Force-wide standard approach for how the Service does acquisition and sustainment as a whole. A successful effort at scaling digital transformation will require an approach that recognizes the resource constraints imposed by the existing DoD budgeting system, the physical realities of how digital acquisition activities are implemented within program offices, the need for local program tailoring, and the underlying requirement for a commonly-held set of standards and tools that set the parameters around how the digital environment is deployed and implemented.

To address these factors, the Air Force needs an implementation plan that encompasses the totality of the acquisition enterprise, but does it in a way that generates immediate value to the programs that implement it. One approach that has worked well in other industries with nascent standards and processes is to create a collaborative system between individual programs with a central office managing the standards and tools. The best analogy may be that of a restaurant franchise where restaurants (i.e., programs) are owned by individual proprietors (i.e., program managers), but the franchise owner in the form of a central digital transformation "office" provides training, operating standards, and processes the individual proprietors agree to adhere to as franchise members. In this construct, the goal is to create a "demand" for digital acquisition capability from the individual System Program Managers (SPMs) that a digital transformation office could provide to them in terms of tools, expertise, and training. The tools, expertise and training support would help the SPMs standup and implement a digital acquisition approach that would provide significant improvements in a program's cost, schedule, performance, and risk posture.

Successfully implementing this approach requires demonstration of the advantages associated with the digital approach, a definition of the standards and tools a digital transformation office would manage and provide to SPMs, and a method of resourcing those standards and tools for implementation and use by the program office. The most effective way to demonstrate the benefits of a digital acquisition approach is to actually use it on a program to show how the digital approach enhances the SPMs ability to lead and manage a program. This has in fact been achieved on several programs using

different government reference architectures. The government reference architectures are defined as a government "authoritative source of information about a specific subject area that guides and constrains the instantiations of multiple architectures and solutions."[3] These "start small" efforts are now mature enough to provide solid lessons learned for how to balance the need for individual program control of their digital engineering environment with the requirement for standards and tools that are held in common across the acquisition enterprise to achieve the benefits of scale across programs.

The missing piece is a "franchise owner" that establishes the standards, tools and infrastructure, provides the workforce training, and has the early expertise program offices need to build a digital acquisition strategy and implement it effectively. Creating a framework that generates SPM demand for these capabilities is the central tenant of this approach, and it will require an initial investment to fund a digital transformation office to build the digital acquisition "franchise." This approach needs to be done in a way that is congruent with the existing program-centric way in which funding is allocated and executed while also leveraging the growing momentum around providing programs with better infrastructure support.

3. INNOVATE THROUGH EACH PROGRAM

The question is not whether to pursue digital transformation. The Air Force must do that. As Dr. Roper has described in his "digital trinity" construct under the digital century series initiative, the Air Force needs a combination of "open systems design, agile cloud-based software, and digital engineering" to change the way we do business in building our weapon systems.[4]

The question before us is how fast can the Air Force change? In truth, the prioritization and budgeting activities of the Air Force corporate process are structured around developing and sustaining individual weapon system programs, not cross-platform enterprise initiatives. Any effort at scaling the digital transformation described above needs to recognize these constraints and leverage the existing system to prioritize and resource the effort.

How does the Air Force start small? In his article on *Think Big, Start Small, and Learn Fast*,[5] Chunka Mui describes the start small process that Google used. He recalls "Google's early investments in its driverless car [was] on par with what it might take a car company to develop a new fender." Ultimately, whether it is the architecture of a Google car or the architecture of a new battle management system, the Air Force risks developing suboptimal systems which could potentially cripple a particular mission area if the architecture is not well researched through affordable prototyping and demonstrations. On the other hand, expensive prototyping has the effect of strangling the decision-making process and causing forced decisions to continue even though data is lacking and progress is not evident. The axiom of "Go Fast to Go Fast" is never true. What Google and many other companies show is "Go Slow to Go Fast." Once an agile architecture is built, the developers can "Go Fast" as much as they have funding but now have supreme confidence that their efforts are optimal in regards to cost, schedule and performance. In starting small, it is critically important for the Air Force to think as an enterprise. Leverage individual programs for enterprise learning if we want to scale.

The approach recommended here is to keep the individual program offices targeted on their specific weapon system needs, and provide a revenue stream and expert resource on digital acquisition implementation through a central office that can assist with instantiating a common standard within each program office. This addresses the challenge of "sticky information" requirements associated with the individual weapon system which would be nearly impossible to account for in a "centralized" manner, and it tags the Digital Campaign resources to specific weapon system platforms in a way the Air Force corporate process will more readily recognize and prioritize. The key is to create a dynamic where individual program offices see engagement with the digital transformation office as a key enabler to their program's success by providing them with value-added resources to build out the needed digital environment and the technical expertise on how to train and implement the capabilities within their workforce.

