16th COMBAT AVIATION BRIGADE:
SUMMARY, CONCLUSIONS & RECOMMENDATIONS
FOR ADOPTING ELECTRONIC FLIGHT BAGS

MSA 698 Directed Administrative Portfolio

Paper #5 Final Report

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Submission Date:
4 August 2017
Summary, Conclusions, & Recommendations for
Adopting Electronic Flight Bags

Section 1: Summary

Most of the aviation industry has transitioned from paper to digital publications and aeronautical charts. Commercial off-the-shelf (COTS) tablets (e.g. iPad) are the electronic flight bags (EFB) of choice for accessing necessary in-flight information. Military aviation, to include the 16th Combat Aviation Brigade (CAB), is beginning the transition to digital charts and publications but has not adopted a means to access information in-flight and therefore continues to use paper references. The following major research questions were developed to address this situation:

1. What is the status of EFB usage in the aviation industry?
2. What are the operational benefits and potential drawbacks of adopting EFBs?
3. How will EFB adoption affect operational dynamics?
4. What is the initial investment and enduring operational costs for required hardware, software, and support resources?
5. What are the likely barriers to implementation and what strategies can be used to address them?
6. What actions should 16th CAB leadership take to ensure successful implementation?

This paper is a synthesis of four preceding studies focusing on strategic, organizational dynamics, administrative, and financial factors related to EFB adoption. This and subsequent sections present a summary of major findings from the preceding studies, answers to the major research questions, and presentation of all recommendations developed in the preceding studies.
Strategic Implications. Commercial aviation is adopting EFBs to reduce operational costs (Sweet, 2016). Eliminating paper publications from aircraft reduces weight which reduces fuel consumption. Digital publications also reduce printing costs (Boyne, 2013). Aircrew administrative records and aircraft maintenance records across the Army are already digital.

EFBs can deliver improvements to safety and operational efficiency, but without proper training they can be detrimental to these goals (Joslin, 2013). Many military pilots use personal tablets to access aviation information, but this raises concerns in regards to the currency and standardization of information. EFBs can be used to maintain the most current standardized information and enable better information sharing (Flight Safety Foundation, 2005).

Army EFBs must adhere to Federal Aviation Administration (FAA) standards (HQDA, 2014). Special operations forces and the U.S. Air Force connect COTS mobile devices to classified military networks (Seffers, 2014). COTS tablets can enable classified information sharing in addition to meeting FAA standards. EFBs with classified ground force software can provide aircrews with a better common operational picture of ground force operations in order to provide better customer support to ground force commanders (Fitzsimmons, 2002).

Organizational Dynamics & Human Behavior. Integrating mobile devices (e.g. iPads) into an organization’s operations can have positive and negative effects. Mobile devices can be of value by improving productivity, operational efficiency, and information sharing. These results can even increase job satisfaction (Burford & Park, 2013; Hess & Jung, 2012; Pitichat, 2013). Mobile devices can also be an anchor that never lets people disconnect from work and eventually burn out (MacCormick, Dery, & Kolb, 2012). The beneficial or detrimental effects of mobile devices depend on the organization’s implementation process which should be tailored to specific desired goals.
Implementing new technology involves changes to an organization. Change breeds opposition because of the inherent uncertainty associated with it (Price, 2014). This can be true of older workers who worry that new technologies could make their skills and experience obsolete (Meyer, 2011). Hierarchical and tradition based organizations, like the military, are even more opposed to change because continuity and use of proven methods is considered vitally important to their success (Price, 2014). People are less opposed to small incremental changes rather than large revolutionary changes (Umble & Umble, 2014).

Integrating new technology requires changes to organizational responsibilities and duties. Achieving the desired benefits requires employees to understand the new technology. Training is not a requirement, but training can help technological understanding. Training programs should focus on improving information retrieval skills and building situational awareness (FAA, 2014; Joslin, 2013).

**Multiculturalism & Globalization.** When adopting new technology men are concerned with usefulness, and women are concerned with the ease of use. The differences in men and women tend to merge into similarities around age 40 (Morris, Venkatesh, & Ackerman, 2005; Venkatesh & Morris, 2000). Technology adoption is lower among older workers as compared to younger workers. This is especially true when older workers view their relevance as threatened by technology (Meyer, 2011).

