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Final Report of the AFIT Quality Initiative: Gap Analysis and Investment Strategy Guidance

Air Force Institute of Technology

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FINAL REPORT OF THE AFIT QUALITY INITIATIVE:
GAP ANALYSIS AND INVESTMENT STRATEGY GUIDANCE

TECHNICAL REPORT

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DEPARTMENT OF THE AIR FORCE
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Wright-Patterson Air Force Base, Ohio

Executive Summary

This report presents the investment strategy guidance emanating from the Air Force Institute of Technology's (AFIT's) Quality Initiative. This report culminates a two-year effort involving external discovery, internal discovery, gap analysis, and investment strategy guidance formulation. The overarching purpose of the Quality Initiative is to recommend investment strategy guidance with the intention of modernizing AFIT's instructional capabilities. The Quality Initiative focused on the five thrust areas shown in Figure 1.

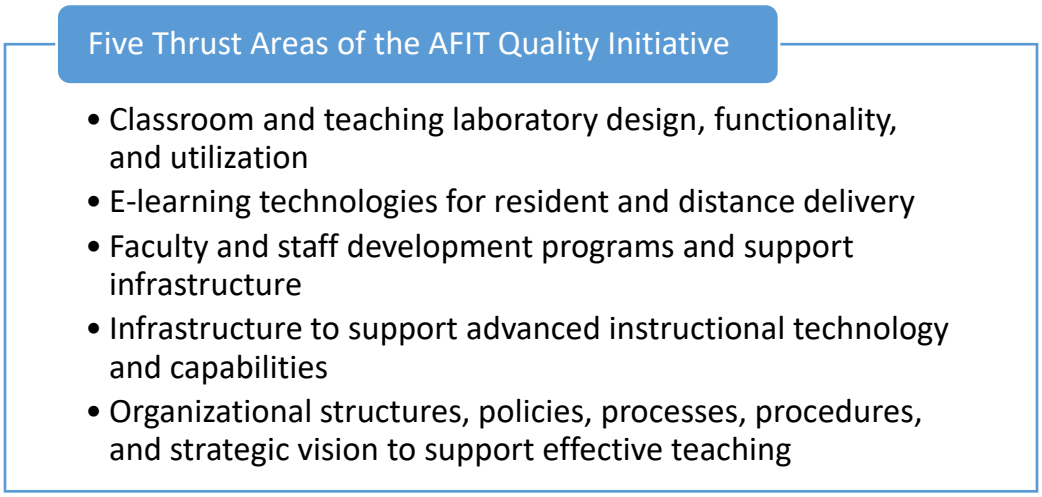

Figure 1. Five thrust areas used for the discovery phase of AFIT's Quality Initiative.

Although this report provides an overview of the entirety of AFIT's quality initiative efforts, the two primary foci of this report are (1) discussing the six initiatives identified by the Gap Analysis Committee and (2) presenting investment strategy guidance relating to each of the six initiatives. These six initiatives are shown in Figure 2.

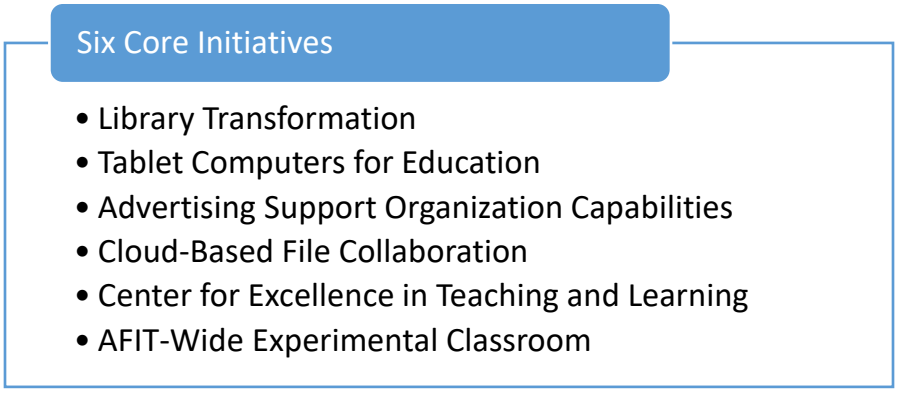

Figure 2. The six core initiatives identified by the Gap Analysis Committee and further developed into investment strategy guidance as a result of AFIT's Quality Initiative.

The recommendations herein are meant to serve as a baseline for ways in which AFIT can program resources to help enhance teaching and instruction across the institution as a whole. Following is a table of contents outlining the items discussed in this report:

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The views presented in this report are the recommendations of the Quality Initiative Executive Committee and do not reflect the official policy or positions of the Air Force Institute of Technology, United States Air Force (USAF), Department of Defense (DoD), or United States Government.

Maj Jason M. Bindewald, Ph.D.
Chair, AFIT QI Steering Committee

1. Overview of AFIT's Quality Initiative

The goal of the Air Force Institute of Technology's (AFIT) quality initiative was to produce an Institute-level, data-driven investment strategy designed to evolve its current instructional capabilities to achieve the most exemplary, relevant attributes found at leading high-quality academic institutions. In addition, process and policy changes were explored to enable effective execution and updating of AFIT's instructional investment strategy into the future. The overall purpose of AFIT's quality initiative is to improve the learning experience for its students and the teaching environment for its faculty.

The quality initiative has been the first formal effort to jointly develop an instructional improvement strategy between AFIT's schools. Three of the four schools, the Civil Engineering School (AFIT/CE), the School of Strategic Force Studies (AFIT/EX), and the School of Systems and Logistics (AFIT/LS), provide non-credit bearing courses for continuing education and workforce development, with a strong emphasis on distance learning modalities accompanied by traditional classroom delivery. The fourth school, the Graduate School of Engineering and Management (AFIT/EN), predominantly uses traditional classroom approaches for its master's and doctoral programs with a small footprint in distance learning. Historically, each of the schools has acted independently when developing instructional infrastructure and support processes. Given today's resource constraints, the difficulties supporting multiple IT systems under new security protocols, and the common desire to focus on quality teaching and improving the environment for student learning, this initiative has allowed AFIT to address its instructional capabilities in an institutional fashion.

This report marks the end of the three phases of the quality initiative: (1) Data Gathering and Analysis, (2) Gap Analysis, and (3) Investment Strategy Guidance. During the Data Gathering and Analysis phase, the team was divided into two subcommittees: Internal and External Discovery. Each of the two subcommittees completed and published a report detailing their process and findings.

One subcommittee focused on internal institutional discovery, systematically collecting information about AFIT's current capabilities included in five identified thrust areas:

1. Classroom and teaching laboratory design, functionality and utilization;
2. E-learning technologies for resident and distance delivery;
3. Faculty and staff development programs and support infrastructure;
4. Infrastructure to support advanced instructional technology capabilities; and
5. Organizational structures to support effective teaching.

This subcommittee also surveyed faculty and students to determine their perceptions of current capabilities, and their desires for the end state.

A second subcommittee performed external discovery of higher education and industry best practices and modern capabilities for improving instruction. This subcommittee investigated the five thrust areas at AFIT's peer institutions, institutions within Ohio, institutions within the DoD, and a selection of institutions with unique instructional capabilities. The effort was not meant to

be an exhaustive one, but took advantage of opportunities to investigate practices from institutions who were willing to share their expertise with AFIT.

The Gap Analysis committee then performed a gap analysis based on the information gathered by the two subcommittees in the first phase of the project, collected additional data as needed, and developed a list of six core initiatives that it recommended for AFIT to pursue in order to improve AFIT's instructional capabilities. The six initiatives identified by the gap analysis committee are presented in this document along with an explanation of why each initiative was identified as one to pursue.

The third phase of AFIT's quality initiative involved the creation of Investment Strategy Guidance. During this phase, the quality initiative's steering committee, in conjunction with AFIT leadership, worked with organizations within AFIT to refine recommendations for a formal investment strategy. The final product of this phase is the investment strategy guidance outlined in this document. This guidance includes an overview of what has taken place to date involving AIFT"s investment in the six identified initiatives as well as steps that can be taken going forward to invest time, manpower, space, and funding into completing those identified objectives.

2. Review of External and Internal Discovery Committee Findings

The external and internal discovery committees were stood up in May 2016 and operated through June 2017. The scope of these efforts and further explanation of the recommendations of each committee can be found in their respective final reports. This section gives an overview of the findings from each of the committees in order to better frame the actions and decisions of the Gap Analysis committee activities that followed.

I. External Discovery Findings

The goal of the External Discovery Team was to reach out to academic institutions, corporate and government organizations, technology vendors, and other entities to identify ways that AFIT can improve instructional capabilities across each of the five thrust areas. The committee produced a final report which can be accessed at https://scholar.afit.edu/docs/1.

Data collection activities included site visits (Buffalo Pacific, University of Cincinnati, University of Dayton, Wright State University, Ohio State University, Florida Institute of Technology), phone interviews (Harvard University, Murray State University, Case Western Reserve University, Gettysburg College, University of Central Florida), conference attendance (EDUCause, Educational Advances in Artificial Intelligence, IEEE Special Interest Group on Computer Science Education), reviews of journal publications related to teaching, and gathering of information through email requests and visiting publicly available websites.

These activities were completed over the course of one year, beginning in June of 2016 and concluding in June of 2017. The data gathered were evaluated and several recommendations for further review were decided upon by the External Discovery Team. Figure 3 gives a summarized list of all recommendations of the External Discovery Team, organized according to the five thrust areas previously mentioned.

The recommended areas of pursuit identified by the external discovery committee were meant to serve as a compliment to the Internal Discovery Team's report that focused on data and feedback gathered from institutions internal to AFIT. These two reports combined, served as a baseline for implementing an institutional instructional capability investment strategy later in the quality initiative.

Classroom Design

- Mobile Tablet Computer Carts for Students
- Displays With Click to Share Capabilities
- Small Subset of Classrooms Designed with Collaborative Furniture Setups
- Interactive Projectors/Display Screens

E-Learning Technologies

- Tools for Cloud-Based File Sharing and Collaboration
- Tools to Organize Communications
- Tools to Access, Edit, and Re-Use Existing Video Content

Faculty and Staff Development

- Center for Teaching and Learning
- Examine and Revise the New Faculty Orientation Program
- Recurring Engagement of Faculty with Leadership
- Develop a Faculty Development Advisory Committee

Infrastructure

- Codified Set of Minimum Requirements for Facilities Upgrades
- Establish Clear Understanding of How Money May Be Raised and Used for Facilities Upgrades
- Clear and Centralized Scheduling Functions for Both Classrooms and Equipment at the Highest Feasible Level

Organizational Structures

- Peer to Peer Evaluation of Teaching
- External Reviewers for Academic Program Reviews
- Professor of Practice Positions
- Tenure Tracks for Both Teaching and Research Faculty
- Processes to Create Flexibility in Allowing Education across Departments
- Rethinking of Library Functionality and Librarian Responsibilities

Figure 3. Recommendations of the External Discovery Committee organized by quality initiative thrust area.

