16th COMBAT AVIATION BRIGADE:
STRATEGIC IMPLICATIONS FOR
ADOPTION OF ELECTRONIC FLIGHT BAGS

MSA 698 Directed Administrative Portfolio

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Submitted by:
Sven Anderson

Instructor:
Dr. Thomas Kessler

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Section 1: Introduction and Strategic-Level Questions

The US Army’s 16th Combat Aviation Brigade (CAB) is comprised of attack, cargo, and utility helicopters and approximately 2,000 aircrew, maintenance, and support personnel. Their mission is “to deploy, on order, to a designated theater and execute aviation operations in support of the ground force commander” (16th CAB, 2017). The 16th CAB is based at Joint Base Lewis-McChord (JBLM), WA and Fort Wainwright, AK.

Aircrew members of the 16th CAB currently utilize paper versions of required in-flight publications. Many civilian pilots and organizations are adopting electronic flight bags (EFB) to replace paper publications. This paper analyzes the strategic implications of the 16th CAB adopting EFBs.

Currently, there is no plan for the CAB to adopt EFBs, but elements of the CAB, particularly the attack battalion, are exploring the possibility of adoption. The decision to adopt EFBs will provide cost savings, increase efficiency for non-tactical garrison operations, and be a knowledge sharing device. Additionally, EFBs could be used to improve situational awareness and customer service to ground force commanders (GFC) in tactical environments.

This paper includes a brief literature review, analysis of external and internal factors affecting the CAB, implications for adopting EFBs, and answers the following questions:

1. What progress has been made in adopting EFBs in the military, especially the Army?
2. How is technology currently integrated into 16th CAB flight operations?
3. How is flight planning currently conducted in the 16th CAB?
4. Impact on garrison vs. tactical operations?
5. Impact on customer support to the GFC?

6. What technology is required for EFBs?

7. What are the strategic implications for the 16th CAB adopting EFBs?

Section 2: Brief Review of the Literature

**EFB adoption history.** The Federal Aviation Administration (FAA) defines an EFB as “an electronic display system intended primarily for flight deck or cabin crew member use that includes the hardware and software necessary to support an intended function” (FAA, 2014). FedEx pioneered the use of laptops in the cockpit as early as 1991 before cockpit integrated EFBs became more popular. General aviation has seen adoption of EFBs at a more rapid pace than commercial or military aviation due to less restrictive guidelines and rules (Scott, 2007).

The FAA began issuing rules regarding EFBs as early as 2002 (FAA, 2002). The prevalence of EFBs has grown exponentially since the advent of the tablet computer, specifically the Apple iPad in 2010. The aviation industry quickly adopted commercial off-the-shelf (COTS) tablets and the number of aviation related applications grew rapidly (Pierobon, 2012). Since American Airlines purchased iPads for its fleet in 2011, most commercial carriers have adopted COTS tablets as EFBs (American Airlines, 2012; Babb, 2017).

The US military’s adoption efforts currently lag behind those of general and commercial aviation (Keller, 2014). The US Air Force (USAF) has been at the forefront of EFB adoption for the military, but only as of 2017 approved EFB use for all of its cargo and tanker aircraft (Knight, 2017).

**EFB adoption strategy.** The decision to adopt EFBs by commercial carriers is part of a cost leadership strategy (Scott, 2007). Fuel costs are one of the largest and most unpredictable expenditures for an airline. Pilots are required to carry flight publications that range from 30
pounds to hundreds of pounds depending on the type of aircraft. Paperless cockpits reduce aircraft weight which results in a reduction in fuel consumption. Reduced fuel consumption combined with the elimination of printing costs for charts and manuals reduces overall cost of operations. The comparatively low cost of tablet EFBs combined with high fuel prices explain the commercial airlines’ rapid adoption of tablets as EFBs (Boyne, 2013). In most cases, the cost of EFB adoption is recouped within a year from fuel savings alone (Sweet, 2016).

Military operational requirements, as well as security concerns, make EFB adoption more challenging than for general or commercial aviation (Fitzsimmons, 2002; Herman & Seinfeld, 2004). Tactical aircraft could take advantage of EFBs by allowing aircrews to better interact and support GFCs by creating a common operational picture of the battlefield (Fitzsimmons, 2002).

**EFB benefits.** There are multiple benefits that support EFB adoption. These benefits include fewer injury claims due the reduction in weight that pilots must carry, constant access to the most up to date information, increased situational awareness, and improved cockpit efficiency (American Airlines, 2012; Boyne, 2013; Fitzsimmons, 2002; Flight Safety Foundation, 2005). Theoretically, the combination of these benefits should enhance overall flight safety.