The overarching philosophy is to win the digital transformation effort from "the inside-out." As General Goldfein would say, "When it comes to innovation, we need to think big, start small, and scale fast."[6] Each individual program has a small enough scope to innovate a manageable digital transformation. Applying a consistent set of digital standards and implementation guidelines provides the underlying foundation on which to scale across multiple platforms. Using a central digital transformation office to resource the effort ensures consistency across program offices. A strategy that targets

programs with development and sustainment components will accelerate the speed at which scaled transformation can be achieved.

The Ground Based Strategic Deterrence (GBSD) program may offer the best insight. Even though GBSD is modernizing the land-based leg of the nuclear triad, it is also directly affecting the sustainment of the legacy Minuteman III weapon system by demonstrating by similarity what is in the art of the possible. Along those lines, leveraging the digital activities of Next Generation Air Dominance (NGAD), Skyborg or Advanced Battle Management System (ABMS) programs would be helpful, but on first look, it is difficult to comprehend what immediate impact those efforts would have on a legacy fleet of B-52s, F-16s, F-15s, and F-22s. The Digital Campaign does not have a product to provide NGAD, Skyborg or ABMS in the near term. Therefore, these programs are out in front just as GBSD is, blazing a trail for others to follow. Fortunately, these programs have the strategy, funding, and momentum to build a digital approach to meet their requirements. Similar to GBSD, new ACAT I programs can orchestrate the training, tools, IT infrastructure and collaborative environment needed to execute their program requirements. However, their products will be narrowly focused on weapon system program needs and not necessarily scalable to the entire digital enterprise.

Legacy systems seem to have little support for improving their digital posture. For example, the F-15EX program is not pursuing much in regards to digital activities. Why? If this program will produce a significant number of F-15EXs, then it should be using digital engineering and other associated digital tools to develop the system for adaptability and speed of future modernization similar to what GBSD is doing in relation to Minuteman III. Similarly, the B-52 is pursuing various digital activities as a part of their many future modernization initiatives. Could the F-15EX and B-52 collaborate so that their products and processes could be used as the basis for all of the legacy fleets?

4. ENTERPRISE CHALLENGES

The Air Force is just beginning to learn the right lessons for digital transformation from our own programs. However, we can definitely learn lessons from the commercial world too as the MIS QE article discusses. Once a program is able to construct a digital services platform, and mechanize it on a robust operational backbone (i.e., Cloud or Cloud-like), then the advantages of the digital environment start to become realizable. The QE article points out common characteristics of digital services platforms as,

- Architecture "must facilitate experimentation and provide reusable technology and digital services
- Digital components that enable a variety of technical and business services
- Platform as a service (PaaS)—a cloud based hosting environment for storing and accessing loosely connected services
- Repositories for massive amounts of data, whether from public sources (e.g., from social media), purchased or derived from sensors
- Analytics engines for converting data into meaningful insights
- Connections to data and processes that reside in the company's operational backbone." (p. 203)

These are good characteristics that are almost universally accepted but not universally achieved. In looking to the future digital world, the Air Force must take action now to forcefully move the entirety of its needed operations into the digital arena, which is found in the Digital Campaign's lines of effort.

In the article, "How Big Old Companies Navigate Digital Transformation," the authors provide a key lesson learned for LOEs 0, 1, and 2. They state, "because an operational backbone is designed for reliability and efficiency, it does not offer the speed and flexibility that companies need for rapid digital innovation." They offer that companies such as the Air Force would also need a digital services platform, which they "define as the technology and business capabilities that facilitate rapid development and implementation of digital innovations." (p.203)

The digital services platform is akin to the Digital Campaign's integrated digital environment coupled with government reference architectures and data architectures. The Digital Campaign has been working with pathfinder programs from across the Air Force to understand the relationship between what the article calls the operational backbone and the digital

services platform. Several USAF programs are attempting to implement a digital services platform and perhaps the best example is the GBSD program.