II. Internal Discovery Findings

Concurrent with the external discovery committee investigation, the internal discovery team pursued a two-pronged approach that sought to understand:

1. The key attributes of each thrust area, and the current state of these attributes.
2. The degree to which each of the thrust areas contribute to student success (relative contribution).

Inputs were solicited from the AFIT community to determine what the key elements are as part of the effort. A series of electronic surveys and focus group meetings were conducted in order to collect data related to each of the thrust areas. The goal of the first part of the two-pronged approach was to make certain the right attributes of our inventory are measured to help further the success of our students and our programs. The second part of the data gathering effort sought to determine whether these attributes exist at AFIT or not. Nearly 400 AFIT personnel across all schools and directorates within AFIT were involved in the study. The committee produced a final report which can be accessed at https://scholar.afit.edu/docs/2.

Findings were selected based on perceived deficiencies in each thrust area and were reached by analyzing the frequency to which comments pointed to problems. Identified issues were then checked to make certain they were correlated to a factor that was identified as contributing to success in school. The committee was tasked to identify five attributes for each thrust area. Following is a summarized list of all recommendations of the Internal Discovery Team, organized according to the five thrust areas as shown in Figure 2. These recommended areas of pursuit helped to identify areas that AFIT could pursue to have a wide-ranging impact on instructional capabilities across all four schools.

Classroom Design

- Displays with wireless screen sharing
- Need for an experimental classroom
- Classrooms with anonymous voting/student feedback
- Moveable/Collaborative furniture
- Computer laboratory utilization

E-learning Technologies

- Video lectures
- Video conferencing limitations
- Lack of student management system combined with a student learning system
- Lack of a readily available/reliable file sharing system
- Lack of training opportunities

Faculty and Staff Development

- Lack of formation mentoring (conversational) communities
- Direct, recurring engagement of university leadership with faculty
- Majoring of faculty not accountable for faculty development
- Time and resources for faculty development are not available
- Lack of available time/money/resources for sabbaticals

Infrastructure

- Network reliability and speed
- Lack of an enterprise solution for teleconferencing capability
- EN Extension Services needs expansion
- Lack of power and connectivity in some classrooms for student computers
- Lack of clear and centralized scheduling functions and resource management for classrooms

Organizational Structures

- Too many restrictive IT policies
- Need for peer to peer teaching evaluations
- (EN) Basic instructor course should be longer and include more topics
- Lack of structured support for master's thesis and other research projects
- Multiple chains of command (within EN)

Figure 4. Recommendations of the Internal Discovery Committee organized by quality initiative thrust area.

3. Gap Analysis Committee Findings

The following six initiatives were chosen by the Gap Analysis Committee to include items that address findings from both the internal and external committees. The gap analysis committee attempted to propose a diverse set of initiatives: some initiatives are broad in scope and others are much smaller; some include preexisting initiatives, while others involve brand new ideas; some AFIT has complete control over, others will require external engagement. Additionally, several of the initiatives have overlaps due to mutually beneficial areas for improvement. Each of the five quality initiative thrust areas is covered in at least one of the six initiatives proposed. The alignment of each of the six initiatives with the quality initiative thrust areas is shown in Table 1.

Table 1: How the six core initiatives align with the five thrust areas of AFIT's Quality Initiative.

	Thrust Area				
Initiative	Classroom Design	E-Learning Technologies	Faculty/Staff Development	Infrastructure	Org Structures
Library Transformation	X		X	X	X
Experimental Classroom	X	X	X	X	
Tablet Computers		X	X		
Support Org Advertisement			X		X
CETL	X	X	X		X
File Collaboration		X		X	

The committee was composed of the following members, representing organizations across AFIT:

- Committee Chair: Maj Jason Bindewald, Ph.D. – Assistant Professor of Computer Science
- Vice Chair: Dr. Alice Grimes – Director of Faculty Development, Graduate School of Engineering and Management
- Dr. Nancy Roszell – Director of Institutional Research and Assessment, Graduate School of Engineering and Management
- Ms. Amy High – Chief of Reader Services, D'Azzo Research Library
- Ms. Amanda Lindsay – Reference Librarian, D'Azzo Research Library
- Mr. Richard Kappel – Instructor of Engineering Applications, Civil Engineer School
- Mr. Michael Farmer – Department Head, Department of Systems Acquisition
- Maj Jeremy Millar, Ph.D. – Director of Client Systems & Assistant Professor of Computer Science

The recommendations that follow were proposed by the gap analysis committee and approved by the quality initiative executive council on 15 August 2017. These recommended areas were

identified by the gap analysis committee and handed off to the steering committee, composed of Maj Bindewald and Dr. Grimes for investment strategy development, to be performed directly in conjunction with the affected organizations.

I: Library Transformation

I.A. Gap Analysis Committee Recommendation:
The gap analysis committee recommended a Library Transformation Initiative consisting of three major components:

- Upgrade/Modernize furniture and study spaces in order to support collaborative learning styles and provide better electrical outlets to support increasing technology demands.
- Improve the library's classroom and collaboration spaces to foster innovation and experimentation and bring the library in line with other AFIT classroom modernization projects.
- Assess the current physical space and review options for introducing potential collaborative initiatives including a Center for Teaching and Learning, Writing Center, and/or additional Special Collections

I.B. Background:
With changes in technology and information retrieval, libraries are finding themselves at a crossroad. Librarians see their roles, teaching styles and their use of physical space in the library changing. They are challenging themselves to find new ways to reach out to students and other offices that complement their services. Reasons the gap analysis committee identified library transformation as a priority included internal data identifying the library as an organizational strength, identification of the changing landscape in library functionality in higher education, a similar success story at AFIT's parent organization, and previously started efforts by the library.

Investing in the AFIT library was seen as an opportunity to expand the capabilities of an organizational strength within AFIT. During the internal discovery committee's data gather work, the library was recognized as AFIT's most helpful organization. It was referenced positively in 98% of all survey responses related to the library's services. The internal discovery committee, specifically mentioned the library when referencing the school's need for a writing center for students and faculty and identified the physical space as a potential place for that type of capability with library functionality transforming in the future.

Additionally, the external discovery committee identified the library as a place where there is great opportunity to gain from transformational changes. Specifically, in the identified area "Rethinking of Library Functionality and Librarian Responsibilities" the external discovery committee showed several examples of schools rethinking the way that they are using their library resources both regarding space and personnel functions. When it comes to space, the library is working to digitize more of its content and will have more space to use for initiatives related to library priorities. As for personnel functions, the digitization of resources over time has made it possible for librarians to perform different tasks than those available in the past, focusing more time on digital research and collaboration with academic departments.

A visit to Air University during the Gap Analysis phase of the quality initiative gave the committee a chance to see the fruits of a multi-year effort by AFIT's parent organization to update and transform the physical space available to AU's Maxwell Air Force Base campus library, the Muir S. Fairchild Research Information Center (MSFRIC). Space was reconfigured with abundant collaborative spaces, improved lighting throughout, and significant improvements in library furniture. The librarians at MSFRIC noted that the work done there had improved their capability to reach more students, specifically with the emphasis on collaborative spaces.

Lastly, this initiative came to light as target of opportunity for AFIT to improve due to work that had already begun with regards to improvement of the physical space within the library. At the time of the Gap Analysis phase, the library had previously identified deficiencies with furniture, lighting, and collaborative spaces within the library and had begun to seek out funding to begin fixing some of the identified problems. Additionally, the library had begun a digitization process to reduce the physical stacks within the library. The committee recognized this work and saw it as an opportunity to focus future efforts on an area already identified by the discovery committees.

II. Tablet Computers for Education

II.A. Gap Analysis Committee Recommendation:
The gap analysis committee recommended that AFIT pursue development of an institution-wide effort to further adopt tablet computers into classroom environments. This effort would involve furthering existing uses of tablet computers through a gradual process of experimenting with new and innovative applications of the technology, developing a standard practice for tablet computer purchases, and identifying new technologies that could make tablet computer usage more effective at AFIT.

II.B. Background:
AFIT has recognized that the use of tablet computers and tablet computer carts in classroom environments could be beneficial for delivery of course material, student assessments, and utilization of resources in residential courses. Proposed uses for the carts/tablets are focused on creating collaborative/active learning environments, where student work can be shared. Reasons the gap analysis committee identified tablet computers for education as a priority included internal data identifying a desire to use the technology, recognition of new ways to improve existing collaborative instructional technology, identified success stories using tablet computers, and a unique need of a unique AFIT learning environment.

The internal discovery committee identified tablet computers, as a tool that a portion of graduate school faculty would like to have access to use in their classrooms. One of the internal discovery committee surveys identified that 29% of surveyed faculty either are already using these devices or would like to use them in classroom delivery and are currently not. Extrapolated to the entirety of the AFIT graduate school faculty (169 Personnel), this would identify a group of approximately 50 individuals who would like to use this technology in their classrooms.

Additionally, the internal discovery committee identified "Displays with Wireless Screen-Sharing Capability" and the external discovery committee similarly identified "Displays With Click to Share Capabilities" as one of the primary recommendations for the "Classroom Design" thrust area. During the periods of discovery phase of the initiative and into the Gap Analysis

Committee's operation, Air University provided AFIT with 12 Microsoft Surface Hub interactive displays. These devices were installed in several classrooms to enable collaborative teaching methods. The committee identified that in classrooms enabled with the Microsoft Hubs, tablet computers could be used to provide the wireless screen-sharing capability recommended by the internal discovery committee.

The external discovery committee also identified "Mobile Tablet Carts" one of their primary recommendations for the "Classroom Design" thrust area. The external discovery committee looked outside of higher education for innovative classroom technology use cases, identifying tablet carts as best practices at two local elementary schools and the DoD Fire Academy training classroom. AFIT's School of Systems and Logistics (AFIT/LS) and Center for Cyberspace Research (CCR) piloted tablet computer carts within their classrooms and were able to successfully integrate lesson plans and course materials. As a result of these successful internal and external efforts, the external discovery team identified further expansion of mobile tablet carts as a potential area of improvement for both the Civil Engineer School (AFIT/CE) and the Graduate School of Engineering and Management (AIFT/EN).