**EFB drawbacks.** Despite the many benefits that EFBs can provide, research has revealed that these benefits are not achieved automatically. Human factors play a significant role in the undesirable outcomes of EFB usage. Increased pilot workload, longer information retrieval time, flight violations, loss of critical information, and even fatal accidents have been associated with and attributed to EFBs (Joslin, 2013; Sweet, 2016; Werfelman, 2012). These findings run counter to the arguments in favor of EFB usage and undermine the concept of EFBs as a tool for safety enhancement.
Research suggests the benefits of EFBs are attainable with training. Lack of training, improper training, and insufficient training are identified as major contributors to a majority of the human factors affecting EFB usage (Boyne, 2013; Joslin, 2013; Sweet, 2016).

Tablets continue to gain popularity as EFBs and commercial airlines are rapidly adopting them to reduce operating costs. The military lags behind the rest of the aviation industry in EFB adoption. The military sees EFBs as a viable technology for improving operations; however, the unique requirements of military operations makes adoption of EFBs more complicated than for commercial airlines. Although EFBs have many potential benefits, more and better training on their use is necessary in order to reduce the negative consequences of human factors and reap potential benefits.

**Section 3: External and Internal Implications of Issue Being Examined**

**External factors.** The aviation industry is moving towards paperless operations, particularly within the cockpit. New regulations and standards for operations are constantly developing (Babb, 2017). Despite differences in military versus civilian operations, the CAB should maintain pace with the industry. If it does not, the CAB may find itself out of sync with industry norms or not in compliance with FAA standards.

The Department of Defense (DOD) believes EFBs and other mobile devices have potential for increasing productivity, reducing costs, and improving functionality (DOD, 2013). Many ground force elements, especially special operations forces (SOF), are interfacing with technologies that are tablet or smartphone based (Cox, 2016). David Bunker, the brigade’s attack battalion commander, views this emerging situation as the CAB’s best reason for EFB adoption (D. R. Bunker, personal communication, May 10, 2017). Army aviation interacts and supports SOF regularly. Much of the graphics and map data used for operations is not compatible with
current aircraft systems, but is easily compatible with many popular EFBs. Using tablets is an easy and achievable means to more easily develop a common operational picture.

**Internal factors.** All required publications for Army aviators are available digitally. Within the last five years aircrew training manuals, aircraft system reference material, and many DOD flight planning documents are no longer offered in print form. Aircrews must use computers to access required publications or print them locally, some of which are over 1,000 pages. To overcome these challenges, many aircrew members purchase their own tablets in order to have easier access to publications. This situation presents challenges for access to publications and conflicts for standardization. Among CAB pilots interviewed for this paper, there is a consensus that the Army or the CAB should provide tablets to pilots as a means of access to exclusively digital publications.

**Impacts to structure.** Maintenance, flight records, and flight planning operations within the CAB are digital and standardized in accordance with Army aviation policies. Flight planning consists of using Army aviation’s portable flight planning software (PFPS) on Army mission planning systems (AMPS). Flight plans can be loaded to aircraft removable hard drives for interfacing with aircraft software. There are a limited number of AMPS, and PFPS is not regarded as user friendly. An EFB would enable easier planning of instrument flights in garrison (D. R. Bunker, personal communication, May 10, 2017) and for in-flight mission changes during tactical operations. This could impact PFPS usage in the future, but is unlikely in the near term.

Electronic equipment, including EFBs, are vulnerable to enemy interference. Regarding electronic interference, the military’s current operational theaters are low threat; however, potential near-peer threats (i.e. Russia and China) pose significant threats to electronic equipment reliability. Until military specific EFB technology is developed, tactical operation training will
need to include contingency plans for a loss of EFB availability. Aircrew training manuals already address the use of electronic and non-electronic means for certain elements of flight planning. Expansion of non-electronic contingency training would require minimal effort.

Some CABs have successfully adopted EFBs (101st CAB, 2017). If more CABs adopt EFBs, eventually Army aviation will be forced to standardize programs which could potentially impact a 16th CAB EFB program (D. R. Bunker, personal communication, May 10, 2017).

Section 4: Implications for Business-Level and Corporate-Level Strategy

Technology integration into a business strategy should pay for itself (Althonayan & Sharif, 2010). The potential exists to lower fuel and printing costs through EFB adoption. Reduction in these costs will allow those funds to be reallocated to enable the CAB to better accomplish its mission. Adoption of EFBs could be part of cost leadership business and differentiation strategy.