The Digital Campaign recognizes that all lines of effort are needed for the Air Force to be successful in its digital transformation. GBSD has demonstrated multiple lessons learned along these lines: (1) it's not nearly sufficient to install new tools on a Cloud if getting access to the Cloud is fragile (i.e., long latency in access, long wait times for Approvals to Operate (ATO) the new or updated tools); (2) new tools require a robust training program; (3) the integrated digital environment requires collaborative access by all functional personnel (functional personnel are for example finance, contracting, logistics, test, manpower to name a few); (4) there must be a reference architecture with a corresponding data architecture that brings coherency to the weapon system development; (5) the policies and processes cannot demand paper when digital evidence and presentation achieves speed, affordability and quality; and (6) the government must have an appropriate data rights strategy from the start that supports the digital strategy. GBSD is already demonstrating many of the characteristics of a good digital program, but there are many more subtle aspects of the digital transformation that the MIS EQ article discusses, which need to be understood.

The article continues with "a company that fails to design and build a well-defined digital services platform risks falling behind competitors that can rapidly act on digital opportunities." This aspect of the digital world is paramount to understand in order to achieve the goals of the Digital Campaign. Both LOEs 1 and 2 are pursuing a prescribed digital environment using community standards and practices. Similarly, GBSD is also pursuing and achieving the same goals. In order for the Air Force to significantly improve its time to field capability, the necessary digital pieces of the environment need to be in place before contracting for a new capability. Again, as GBSD has shown, by establishing a government reference architecture with data standards along with building an integrated digital environment for collaborative use by all functional personnel, a program will achieve unparalleled success. As the article conveys,

> "Roadmaps and traditional architecture reviews guide the development of an operational backbone's standardized business processes and controlled access to enterprise data. In contrast, a digital services platform relies on cross-functional development teams that apply user-centered design techniques to develop and assemble reusable plug and-play business and technology components." (p. 204)

MIT Sloan has determined that "developers can build digital functionality without a digital services platform but will likely generate a messy collection of individual services (i.e., APIs) that create new risks and hinder reuse." (p.203) This situation is what we are currently experiencing in the Air Force. Each program defines its own system architecture which is different from every other system architecture, which not only prevents sharing and commonality but also prevents innovation because the government does not have the ability to solicit and receive products from a wide source of suppliers. In fact, the Air Force is many times forced to return to a single supplier. Also, without prescribing a digital services platform or integrated digital environment, the Air Force will not be able to integrate the digital pieces from concept to sustainment.

As was mentioned earlier, companies who have embraced digital approaches are moving to a cloud environment to gain efficiencies in their operations. However, more than just cloud approaches, the Air Force needs a coordinated strategy between the operational backbone and the integrated digital environment. As the MIS EQ article states,

> "If [companies] choose to build digital services on their operational backbone, development will be slow and expensive. Because operational backbones are built to ensure the integrity of transactions and master data, companies carefully manage releases for maintenance, upgrades and enhancements. However, when applied to digital services, this approach will severely limit innovation and, ultimately, competitiveness." (p. 203)

GBSD has been using a sandbox approach to implement their digital environment (although they are taking steps to move to the cloud one day). A sandbox is an attractive approach for a digital environment, because its isolation from an operational environment should allow it to be more agile to incorporate tools, emerging standards, and processes.

One approach may be to leverage the Air Force implemented "Cloud One" thinking for this effort and create the integrated digital services capability as the "Digital One" complement to the "Cloud One" capability, and in fact, riding on the Cloud One infrastructure. Not only does this maximize the use of the Cloud One infrastructure, it also builds on the underlying

philosophical approach of having a single, integrated approach while still preserving the autonomy of local action. What is clear at this point is that a top-down directed, centrally owned and managed set of rigid standards and practices will not work for the level of flexibility, diversity, and scope of outcomes required across the Air Force's acquisition enterprise. The approach must remain agile enough to support individual program needs that are locally derived and implemented, but structured enough to put commonality in the underlying standards and tools to take advantage of scale across programs. This effectively translates into something akin to the way the Air Force Cyber Resiliency Office for Weapon Systems (CROWS) office operates, but for digital acquisition instead of cybersecurity. A digital transformation office would develop and own the equivalent of the Risk Management Framework (RMF) for digital acquisition standards, but SPMs would have the flexibility of tailoring which standards they implement on their programs, and which tools they decide they want to use. The digital transformation office would help the SPM build their digital strategy, incorporate it into their acquisition strategy, and provide initial-level training and expertise to get it up and running. As the program builds experience and expertise, the digital transformation office's roles would primarily resort back to providing expert advice on how the program office could further leverage the digital acquisition environment to improve their cost, schedule, performance, and risk posture.

5. CONCLUSION

The Air Force is just beginning its digital transformation which is inherently an enterprise activity. The lessons are arriving but there are many, many more to come. In order to scale fast, we must learn those lessons as quickly as possible. The digital campaign is on the path to do that but it will require targeted investment into the right programs.

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