Another internal area of need identified during the gap analysis phase of the project was to remove paper from AFIT's Cleanroom. The cleanroom environment prohibits the use of paper. Cleanroom paper is available in some circumstances, but having tablets available addresses issues with items such as wiring schematics (which can't be printed on standard size paper), and supports student data collection and access to course information required during operation. Tablet computers provided an avenue to eliminate the need for paper in this environment.

III. Advertising Support Organization Capabilities

III.A. Gap Analysis Committee Recommendation:
Develop an investment strategy guidance to address the question: "What can support organizations, both internal and external, do for AFIT faculty, students, and staff to create a better teaching/learning environment?" Organizations involved may include a wide range of topics, ranging from AFIT financial management and AFIT Communications and Information Directorate all the way to Wright-Patterson AFB chaplain team and Wright-Patterson AFB contracting services. The goal is to give greater visibility to the services provided by organizations that support AFIT's mission.

This project should pursue two stages:

- An in-person presentation time for the "face" of each organization to describe their services to the AFIT community and give AFIT personnel a chance to ask questions.
- Creating video recordings of and capturing resources from the presentations and place them on an electronic repository available to AFIT faculty, students, and staff.

As presented, the effectiveness of the presentations should be measured and ways to improve the process should be addressed annually.

III.B. Background:
Reasons the gap analysis committee chose support organization advertisement as a core initiative include an analysis of the internal discovery committee's findings, input gathered from outside

institutions, a good example of an initiative that has worked in AFIT's parent organization, and the opportunity for a low-cost/high-impact initiative.

One of the recurrent themes that became apparent in the internal discovery committee's findings, based on surveys of faculty, students and staff, involved lack of specific types of support and capability. However, another thing that became apparent very quickly during the Gap Analysis phase was that many of the "problem areas" identified through surveys and feedback mechanisms were not problems with the capability itself but rather problems with communicating and advertising that capability's existence. For example, one finding of the internal discovery committee was the "lack of an enterprise solution for teleconferencing capability." When addressed by the gap analysis committee, however, the client systems representative on the committee noted that there are actually three solutions available to AFIT personnel, each with different capabilities depending on user needs. Examples like this illustrated that internal capabilities and support organization functionality need to be advertised transparently to students, faculty, and staff.

The external committee also found that several institutions visited by the committee had similar problems with capability advertisement. Other universities visited by the committee noted that some of the most effective work they have done in faculty and staff development has not necessarily been the faculty development itself, but rather the advertisement used to make those tools available to their members. The gap analysis committee saw that without developing AFIT's ability to advertise what capabilities were available, procuring and implementing more technologies and updating organizational structures would be rendered ineffective.

AFIT's site visit to Air University (AU) headquarters afforded the gap analysis committee with a model to pursue involving support organization capability advertisement. AU's Teaching and Learning Center has started a recurring "lunch and learn" program, wherein guest speakers are invited to present on a relevant topic and videos of the presentations are made available to the entire campus. These discussion sessions have not only allowed for faculty development opportunities, but have allowed the support organizations to better understand customers.

Lastly, the gap analysis committee chose to select at least one initiative that could be implemented quickly and with little to no investment of money and yet have a large impact on the institution. This was seen as an area that could have just that type of impact and was selected.

IV. Cloud-Based File Collaboration

IV.A. Gap Analysis Committee Recommendation:
Pursue an enterprise file collaboration system, such as Google Drive, Microsoft OneDrive, or Box, for use across AFIT. An ideal file collaboration solution would meet the following criteria, listed in order of importance:

- Enables file sharing and real-time file collaboration capability among internal AFIT users.
- Solution should be cloud-based, allowing access from offsite locations.
- Enables file sharing and collaboration between AFIT users and outside collaborators, as approved through proper security and public affairs channels.

- Integrates well with pre-existing equipment and software already in use at AFIT.

The file collaboration system pursued should not only fill AFIT's needs, but should be pursued in conjunction with higher-headquarters initiatives as much as is feasible.

IV.B. Background:
AFIT's internal and external QIP committees identified lack of cloud-based file collaboration capability sharing and storage as a major limiting factor for educational operations. Cloud storage supports communication and collaboration between students, faculty, and external collaborators (e.g., Air Force Research Laboratories, Air University, Southwestern Ohio Council for Higher Education, etc.). Access to cloud storage was identified by other universities visited by the external committee as a "must have" capability to support student success. Reasons the gap analysis committee chose cloud-based file collaboration as a core initiative include identification of the initiative by both the internal and external committees and an identification of trends being pursued within the Air Force to move to cloud-based productivity suites.

The internal discovery committee found, through surveys and other feedback instruments, that cloud-based file collaboration was an identified need. Specifically, the system currently in place (shared drives) is not accessible from any location outside of the AFIT internal network. Additionally, the current solution does not allow for real-time file collaboration and editing. Another facet of this identified problem includes the lack of access to available cloud-based file collaboration utilities due to restrictions on public file sharing usage across the DoD.

Concurrently, the external committee identified cloud-based file collaboration as the highest priority e-learning technology capability that AFIT lacks. The QIP external committee asked the representatives from each school with whom we met "If you were forced to give up all but one e-learning technology – which would you keep." Each school responded that their cloud-based file collaboration service was the most important e-learning technology. A common response was that not having a cloud-based file collaboration service would have a significant, negative effect on the ability of their faculty to collaborate both internally and with other institutions.

Additionally, the gap analysis committee identified that several initiatives within the Air Force have targeted cloud-based productivity and collaboration solutions. Several USAF organizations, including AFIT's parent organizations (Air Education and Training Command, Air University) and the U.S. Air Force Academy are currently pursuing cloud-based storage and collaboration solutions. At present, these efforts are focused around Microsoft's Office 365 product line, which provides cloud storage in addition to collaboration and office automation products. While these solutions are usable for collaboration within the Air Force, the requirement to host cloud storage in a Federal Risk and Authorization Management Program (FedRAMP) certified data center[1] or to clear the information for public release limits inter-agency and extra-governmental collaboration. In particular, it will be difficult for AFIT faculty to collaborate with other universities while employing FedRAMP certified cloud storage. This limiting factor is

[1] FedRAMP is a U.S. Federal Governement-wide program designed to ensure standardization to security of cloud-based technology solutions. This is achieved through security assessments and system authorization throughout the system life-cycle. Further information can be found at https://www.fedramp.gov

independent of vendor, and is the main reason that the committee's recommendation has rank-ordered the criteria for a successful solution.

V. Center for Excellence in Teaching and Learning (CETL)

V.A. Gap Analysis Committee Recommendation:
Develop an AFIT-wide Center for Excellence in Teaching and Learning (CETL) designed to support instructional capabilities that go beyond any one school. This organization would support faculty in instructional innovation and effectiveness, provide e-learning technology and course design training, assist faculty and students with writing and publishing, and coordinate training efforts for faculty. Additionally, this recommendation not only includes the pursuit of personnel to fulfill some or all of these functions, but also a centrally available location for any "student/faculty help" functions for CETL personnel to consult.

V.B. Background:
Both the internal and external discovery committees recommended aspects of a CETL. Reasons the gap analysis committee chose the CETL as a core initiative include the internal discovery committee's identification of needs for expansion of support for faculty development and a student writing center, the external discovery committee's recommendation based on visits to other institutions, and the gap analysis committee's visit to Air University's Teaching and Learning Center (TLC).

The internal discovery committee found that there is a lack of resources available for faculty development throughout the school. A survey devoted to faculty development identified that a more focused faculty development function would be useful for the graduate school in particular. Although each school has its own faculty development function, there are places where an institutional CETL faculty development function could aid everyone. An institution-wide faculty development role would allow best practices from schools to move outside of the rigid faculty stovepipes that we currently see, especially in areas of commonality like teaching.

Additionally, the internal discovery committee identified the need for an institutional writing center. Across the board, there were problems expressed with the quality of writing for incoming students. As such, having a centralized place where faculty from all AFIT schools could send students for writing help would be beneficial. This function could be used effectively for both in-residence graduate students as well as short-term continuing education students. A writing center could help AFIT to aid international students as they struggle with English as a second language in their already demanding programs.

The external discovery committee saw teaching and learning centers implemented at nearly all schools visited. These schools, ranging in size from small liberal arts institutions like University of Dayton up to Tier I research institutions like The Ohio State University, provided resources for faculty and student development. Additionally, these institutions made these resources available in a centralized and well-known location, in most cases this was the school library building. The availability of consolidated resources to help with teaching and learning proved useful to these institutions, with the most useful resources being writing aids, education technology specialists, and teaching/course development mentors.

After taking into account the discovery committees' findings, the gap analysis committee visited Air University headquarters at Maxwell AFB, AL and toured their recently stood up Teaching and Learning Center (TLC). This facility, located in the Air University Library, provides faculty development and student learning resources to anyone and everyone on campus. They have staff devoted to educational technology training and evaluation, writing help and training, and faculty development training and leadership. The facility given to the TLC includes a faculty and student lounge, a presentation/meeting room, and an experimental classroom, and offices for writing and faculty development consultation. The center is new and is still gaining a footprint at AU, but has taken great strides in conjunction with AU's investment to help the entire landscape of faculty and students.

VI. AFIT-Wide Experimental Classroom

VI.A. Gap Analysis Committee Recommendation:
Dedicate and outfit a classroom to serve as an AFIT-wide experimental classroom and ensure that it is staffed with properly knowledgeable personnel. Each AFIT school is individually investigating/testing new concepts and ideas for modernizing AFIT campus' physical classroom space and design. The AFIT-wide experimental classroom initiative will be a repository for promising technologies, to include underused currently-owned technologies (such as Clicker Response Systems), as well as emerging technologies. "Technologies" need not be cutting edge or even electronic. The AFIT-wide experimental classroom initiative encourages pedagogical experimentation. There needs to be technical experts at the ready to help instructors negotiate the technical learning curves as well as administrative/purchasing support since the lack of either will quickly stymie faculty innovation. At the end of the day, this initiative should provide AFIT leadership with recommendations (some tested, others not) and budget estimates for an Institute Investment Strategy that supports wider application, understanding that a graduate school solution may look very different than a continuing school solution.

VI.B. Background:
The internal discovery committee found that AFIT faculty would favor having access to an experimental classroom, with 62% of all survey respondents indicating a positive interest in having access to a classroom like this. More than 1/3 of faculty stated they would be "extremely interested" in this opportunity. As such, a core recommendation of the internal discovery team was to explore an experimental classroom.

Although the external discovery committee's findings showed a potential need for an experimental venue. Specifically, the committee's recommendation for a center for teaching and learning mentioned the need for "e-learning technology and support" and a "technology-equipped classroom space" made available to faculty members. Additionally, the external discovery committee recommended that AFIT look at several classroom design capabilities and e-learning technologies that the gap analysis committee believes would be best served by an experimental classroom to test out potential solutions before deploying them AFIT-wide.