Most tactical aircraft, including helicopters in most CABs, are not using EFBs. Adoption of EFBs could be part of a differentiation strategy that allows the 16th CAB to better support GFCs through the use of new technology.

Adoption of EFBs as part of a business strategy is low risk because standards for use have been developed. This allows the CAB to solve its current lack of standardization regarding publications. The risk of purchasing a device that is not approved or likely to be discontinued in the near future is very low. Microsoft Surface tablets, iPads, and Android supported devices are proliferated throughout the aviation industry (Babb, 2017). The CAB has options to choose from with minimal risk of failure.
Section 5: Implications for Structure and Control Systems

The implications for structure of the CAB are minimal. The most likely course of action for EFB management would fall to the flight operations section. The flight operations section currently handles paper flight publications as well as the distribution of mission specific documents and equipment (16th CAB, 2015).

The CAB’s standardization standard operation procedures (SOP) will need to be updated to include procedures for EFBs. Specific updates should include policies for maintenance, rules for usage, integration into missions, and training. These implementation measures would be handled by the CAB’s standardization and safety personnel program (D. R. Bunker, personal communication, May 10, 2017).

Section 6: Conclusions and Recommendations

Conclusions

Most of the aviation industry is moving towards COTS tablet EFBs. Army aviation and the 16th CAB have been slow to recognize a need for EFBs. However, Army aviation publications are becoming exclusively digital. This impacts standardization to aircrew’s access to and sharing of information. Many EFBs can also integrate with new technologies being utilized by ground force elements.

Adoption of EFBs can save money, standardize access to information, and improve customer service to GFCs. Major changes to organizational strategy or structure are not required. Impacts include SOP revision and training development for management and usage of EFBs.

Answers to the aforementioned questions in section one are as follows:

1. What progress has been made in adopting EFBs in the military, especially the Army? The USAF has recently outfitted its cargo and tanker aircraft with EFBs. Tactical aircraft across
the services are in the early stages of adoption. Most CABs, including the 16th, are not using EFBs.

2. How is technology currently integrated into 16th CAB flight operations? Maintenance publications and records across Army aviation are digital. The same is true of aircrew administrative records.

3. How is flight planning currently conducted in the 16th CAB? Flight planning uses a mixture of digital and paper technical, training, reference, and planning documents. Additionally, PFPS provides an interface with aircraft systems for detailed planning, but is typically not suitable for missions with reduced planning times or in-flight mission changes.

4. Impact on garrison vs. tactical operations? Use of EFBs will standardize and improve access to information in garrison and tactical environments. Instrument flights in garrison will benefit from simpler access to necessary publications in flight and for flight planning. Additionally, aircrews will be able to better sync with ground forces during training events by utilizing like software for shared operational plans and graphics. This same benefit will be experienced in tactical environments where it is most important.

5. Impact on customer support to the GFC? Ground force commanders interact with numerous aerial platforms. Having Army aviation assets and GFCs using the same operational documents and graphics through like technologies creates a common operational picture and reduces the workload of the GFC in explaining the concept of operations and scheme of maneuver to other aerial assets.

6. What technology is required for EFBs? Army regulations require EFBs to be in compliance with FAA guidelines, which are well defined (HQDA, 2014). EFBs needs to be able to use the same software or applications as those being used by ground forces, particularly Army
SOF. Do to the need for operational information security, EFBs will require the ability to be connected to the military’s non-secret and secret internet protocol router network (NIPRNet/SIPRNet). The USAF and SOF have already demonstrated that COTS mobile devices, including tablets, can be appropriately connected (Seffers, 2014).

7. What are the strategic implications for the 16th CAB adopting EFBs? The CAB stands to reduce the cost of operations, standardize information sharing, and improve customer service to GFCs.

**Recommendations**

The first recommendation is to adopt and tailor the 101st CAB’s EFB SOP for 16th CAB operations. The 101st CAB is one of the only CABs with a well-developed and effective EFB program. The SOP has even been recently updated to improve EFB best practices (A. Fletcher, personal communication, May 6, 2017). The training section of the SOP must be robust and focus on reducing human factors.

The second recommendation is to tap into the existing knowledge base of personal EFB users within the CAB. This ensures EFBs will meet the expectations of users as well as regulatory and operational requirements. Soliciting aircrew input to the program can also reduce opposition to change (Boyne, 2013).

The third recommendation is to focus on how EFBs help the CAB achieve the strategic goals of improving information sharing, improving customer support, and reducing operational costs. Adoption of technology is not a strategy but a means for strategic achievement (Kane, Palmer, Phillips, Kiron, & Buckley, 2015).
References