Distribution of mobile devices could create a feeling of inequality among some in the organization since only a small number of personnel would have access to or a need for such devices. Unnecessary organizational inequality can cause envy and result in lowered morale and productivity. Fostering an environment which emphasizes teamwork can help assuage feelings of perceived inequalities (Tai, Narayanan, & McAllister, 2012).
Financial Analysis, Planning & Control. The Army can use tablets that support the storage and display of Department of Defense (DOD) Flight Information Publications (FLIP) in accordance with FAA guidelines as EFBs (FAA, 2014; HQDA, 2014). The Apple iPad is the most popular EFB in part because of their ease of use and reliability. ForeFlight and Jeppesen are the leading commercially available EFB software (Babb, 2017). The National Geospatial-Intelligence Agency (NGA) provides similar software to DOD users for free. Cases and screen protectors are common EFB accessories with varied costs. Cases and screen protectors may extend the life cycle of EFBs and negate the need for extended warranties, which are another common tablet expense.

Savings from reduced printing and fuel costs could be as much as $100,000, and could help recoup some of the procurement costs (Lott, 2014). Reduction in costs is an important perspective to consider but not the only one. Improvements to operational efficiency and customer support may not have concrete financial impacts, but improvements to these metrics can often justify technological investments for public organizations (Schell, 2011). The ability to reallocate financial resources and improve everyday functions may justify EFBs as a readiness initiative which is the DOD’s top priority (DOD, 2017).

Section 2: Conclusions

Information developed in the four preceding studies produced factual data useful for answering the major research questions.

EFB Usage. The first significant research question was: What is the status of EFB usage in the aviation industry? EFBs are very popular among general aviation pilots. In commercial airlines, EFBs are the standard with few outliers yet to adopt. American Airlines began the trend
among U.S. carriers in 2011 and most carriers including Delta, Southwest, and Alaska are using either iPads or Microsoft Surface tablets (Babb, 2017).

The U.S. Air Force is using iPads for their tanker and cargo fleet, but fighters and bombers have yet to integrate the technology on a widescale (Knight, 2017). The iPad is the only COTS EFB approved for Army use (Department of the Army, 2016). Within the Army, the 101st CAB is about the only rotary wing unit taking advantage of EFB technology. Many military pilots in organizations that have not adopted EFBs use personal tablets to access aeronautical charts and necessary publications.

**Benefits & Drawbacks.** The second significant research question was: What are the operational benefits and potential drawbacks of adopting EFBs? Commercial airlines and the U.S. Air Force have adopted EFBs for the expressed purpose of reducing fuel costs by eliminating the weight of paper publications from flights (Lawlor, 2017; Sweet, 2016). In addition to fuel savings, printing costs are reduced by utilizing digital information rather than paper (Lawlor, 2017).

Improvements in operational efficiency and safety are two of the most anticipated benefits among EFB users. Research reveals that while achievable, these benefits are not reaped by the mere presence of EFBs. In fact, the opposite can be true. EFBs can be a detriment to safety and inhibit efficiency without appropriate training emphasizing the reduction of human factors and understanding when and how to use EFBs (Joslin, 2013). However, if efficiency is improved then job satisfaction may also improve which can have a positive impact on talent retention (Burford & Park, 2013; Hess & Jung, 2012; Pitichat, 2013).

Improving customer support to ground force commanders is probably the biggest potential benefit for the 16th CAB (D. R. Bunker, personal communication, May 10, 2017). The
ability to connect with the same software, maps, and graphics as ground force commanders would give aircrews better situational awareness and enable them to provide faster and better customer service (Fitzsimmons, 2002).

**Organizational Dynamics.** The third significant research question was: How will EFB adoption affect organizational dynamics? Poor EFB program implementation can negatively impact an organization’s dynamics. Older workers may struggle to adapt to new technology and suffer from perceptions of technological incompetence by younger workers (McCausland, King, Bartholomew, Feyre, Ahmad, & Finkelstein, 2015; Morris & Venkatesh, 2000). Some older workers may even resist EFB adoption outright. Additionally, providing tablets to a limited number of personnel can result in perceived organizational inequality (Tai, Narayanan, & McAllister, 2012).

A comprehensive training program can help overcome many of the potential negative side effects. It can also enable an organization to harness mobile devices to improve productivity, operational efficiency, and customer support. Positive impacts on these factors can improve job satisfaction throughout the organization which could make it easier for the 16th CAB to maintain the highest quality talent (Buford & Park, 2013; Hess & Jung, 2012; Pitichat, 2013).