Lastly, the Communications and Information Directorate has expressed a desire to have a chance to look at incoming technologies at an early stage in the procurement process to ensure they can best support that technology. An experimental classroom could provide a place for them to do just that. Additionally, bringing in an additional dedicated person to support educational technology

procurement, usage, and training could help bring AFIT to a quicker place in educational technology adoption.

4. Overview of AFIT's Financial Management Process

This section aims to educate the reader to specific processes that AFIT must work through to obtain funding and the constraints that are placed on different funding vehicles. The understanding of these processes will help the reader understand the barriers to implementation and unique opportunities that this places AFIT under when it comes to improving our instructional capabilities.

I. Financial Management

I.A. AFIT Funding Process

As an Air Force organization, AFIT receives the primary operating budget through the standard Air Force (AF) and Department of Defense (DoD) processes as a federal agency. Air Force budgets are approved by Congress and the President of the United States through the Defense Appropriation and Authorization Acts each fiscal year (FY) which runs from October to September. This process is illustrated in Figure 5.

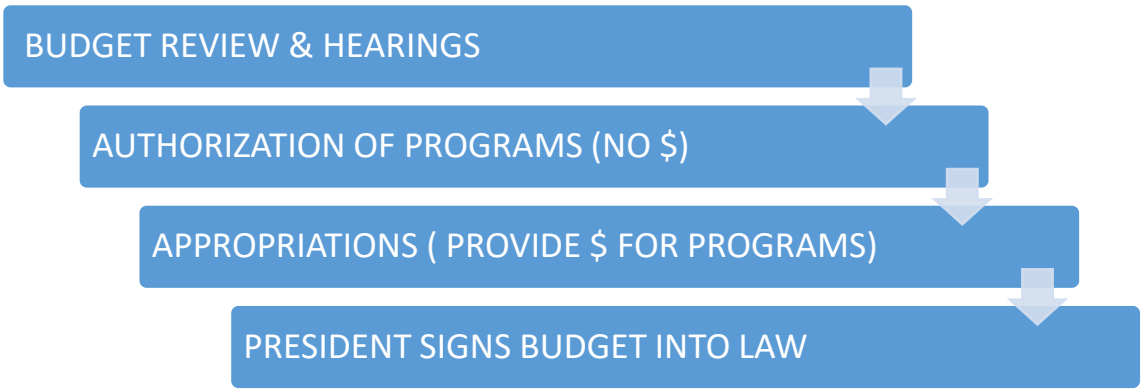

Figure 5. An illustration of the congressional budget process through which the United States Air Force and, as a result AFIT, receive funding.

The AFIT operating budget includes payroll for civilian faculty and staff, information technology expenses, educational service expenses, and basic supplies and expenses for operations. Salaries for active duty Air Force faculty, staff, and students are centrally funded by the Air Force, and are therefore not part of AFIT's operating budget. Standard facility maintenance costs and utilities for AFIT buildings are provided by Wright-Patterson Air Force Base. AFIT funding is subject to federal, DoD, and AF fiscal law, regulations and guidelines.

Once appropriated to the DoD, funding is distributed through the Air Force, to Air Education & Training Command (AETC), to Air University (AU), and then to AFIT for execution. In the spring before each FY, AFIT is given a budget target from AU with which to build an execution plan. If requirements exceed the budget target, unfunded requirements can be submitted to AU to request additional funding. If the unfunded requirements are critical to the ability to continue operations, they are typically approved for additional funding prior to the start of the FY. Other less critical or non-critical unfunded requirements are often funded throughout the FY based on need dates.

AU then submits a consolidated plan to AETC, AETC to AF, and AF to DoD. Figure 6 illustrates this process.

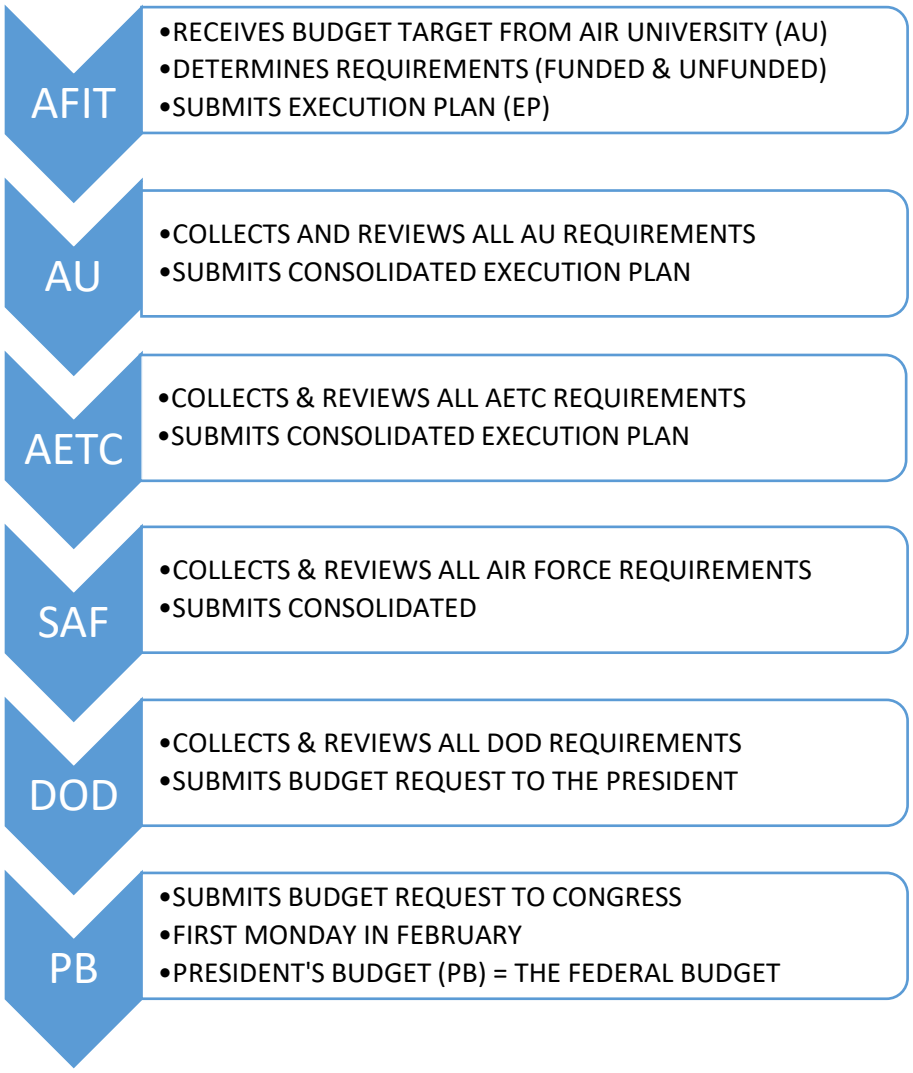

Figure 6. The process through which AFIT requests funding and submits plans for budget execution to higher headquarters and ultimately the United States federal government.

I.B. AFIT Funding Sources

While AFIT receives the primary operating budget through the process out-lined above, there are other sources of funding AFIT receives sponsoring activity beyond the graduate education mission. For example, research sponsors from various AF, DoD, and other federal agencies provide AFIT funding to support education related research activities. AFIT also receives funding from sponsors of Professional Continuing Education Courses (ex: Acquisition and Civil Engineering courses) and to fund AF personnel to obtain medical related degrees at civilian institutions. A minor source of funding comes from the small set of tuition paying AFIT graduate students. Most of AFIT students are centrally funded by the AF Figure 7 illustrates various sources of funding for AFIT.

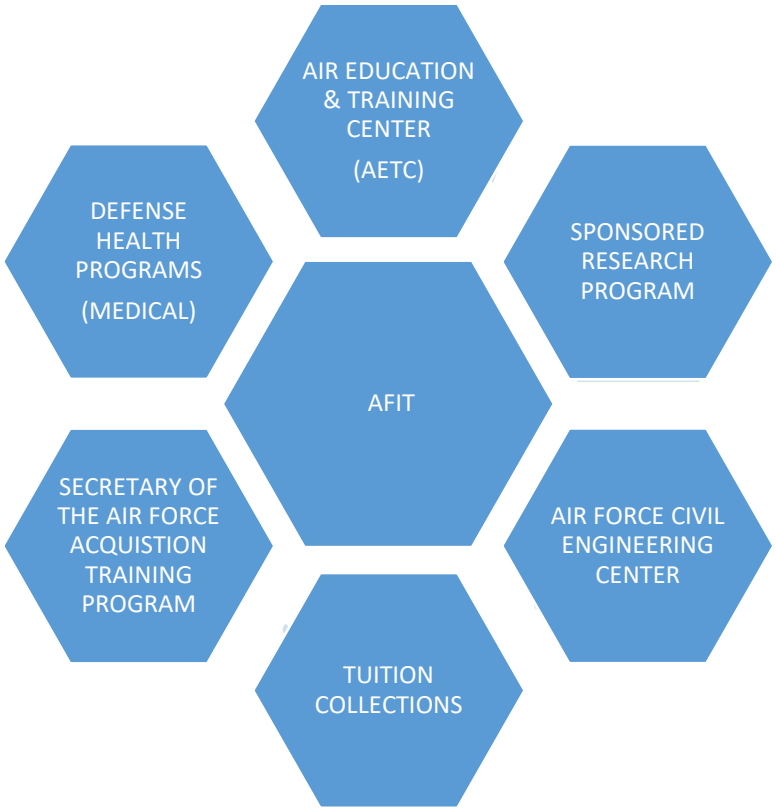

Figure 7. Organizations and processes through which AFIT receives funding.

5. Investment Strategy Guidance

This section of the quality initiative overviews the recommended investment strategy for the six initiatives identified by the gap analysis committee. Each section begins by identifying the momentum with which each initiative began before the quality initiative even started. Then it moves across to document the progress made during the execution of the quality initiative. The third section then summarizes the investments made into the specific initiative (e.g. time, money, human resources) throughout the quality initiative. Each initiative's stakeholders are then defined, with one organization specifically recommended as the primary controlling stakeholder. Finally, a list of recommendations for investment is given for each initiative.

Initiatives that can be quantified into timelines are presented as such, with other recommendations also being given. Based on the progress on each of the initiatives at this time, the recommendations for some are more developed than others. Specifically, the Center for Excellence in Teaching and Learning and AFIT-Wide Experimental Classroom will begin with further investment into planning. The Center for Excellence in Teaching and Learning has been initiated in virtual form, with many of the component services in place with others planned. Additional allocation of resources will allow the Center to be realized as described in this report, including writing support and the broadening of programs to benefit all of AFIT.

Additionally, in order to properly represent the investments made in AFIT's Quality Initiative to date, the following costs are assumed with respect to human resources:

- 1 FTE/year = $250K for senior leadership, $200K for faculty/students, $100K for admin.
- 1 FTE/hour = $120 for senior leadership, $96 for faculty/students, $48 for admin.

I. Tablet Computers for Education

I.A. Progress up to start of quality initiative

Prior to the start of the quality initiative, the School for Systems and Logistics (LS) and the Center for Cyberspace Research (CCR) had begun using tablet computers to supply course materials to students within classes. LS had purchased a mobile tablet computer cart equipped with 24 Surface Pro 4 tablet computers for student/classroom use. They have used these tablets to deliver course materials to continuing educations students in order to cut down on printing costs and enable experimentation with various classroom technologies. CCR had purchased two tablet computer carts equipped with 36 and 32 iPads respectively, to supply course materials to students in two continuing education courses, where students are taught Cyber Security leadership in a two-week, full-time in-residence course.

During the quality initiative, the Civil Engineer School (CE) worked with CCR and LS to identify lessons learned and decided to pursue the purchase of a tablet computer cart to aid with delivery of their continuing education courses. They chose to purchase a mobile tablet computer cart with 30 Surface Pro 4 Tablets, to be used in much the same manner as LS. Figure 8 shows a tablet computer cart purchased during the initiative.

Figure 8. A tablet computer cart implemented by the Civil Engineering School during AFIT's Quality Initiative.

Additionally, CE chose the Microsoft devices in order to work with the 12 Microsoft Surface Hub interactive displays that were purchased by AFIT's parent organization Air University (AU). Figure 8 shows the Microsoft Surface Hub setup used by CE. As the Surface Hubs were designed by Microsoft, the CE school identified that MS Surface Pro tablet computers worked especially well with the devices and allowed their students and faculty to take advantage of some of the technologies and capabilities provided by the devices. These capabilities include wireless screen sharing, real-time polling of students, sharing of collaborative control of the presentations screen.

Figure 9. A demonstration of the Microsoft Hub and a MS Surface Pro tablet computer utilizing wireless screen sharing.

I.B. Current status and work on the initiative

Once the Gap Analysis committee identified tablet computers for instruction as an item to pursue, it was determined that a good place to start would be to identify specific uses that AFIT may have for these technologies. It was suggested that the process could launch within the Graduate School for Engineering and Management (EN) with an experimental tablet cart. The first tablet cart has been submitted to AFIT's internal capabilities request process and upon approval by AFIT's computer support function will be purchased. This cart will contain 32 tablet computers along with a mobile cart. However, the cart will provide an additional capability to those previously purchased by LS and CE, wherein the tablet can not only be stored and charged, but also can be administered and updated in a batch process as opposed to individual updates.

Additionally, it was identified that AFIT's cleanroom needed tablet computers in order to operate paper free and eliminate a potential contaminant from their environment. Six tablet computers have been ordered and are expected to arrive in the summer of 2018. These tablets used in a laboratory environment will be used to potentially give a chance for other research laboratories to see whether or not they could be used in their facilities for similar purposes.

The purchase of all tablet computers and tablet carts is ongoing and will be used to identify best practices for future purchases of tablet computers within AFIT and to further standardize product purchases across AFIT.

I.C. Summary of investments made during the QI

In addition to the investments made prior to the quality initiative by LS and CCR, AFIT and its parent organization have invested heavily into the pursuit of this core initiative. $36,893 have been invested in the purchase of the 25 CE school Microsoft Surface Pro tablets and mobile cart. Currently in the process of being purchased, $10,000 will be invested in the AFIT cleanroom tablets and approximately $97,000 will be invested into the experimental tablet computers and tablet computer cart for EN. Additionally, the MS Surface Pro Hubs were procured for AFIT at a total cost of $312,000, showing Air University's investment in AFIT's mission as well as their desire to improve collaboration capabilities directly with AFIT.

In addition to the money needed for these devices, several FTE-hours have been invested into the purchase and procurement of the tablet computer carts and MS Hubs. Approximately eight faculty FTE-hours, $768 at $96/hour, and 40 admin FTE-hours, $1,920 at $48/hour, were invested into the investigation of alternatives for tablet computer and computer cart purchases across CE, EN, and the AFIT Cleanroom. In addition 192 admin FTE-hours, $9,216 at $48/hour, were invested into the set-up and installation of MS Hubs, and approximately 34 admin FTE-hours, $1,632 at $48/hour, into the set-up of the tablet computers and mobile tablet carts. Lastly, 12 rooms across AFIT's schools have been allocated for use in conjunction with the MS Hubs.

The total investment to date for the Tablet Computers for Education initiative includes 266 admin FTE-hours, which translates to an outlay of $12,768 at the aforementioned cost of $48 per hour,

and eight faculty FTE-hours, an outlay of $768 at $96 per hour. Including both human resource and equipment costs, AFIT's total investment (to include contributions given via Air University) to date in the Tablet Computers for Education initiative includes an outlay of approximately 274 FTE-hour and $\$36{,}893 + \$10{,}000 + \$97{,}000 + \$312{,}000 + \$12{,}768 + \$768 = \$469{,}429$.

I.D. Stakeholders

As AFIT moves forward with this initiative, the primary leaders of this initiative will be the educational technology liaisons for each of the schools, with the CE school identified as the lead for all of AFIT in this initiative. At the time of writing, the primary points of contact for each school include: LS – Mr. Brian Fitch, CE – Mr. Tim Fuller and Mr. Richard Kappel, EN – Mr. John Reisner, and EX – LtCol Reginald Smith.

Additionally, other stakeholders who will be involved in this process include the Center for Excellence in Teaching and Learning (CETL) and AFIT Communications and Information Directorate. The CETL will be involved in providing training on how to use the tablets more effectively within classrooms to aid faculty with improving their overall instruction. The AFIT client systems branch will need to be involved in the process throughout, as they will provide approval for purchases of IT equipment and will be able to enable more effective coordination of AFIT-wide standards for purchase and use of equipment.

I.E. Recommended future steps

The quality initiative's Executive Committee recommends the following future steps and approximate timeline for completion, with adjustments as new inputs and circumstances may dictate:

- February-June 2018 – Complete purchase and installation of AFIT Cleanroom tablet computers
- January-February 2018 – Analyze and identify a set of tablets and tablet computer cart for purchase by EN
- February-June 2018 - Complete purchase and installation of EN tablet computer carts
- June 2018-January 2019 – The leads in EN, LS, & CE work to identify best practices and potential areas of expansion for further use of tablet computers and mobile tablet carts
- February-June 2018 – Client Systems works with all AFIT schools to determine a tablet computer procurement best practice and standardization
- January 2019-September 2019 – CE leads working group to determine areas of expansion for tablet computers within AFIT, with specific emphasis on three areas:
    - Further purchases of mobile tablet carts for additional classrooms
    - Pruchase of future tablet comptuers as a service
    - Initiatives to provide every student within a given program/school with a tablet comptuer
- October 2019-September 2020 – Procure and implement tablet computers and mobile tablet carts in identified areas

II. Library Transformation

II.A. Progress up to start of quality initiative

Prior to the start of the quality initiative, the AFIT D'Azzo Research Library began work to modernize some of the furniture in the library and investigate ways to transform some of the library's spaces currently devoted to shelved materials. Three arms of effort have taken place either before or during the quality initiative: (1) a collection digitization effort, (2) update of lighting and furniture within the library, and (3) a movement toward more of an online presence for library personnel.

The library's digitization efforts have run in conjunction with AFIT's quality initiative and have begun to bear some fruit, but will continue into future years. The effort began by attempting to identify physical stacks (shelved materials) within the library that could be removed if the materials present could either be (a) found available online or (b) digitized and made available. These efforts have begun with the library's journal collections and continued with the collections of theses and dissertations. As these efforts continue into future years, the entirety of the library's physical stacks will be addressed.

Identified simultaneously was an effort to update the lighting in the library and to purchase new collaborative furniture for the library. One of the limiting factors of the library's design has been the lack of sufficient lighting for reading and student/faculty work. Due to the large windows on the North side of the building, the library has unique lighting needs and constraints. Consequently, the lighting design for the space has proven insufficient. Requests have been made to address this lighting in the past, but has not met with high enough priority to gain the appropriate type of funding needed to sufficiently address it.

Additionally, the furniture in the library has become outdated and needs to be refreshed. As such, flexible, collaborative furniture setups (such as those identified in the External Discovery Committee's final report) have been pursued and procured. The entire main floor's furniture has been replaced during the time of the quality initiative. Additionally, digitization efforts have proved useful in freeing up space, as a small room previously devoted to AFIT's microfiche collection has been transformed into a student/faculty workspace with flexible use table and study spaces. Further furniture upgrades are projected into the future in conjunction with the D'Azzo Library's digitization efforts.

As the digitization and physical space efforts have moved forward, an online presence for AFIT's library has been pursued. During the quality initiative effort, the library has created an institutional repository, AFIT Scholar (http://scholar.afit.edu). This effort has provided a home for digitized material previously physically housed within the library's shelves. The site went live during the investment strategy development phase of the quality initiative and is currently available to the general public. The move to more of an online presence, directly tied to the library, ties in well with practices observed by institutions researched by the External Discovery Committee.

II.B. Current status and work on the initiative

Once the gap analysis committee identified the library transformation as a priority initiative a meeting with the library's faculty advisory committee identified several areas for future planning and work to further develop the initiative into an actionable plan. Upon completion of that

meeting, three main thrusts of future effort began (1) work to request upgrades to existing classroom furniture and furniture for the converted microfiche room, (2) development of a plan for space usage by a library planning architect for building transformation, and (3) continuation of the digitization efforts.

The first action item from the meeting was to submit an unfunded requirement request for furniture needed for existing classrooms and the converted microfiche room. This request covers collaborative furniture for a much improved functionality of space and to facilitate learning in the library's existing spaces. It is essential that the library have funding to purchase furniture that is conducive to peer to peer learning, inspires creativity and increases student engagement. This request has been submitted to AFIT's internal unfunded request process and will be weighed against other funding requirements to prioritize its completion.

Since the library's infrastructure requires major modifications to accommodate the transformation project (including library-wide electrical updates, improved lighting, and periodical/book placements), an unfunded requirement request was also submitted to bring in a qualified architectural firm that specializes in library design, working with the library staff and leadership, to properly plan for a major library renovation including developing design plans and specifications, cost estimates, and schematics for the entire library. This request has been submitted to AFIT's internal unfunded request process and will be weighed against other funding requirements to prioritize its completion.