**Program Costs.** The fourth significant research question was: What is the initial investment and enduring operational costs for required hardware, software, and support resources? Initial cost is estimated at $290,000 with annual software costs estimated at $50,000 (ForeFlight, 2017). Annual software costs can be nearly eliminated if NGA mobile applications are utilized instead of commercial software (e.g. Foreflight). A two-year life cycle is a conservative planning estimate that could be extended to four years. Initial costs, enduring costs, and life-cycle of an EFB program will vary based on procurement decisions.
Implementation Barriers. The fifth significant research question was: What are the likely barriers to implementation and what strategies can be used to address them? Change typically involves some level of uncertainty which can breed fear (Price, 2014). This can be true of older workers who worry that new technologies could make their skills and experience obsolete (Meyer, 2011). Hierarchical and traditional organizations, like the military, are even more opposed to change because continuity and the use of proven strategies is vitally important to their success (Price, 2014).

For the 16th CAB, the cost of EFBs may not be directly compensated for by fuel and paper savings. Additional savings from operational efficiency improvement and better customer support may prove to be financially beneficial, but these metrics are hard to gauge with concrete monetary numbers (Al-Raisi & Al-Khour, 2010). The expense of an EFB program without a clear beneficial financial correlation may deter some leaders to pursue such a project.

Resistance to change can be overcome in a number of ways. One technique that is applicable to EFB adoption is incremental change. Organizations that continually find ways to improve through incremental changes tend to be more successful in implementing new technology (Umble & Umble, 2014).

The sixth and final significant research question was: What actions should leadership take to ensure successful implementation? The next and final section discusses the recommendations to the 16th CAB leadership for successful EFB implementation.

Section 3: Recommendations

Each of the four preceding studies produced a number of recommendations specifically tailored to address the issues associated with each respective study. Recommendations resulted
from an analysis of the literature and information discussed in each respective study. Recommendations are presented in a sequence commensurate with the implementation process.

The first recommendation is to determine how to best achieve the strategic benefits of EFBs. The 16th CAB should prioritize the strategic goals of improving information sharing, improving customer support, improving operational efficiency, and reducing operational costs. Meaningful and identifiable metrics for determining the success of specific goals should be established. Goal setting and metric identification should drive the implementation process.

The second recommendation is to initially design the EFB program to replace paper publications. Additional EFB capabilities can be phased in after initial adoption and training. This strategy solves the immediate problem of required paper publication unavailability, pursues the aforementioned strategic goals, and may reduce opposition to change through incremental implementation of change.

The third recommendation is to establish two-way communication between leadership and the organization’s internal stakeholders. Leadership should communicate the plan for EFB adoption and solicit input for the program from those affected by its implementation. This strategy could reduce opposition and build support within the organization to achieve the desired goals.

The fourth recommendation is to adopt Apple iPads, which is the only Army approved EFB. Pursuing other EFB options could slow the implementation process. Additionally, the iPad is reliable, relatively inexpensive, and popular among EFB users. NGA apps are free to the DOD and should therefore be the first software choice. ForeFlight’s Military Flight Bag is designed for military needs and should be adopted if NGA apps do not provide the desired benefits.
The fifth recommendation is to request additional funding for EFB procurement from higher echelons prior to using the organizational budget. A detailed implementation plan with strategic benefits may convince higher echelons to support EFB adoption and shape the Army’s EFB policy for a greater shared benefit.

The sixth recommendation is to enable the battalions in the 16th CAB to have the flexibility and individuality to mold their EFBs to their own specific mission. Although the 16th CAB EFB program should be standardized in many ways, the different missions of each battalion (i.e. attack, reconnaissance, assault, medical evacuation, and general support) requires EFB capabilities to be tailored to the specific mission. Customizing capabilities will allow each battalion to achieve its own benefits as well as the combined desired benefits for the 16th CAB.

The sixth recommendation is to appoint a program manager who serves to connect the different organizational elements affected by EFBs. A program manager can coordinate between aircrews, organic technical support, outsourced technical support when necessary, administrative support, and leadership. The program manager should use the 101st CAB’s EFB standard operating procedures (SOP) as a template for the 16th CAB EFB SOP because of the precedent set by the 101st CAB’s EFB program.

The seventh recommendation is to establish an initial and continuation training program focused on reducing human factors. The program should be in line with FAA standards for commercial operations. Training should be conducted as a crew rather than as individuals. Mixing older aircrew members with younger aircrew members and men with women will allow the strengths of each group to complement each other and enhance the success of training outcomes. Annual evaluations will ensure that standards are adhered to and training objectives are met.
The final recommendation is for the 16th CAB to adopt EFBs in accordance with the aforementioned recommendations only if the leadership is fully committed to the program. If the leadership is not fully committed to the program then the program is unlikely to achieve the desired benefits. Program failure would represent a waste of 16th CAB time and money.
References