Figure 10. Before and after pictures showing an example of the tables previously in place in the D'Azzo Research Library and those put in place as a result of the Library Transformation initiative.

In addition to this request for funding/procurement, which are major hurdles in AFIT's funding process, the following items have been completed during the time of the quality initiative. The AFIT Scholar website (http://scholar.afit.edu) has been made publicly available and several years of theses and dissertations have been digitized. As previously noted, several pieces of furniture were purchased for the library main floor. Most have since been installed and placed into use, Figures 8 and 9 show before and after photographs capturing two aspects of the main floor furniture upgrade that have been completed during the Quality Initiative. Additional momentum in the

library transformation is reflected in the digitization of more than 700 theses/dissertations and technical reports, with 10,000 more to come in future years.

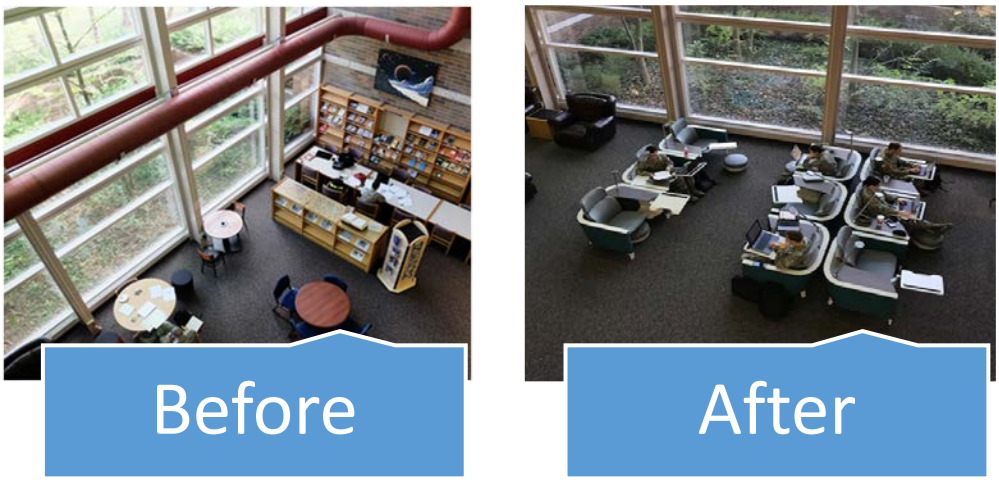

Figure 11. Before and after pictures showing an example of the ongoing Library Transformation efforts as they pertain to main floor seating options.

II.C. Summary of investments made during the QI

In addition to the investments made into the library transformation prior to the quality initiative by AFIT, the institute has invested personnel, time, space, and money to this initiative. To date, 1,245 FTE-hours and $75,000 in equipment have been invested into the digitization project. Additionally, $131,150 worth of collaborative furniture has been purchased and installed on the main floor in the D'Azzo Research Library. The setup of this furniture has required, to date, an outlay of 30 FTE-hours.

The library staff and faculty advisory committee has invested several FTE-hours to the development of the requirements and plans for this initiative, as well as in the creation of unfunded requirements request. In total, 350 admin FTE-hours have been devoted to planning and programming for this initiative and approximately 20 faculty FTE-hours. Lastly, the D'Azzo Research Library has devoted the former Microfiche room at a total of 400 square feet for use as a collaborative work area for this purpose.

The total investment to date for the library transformation initiative includes 1,625 admin FTE-hours, which translates to an outlay of $78,000 at the aforementioned cost of $48 per hour, and 20 faculty FTE-hours, an outlay of $1,920 at $96 per hour. Including both human resource and equipment costs, AFIT's total investment to date in the Library Transformation initiative includes an outlay of approximately 1,645 FTE-hours and $\$75{,}000 + \$131{,}150 + \$78{,}000 + \$1{,}920 = \$286{,}070$.

II.D. Stakeholders

As AFIT moves forward with this initiative, the primary leaders of the initiative will be the D'Azzo Research Library director. At the time of writing, the primary points of contact for the initiative is Dr. Ellis Beteck. The Air Force Research Laboratory (AFRL) library liaison will need to be included, as the library is a joint facility and any changes will need to be coordinated. The library's

faculty advisory board will also be a stakeholder in ensuring that faculty and student needs are adequately addressed in all future plans.

Additionally, other stakeholders who will be involved in this process include AFIT Facilities Utilization Board (FUB), which must be included in the process of apportioning any space utilization plans. The Center for Excellence in Teaching and Learning (CETL) will be involved based on the recommendation herein to implement portions of the CETL in the library, in particular the writing center. The AFIT client systems and facilities management offices will need to be included on any details involving their offices.

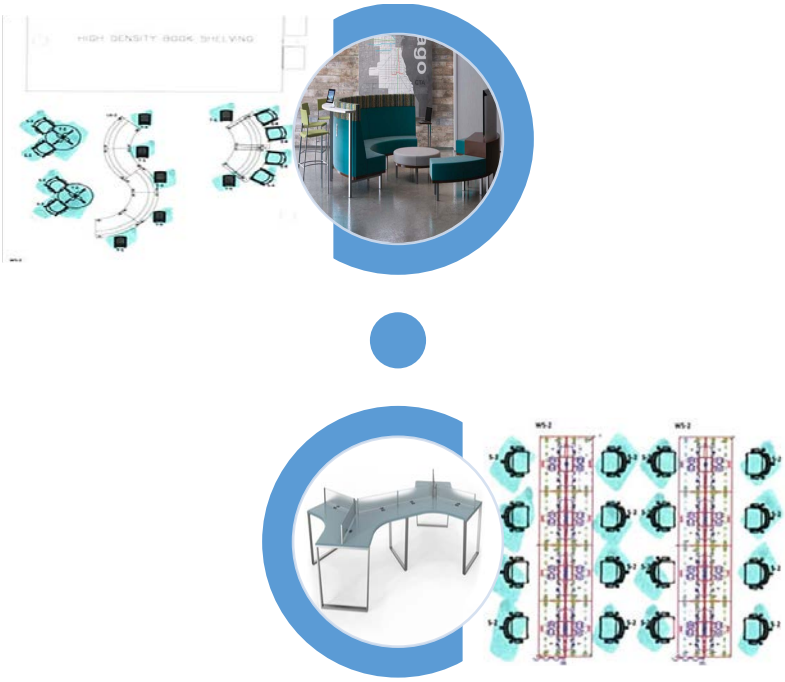

Figure 12. Pictures of and architectural drawings for furniture arriving for the D'Azzo Research Library in January 2018.

II.E. Recommended future steps

The quality initiative's Executive Committee recommends the following future steps and approximate timeline for completion, with adjustments as new inputs and circumstances may dictate. The timeline recommended here relies heavily on the development of a master renovation plan to be developed by an architectural firm with experience in library renovations. As such, a revisiting of this plan upon completion of that step is important to successful completion:

- December 2017-June 2019 – Complete technical report, microfiche, and second floor journals stack reduction project.
- December 2017-January 2018 - Install additional main floor furniture (see Figure 10).
- December 2017-March 2018 - Review and update unfunded requirement request for additional collaborative furniture for existing classroom space and microfiche room.
- January-June 2018 - Update library strategic plan.
- March-September 2018 – Hire and work with an architect on library redesign efforts to take advantage of space cleared up through digitization efforts and create a library master renovation plan.

- October 2018-January 2019 - Submit requests to Wright-Patterson Air Force Base civil engineering squadron for electric updates and to merge physical locations of the circulation and reference librarian desks in conjunction with library master renovation plan.
- October 2018 - Submit funding request and project plan for second floor renovation projects in conjunction with library master renovation plan.
- October 2018-September 2020 - Update lighting and electric capabilities for the entire library.
- November 2018-October 2019 - Complete third floor stacks reduction project.
- July 2019-June 2020 – Complete second floor renovation project.
- November 2019 - Submit funding request and project plan for third floor renovation projects in conjunction with library master renovation plan (contingent on complertion of second floor renovation project).
- November 2019-February 2020 – Complete project to merge physical locations of the circulation and reference librarian desks.
- March 2020-September 2020 - Add consultation rooms in conjunction with library master renovation plan.
- August 2020-July 2021 - Complete third floor renovation projects in conjunction with library master renovation plan.
- May 2021-August 2021 - Update carpet and paint throughout the entire library.

Additionally, Executive Committee specifically recommends that AFIT actively pursue housing outward facing portions of the CETL in the library as space is freed up through the library's digitization efforts. Two specific areas of use include the writing center and AFIT-wide experimental classroom.

III. Advertising Support Organization Capabilities

III.A. Progress up to start of quality initiative

Before the quality initiative, there was no consolidated effort across AFIT to advertise the capabilities of either AFIT's internal support organizations or those of support organizations who could help AFIT personnel. There had been efforts in each of the different schools to bring in speakers for faculty development and training, but most of these efforts tended not to be geared for AFIT-wide consumption. As such, any interactions of this nature were not known to the quality initiative team.

III.B. Current status and work on the initiative

Part of the identification of support organization advertisement happened during the external discovery committee phase. Several of the schools visited had teaching and learning centers with a capability specifically assigned to making sure faculty knew about opportunities for development and to learn about technologies within the organization. The University of Dayton specifically noted that one of their most important functions (and one they would like to improve) was to advertise capabilities to faculty via their social media accounts.

Additionally, during the gap analysis phase of the initiative a group of four from the gap analysis committee made a visit to Air University headquarters at Maxwell Air Force Base, AL and saw

some potential ways to help faculty demonstrated through their Teaching and Learning Center (TLC). The TLC would hold regular "Lunch and Learn" events wherein they would bring in speakers to help with faculty development. However, they added two items onto this that seemed extremely helpful. First, they would record each of the sessions and make them available to folks throughout the organization. Second, rather than just the traditional faculty development sessions aiming to improve productivity or teach some concept, they brought in organizations from around campus and Wright-Patterson Air Force Base who would let faculty members know how they could help. The AFIT/EN Faculty Development Office currently provides monthly "lunch and learn" opportunities and as a result of the QIP, support organization presentations have been added and are recorded and archived online for future viewing.

Once the gap analysis committee decided on the pursuit of Advertising Support Organization Capabilities, the Graduate School of Engineering and Management's faculty development coordinator began pursuing a series of "Lunch and Learn" events geared toward giving faculty and staff across all of AFIT the chance to learn about capabilities of support organizations. The first such event took place in December of 2017 and gave pointers and best practices for how to navigate the Air Force's funding through a vehicle called Unfunded Requirements. Screen captures from the recorded video are shown in Figure 11. The event was attended by faculty and staff representing organizations throughout all of the schools and received extremely positive feedback. Current efforts are underway to take the lessons learned from this event and to expand it in the future, house all of the videos of the events online, and seek out new topics.

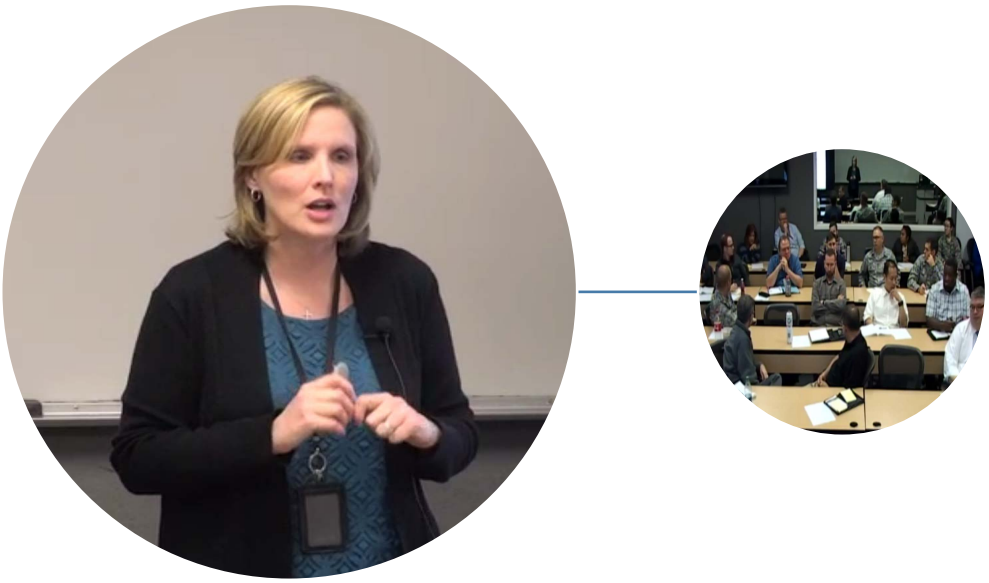

Figure 13. Screen captures from video recorded during the first "Lunch and Learn" covering unfunded requirements requests, started as a result of the Advertising Support Organization Capabilities initiative.

III.C. Summary of investments made during the QI

The primary investment for this initiative is human resources and space. During the initiative two sets of efforts have been completed. First, a group of six faculty members invested a total of 10 faculty FTE-hours, $960 at $96/hour, creating a list of initial topics that would be useful across all of AFIT. The Graduate School of Engineering and Management's Director of Faculty

Development spent approximately 20 faculty FTE-hours, $1,920 at $96/hour, organizing the first "Lunch and Learn," scheduling the speaker, classroom space, videographer, and reorganizing the institution's SharePoint site to accommodate the videos. AFIT's Communications and Information Directorate invested approximately four admin FTE-hours, $192 at $48/hour, adjusting privileged and updating the SharePoint site in order to accommodate the videos and other briefing materials. AFIT's head of financial management spent approximately eight senior-leader FTE-hours, $960 at $120/hour, preparing the session materials. Lastly, the Extension Services Office spent approximately four admin FTE-hours, $192 at $48/hour, setting up, recording, and editing the video capture for the "Lunch and Learn" and devoted one classroom for approximately two hours to the effort.

In total 46 FTE-hours were invested up to the time of the first session at a cost of $4,224. Moving forward, the goal is that the lessons learned and time invested up front will make future efforts' time and resource investments smaller in scope.

III.D. Stakeholders

As this initiative moves forward, it is important that the primary stakeholder for this initiative have an AFIT-wide view of the initiative. Therefore, it is proposed by the gap analysis committee that the primary stakeholder be the head of the proposed Center for Excellence in Teaching and Learning. Other stakeholders include AFIT's Communications and Information Directorate, who will need to help manage the online repository for sharing videos and resources, and the extension services office, who control access to the classroom used for recording these sessions as well as the recording equipment therein. Lastly, the organizations that will be presenting at these sessions will be investing significant time and effort to this initiative.

III.E. Recommended future steps

The quality initiative's Executive Committee recommends the following future steps and approximate timeline for completion, with adjustments as new inputs and circumstances may dictate:

- January-June 2018 – CETL director works with the Communications and Information Directorate to develop a SharePoint website to house materials that advertise support organizations relevant across AFIT.
- January-December 2018 - CETL director schedules and executes six relevant events and gathers feedback from attendees throguhout the first year of the initiative.
- November-December 2018 – CETL reevaluates the types of organizations and formats of presentations for future years and makes recommendation for future years of the initiative.
- January 2019-Indefinite – Execute the strategy proposed by the CETL.

The recommendation provided by the CETL director at the end of 2018 should focus on:

- Addressing feedback and lessons learned from 2018 sessions.
- Technologies and human resources that could improve AFIT's ability to advertise support organizations.

IV. Cloud-Based File Collaboration

IV.A. Progress up to start of quality initiative

Prior to the start of the quality initiative, no significant push for file collaboration capability was completed at AFIT. The current solution for file sharing has consisted of a combination of file servers constructed as a set of shared drives and the use of Blackboard websites. The shared drives are useful for sharing documents, but limitations include the difficulty of accessing files from offsite, as they require the use of a VPN connection, and the lack of capability to collaboratively work on files concurrently. Blackboard is useful for sharing files within classes, solving the offsite access problems, but has the same limitations with regard to real-time file collaboration and adds the limitation of being connected directly to classes, thus not allowing file sharing outside of small limited-focus collaborative groups.

Additionally, the AFIT network has restricted access to publicly available file collaboration tools such as Google Docs and Box, due to Air Force network public release and security concerns. As such, tools that could be used for this purpose have been limited.

IV.B. Current status and work on the initiative

During the quality initiative, work has been done to identify the need for cloud-based file collaboration. The internal and external discovery committees both identified the need for file sharing and collaboration capability, as described in the gap analysis section of this report. Additionally, during the time of the initiative, the Academic Resources Committee (ARC) developed their annual report outlining technical needs identified by faculty members throughout the year. This report specifically mentioned a widespread desire for some form of file sharing and collaboration capability that allowed internal collaboration and potentially external collaboration opportunities.

Concurrently to the identification of this problem, the client systems branch began to identify barriers to the publicly available solutions and ways to address them. The first barrier involved the requirement for all DoD internal documents housed on cloud-based services to be housed on a FedRAMP approved data center, approved for documents of the appropriate classification level. The Communications and Information Directorate identified Google Docs, Microsoft Office 365, and Box as providing file collaboration services on FedRAMP approved servers. The limitation these services place on usage at AFIT is that they restrict file-sharing to internal sharing and collaboration only. However, this is an improvement on the current situation and is a restriction inherent to dealing with information that can have different classification levels and releasability restrictions.

In December of 2017, AFIT began to engage with higher headquarters to develop an enterprise solution that will provide file collaboration services on a FedRAMP approved data center. Upon proposing this solution through the Air Force Program Objectives Memorandum (POM) funding request process, AFIT learned of two initiatives already started within the Air Force that could be useful to AFIT in this process.

First, the investment strategy team for this initiative learned that the U.S. Air Force Academy (USAFA) is pursuing the use of an Office 365 service across their campus to provide all of its productivity services, to include email and file sharing. Secondly, and more directly applicable to

AFIT, is an Air University initiative to deploy Office 365 across its entire enterprise, with several of the same capabilities identified for USAFA. This initiative is in the fact-finding stages and will include capabilities such as email and other productivity software and could take a few years before coming to fruition. That being said, AFIT was advised to ensure integration of any file collaboration system into a solution that would work with AU's eventual decision.

Lastly, AFIT's current learning management system is in the process of being replaced by Canvas. This solution was implemented due to a contract change across the entirety of Air University, where Canvas will be rolled out to the entirety of AU to include AFIT during 2018. As a result, it is important that any solutions provided to the file collaboration problem specifically are able to interact with Canvas.

IV.C. Summary of investments made during the QI

The primary investment for this initiative has been in time devoted toward capabilities development and pursuit of funding for the project. During the initiative, two faculty FTE-hours, $192 at $96, were devoted to finding out what solutions to the problem were FedRAMP approved. Eight faculty FTE-hours, $768 at $96/hour, were devoted to developing, revising, and presenting the inputs to the Air Force POM process, a request for funding limited to projects or resources of a large scale. Although the initial request was not successful in gaining monetary resources, it served as a chance to codify AFIT's requirement and to learn about similar initiatives going on throughout the Air Force that could open up resources heretofore unknown to AFIT. Additionally, four admin FTE-hours, $192 at $48/hour, have been devoted to capturing the needs of AFIT, such as number of licenses and bandwidth limitations, for this project. This investment reaches a total of 14 FTE-hours and $1,152.

IV.D. Stakeholders

The primary stakeholder in this initiative is AFIT's client systems branch, as they will provide any IT services rendered to this project and will ultimately be responsible for implementation and service. Additionally, the Air University Chief Information Officer and Financial Manager will need to be involved due to the need for collaboration with our parent organization. Committees present at AFIT that will have a say in the final implementation include the Academic Resources Committee (ARC), for the purposes of gathering needs/requirements, and the IT Utilization Board (ITUB), for the purposes of approval of an overall IT strategy. Lastly, representatives from each AFIT school will need to have input to the overall solution as the project progresses.

IV.E. Recommended future steps

The quality initiative's Executive Committee recommends the following future steps and approximate timeline for completion, with adjustments as new inputs and circumstances may dictate:

- December 2017-January 2018 – Client Systems director submits a capability request for file collaboration service through Air University's request process.
- December 2017-March 2018 - Research other DoD organizations that have been moving to Office 365 or other cloud-based productivity suites to ensuring that we are not inadvertently requesting a capability that our current infrastructure can't support.

- December 2017-April 2018 – Investigate interim solutions for file collaboration as a stop-gap solution until AU solution comes online.
- January 2018 – Site visit by Client Systems director to AU in order to speak with AU CIO and clearly communicate AFIT's needs for a file collaboration solution.
- May 2018 – Client Systems presents file collaboration solution to IT Utilization Board for approval.
- June-September 2018 – Pursue unfunded requirements money to implement an interim solution for file collaboration until AU solution is fully on-board.
- October 2018-March 2019 – Client systems implements interim file collaboration solution.

Any solutions procured by the client Systems team must be FedRAMP approved to the appropriate level needed by AFIT. An ideal file collaboration solution should strive to meet the following requirements as possible (listed in order of importance):

- Enables file sharing and real-time file collaboration capability among internal AFIT users.
- Solution should be cloud-based, allowing access from offsite locations.
- Enables file sharing and collaboration between AFIT users and outside collaborators, as approved through proper security and public affairs channels.
- Integrates well with pre-existing equipment and software already in use at AFIT.

Any IT solutions produced from this initiative should include appropriate allocations of resources need by client systems to support their implementation and support.

V. Center for Excellence in Teaching and Learning

V.A. Progress up to start of quality initiative

Based on the gap analysis committee's recommendation, the three primary capabilities for this initiative include faculty development, writing help, and educational technology development at an AFIT-wide level. Similar to the Advertising Support Organization Capabilities initiative, before the start of the quality initiative the efforts herein were compartmentalized to each specific school. All of the schools have created some sort of faculty development function and support continuous learning from the faculty, but there were opportunities for synergy between the schools.

For writing help, the only school actively employing this capability in any way that the Quality Initiative committees could find is the Graduate School of Engineering and Management. This help is limited to an adjunct faculty member teaching a technical writing course. The limitations of the method include the lack of specific help given to individual students, no concern for non-degree-seeking students, and no ongoing mentoring to support student development or to assist faculty.

With educational technology, each school has at least one person devoted to educational technology development and training. However, each person has his own school as the primary responsibility and as such, many technologies are not looked at across the entire institution.

V.B. Current status and work on the initiative

During the quality initiative, work has been done to identify the need for a Center for Excellence in Teaching and Learning (CETL). As laid out in the gap analysis section, it was clear that other institutions are prominently moving toward a teaching and learning center model for delivering student help (e.g. writing centers) and teaching mentorship opportunities.

During the discovery phase of the quality initiative, the dean of the Graduate School of Engineering and Management (AFIT/EN) stood up the Center for Advanced Teaching and Learning for the graduate school, placing the Director of Faculty Development as the chair. At this time, the organization has been tasked to determine the best ways to move forward and what resources are needed to improve teaching at AFIT. Because of this organization already being in existence in EN, there is an opportunity to expand it and serve a greater population than just the graduate school.

During the time since the gap analysis phase of this quality initiative the primary investment, significant work has not been completed on this initiative, as the main focus was on the first four listed. As such, most of the investment of time and resources will come in the proposed recommendations.

V.C. Summary of investments made during the QI

As this was not a primary focus to begin work during the initiative, the investments in this initiative have all been from a planning and strategy development perspective. The quality initiative steering committee has devoted 40 faculty FTE-hours, $3,840 at $96/hour, directly to this initiative's planning over the cycle of the quality initiative.

V.D. Stakeholders

The primary stakeholder for this initiative include the faculty development coordinators from each of the schools, with the Director of Faculty Development from the graduate school taking the lead for all of AFIT. Additionally, the educational technology experts from each school will need to be integrated into processes as will the writing adjunct professors currently teaching technical writing courses. The elements of the CETL could also play into the Library Transformation initiative. Lastly, the facilities utilization board (FUB) will need to address the use of any facilities needed for CETL functions.

V.E. Recommended future steps

The quality initiative's Executive Committee recommends the following future steps and approximate timeline for completion, with adjustments as new inputs and circumstances may dictate:

- December 2017-March 2018 – Establish the Center for Excellence in Teaching and Learning (CETL) as an AFIT-wide organization, housed within the graduate school of engineering and management.
- January-March 2018 – Define the functions that the CETL will lead, specifically focusing on functions that will have an AFIT-wide impact, such as writing support and experimental classroom technology.

- January-September 2018 – Procure a writing support capability that is open and accessible to all AFIT students and is preferably available in a visible location such as the library. This should be similar to the capability currently in place at Air University headquarters.
- January-September 2018 – Define the requirements for an educational technology liaison who can work in conjunction with the experimental classroom initiative to help all the schools with experimental technology not ready for use in operational classrooms. This person should work hand-in-hand with the school educational technology experts and the Communications and Information Directorate.
- March-September 2018 - Develop space for an experimental classroom and space for a writing center along with consultation rooms. These spaces should be considered for multi-purpose use along with other purposes to ensure best use of available space.
- October 2018- March 2019 – Procure the services defined for the educational technology liaison. This person should function similarly to the educational technology support that is already in place at Air University headquarters.

The CETL's mission should not be to replace the faculty development and educational technology functions of each individual school, but rather to supplement them. This should be done by facilitating sharing of ideas in faculty and student development and by pursuing initiatives that will benefit all schools mutually.

VI. AFIT-Wide Experimental Classroom

VI.A. Progress up to start of quality initiative

Before the start of the quality initiative there had been educational technology experimentation within each of the schools, but that process has been devoted to each of the individual schools' needs. Additionally, technology for experimental usage has been brought into operational classrooms and it has been difficult to test new technologies or capabilities without interrupting day-to-day operations of the schools. As such, this initiative had the least momentum before it was identified by the gap analysis committee.

VI.B. Current status and work on the initiative

In conjunction with the CETL, the AFIT-Wide Experimental Classroom was not fully developed during the quality initiative, instead focusing on starting the first four initiatives and setting up this initiative for future investment upon completion of the initiative according to the recommendations outlined below. As laid out in the gap analysis section, it was clear that other institutions are working with experimental classrooms before moving technology out to the larger institutions. For example, Air University has developed an experimental classroom location, wherein teachers can work on new technologies and give educational technology liaisons insights into what works and what does not.

At this time, no significant work other than planning and investment recommendation has been invested into this initiative since the gap analysis phase of this quality initiative, as the main focus was on the first four listed initiatives. As such, most of the investment of time and resources will come in the proposed recommendations.

VI.C. Summary of investments made during the QI

As this was not a primary focus to begin work during the initiative, the investments in this initiative have all been from a planning and strategy development perspective. The Gap Analysis Committee invested 20 admin FTE-hours, $960 at $48/hour, on defining the needs for an experimental classroom from each of the schools at AFIT. Additionally, the quality initiative steering committee has devoted 10 faculty FTE-hours, $960 at $96/hour directly to the development of this initiative's planning over the cycle of the quality initiative. The total investment to date on this initiative is approximately $1,920 across 30 FTE-hours.

VI.D. Stakeholders

The primary stakeholder should start with AFIT's Facilities Utilization Board (FUB), with the charge to create a task force charged with assigning a room for this initiative and seeing the process through to construction and full operational capability of the experimental classroom. The task of the assigned FUB committee would be to develop a classroom with the infrastructure to support an AFIT-wide experimental classroom model. At this point, the primary ownership of the process should be transferred to the long-term owner and developer of the experimental classroom. The Quality Initiative Committee recommends that strong consideration be given to the CETL as primary owner.

Another significant stakeholder is the Communications and Information Directorate, as this initiative would serve as a great opportunity for them to provide input on future technology adoption. The recommendations also address placing the experimental classroom into the library, and as such the library leadership will play a role in future developments. The elements of this initiative could also play into the Library Transformation and CETL initiatives. Lastly, the facilities utilization board (FUB) will need to address the use of any facilities needed for experimental classroom functions.

VI.E. Recommended future steps

The quality initiative's Executive Committee recommends the following future steps and approximate timeline for completion, with adjustments as new inputs and circumstances may dictate. Note that this initiative is recommended to be developed hand-in-hand with the CETL and library transformation initiatives and has several overlapping milestones:

- February-March 2018 – FUB stands up a committee to determine requirements for an experimental classroom initiative to help all the schools with experimental technology not ready for use in operational classrooms. This team should work hand-in-hand with the school educational technology experts and the Communications and Information Directorate.
- January-September 2018 – The assigned committee works with all AFIT schools and the Communications and Information Directorate to develop a plan for the requirements for an experimental classroom space.
- March-September 2018 – The FUB assign a classroom to serve as the location of the AFIT-wide experimental classroom. The spaces should be considered for multi-purpose use.
- October 2018-March 2019 – Develop requirements for an AFIT-wide Educational Technology Liaison. This person should function similarly to the educational technology support that is already in place at Air University headquarters.

- March 2019-September 2019 – Transfer responsibility of the initiative over to the CETL for future development and maintenance and hire a person as the Educational Technology Liaison.

6. Summary of Investments

This section overviews the investments made, both in human resources and dollars, toward AFIT's Quality Initiative. The investment summary captures only investments made to date, and does not capture those that will be made in the future as the six recommended initiatives move forward and evolve as they are implemented.

I. Internal Discovery

Investments made into the Internal Discovery Committee's efforts are more fully outlined in the Internal Discovery Committee's final report. The efforts were supported by approximately 243.5 FTE/hours at $96/hour $23,376 invested by AFIT personnel participating in surveys, focus groups, and panel discussion. Additionally, eight committee members devoted to the project at 10% of their duty hours during the project, which lasted approximatley 14 months: $8\,FTEs \times 0.1\,\textit{FTE-years} \times \frac{14}{12}\,years \times \$200{,}000/\textit{FTE-year} = \$186{,}667$. Lastly, an investement of approximately $750 was provided for supplies and expenses for the team's efforts. The efforts of the Internal Discovery Committee totaled an investment of approximately 1,910 FTE-hours and $\$23{,}376 + \$186{,}667 + \$750 = \$210{,}793$.

II. External Discovery

The scope of the External Discovery Committee's work is more fully outlined in the External Discovery Committee's final report. The efforts of the committee included: $4\,FTEs \times 0.1\,\textit{FTE-years} \times \frac{14}{12}\,years \times \frac{\$200{,}000}{\textit{FTE-year}} + 4\,FTEs \times 0.1\,\textit{FTE-years} \times \frac{14}{12}\,years \times \frac{\$100{,}000}{\textit{FTE-year}} = \$140{,}000$. Six faculty members travelled to four separate educational conferences attended at a cost of approximately $1,500 per conference attendee, for a total of $9,000. Six faculty performed six on-site visits to different universities around the country (a total of 26 individual faculty visits) at a cost of approximatley $500 per visit for a total of $13,000. Additionally, about $200 in supplies and admin costs were needed for processing External Discovery Committee needs. The efforts of the External Discovery Committee totaled an investment of approximately 1,910 FTE-hours and $\$140{,}000 + \$9{,}000 + \$13{,}000 + \$200 = \$164{,}000$.

III. Gap Analysis

The Gap Analysis Committee's efforts included five faculty and three admin devoted to the effort at a rate of 10% duty time for a period of 3 months. The efforts of the committee included: $5\,FTEs \times 0.1\,\textit{FTE-years} \times \frac{1}{4}\,years \times \frac{\$200{,}000}{\textit{FTE-year}} + 3\,FTEs \times 0.1\,\textit{FTE-years} \times \frac{1}{4}\,years \times \frac{\$100{,}000}{\textit{FTE-year}} = \$32{,}500$. Additionally, a team of four performed a site-vist to Air University headquarters for two days at a cost of $1,100 per individual, for a total cost of $4,400. The efforts of the Gap Analysis Committee totaled an investement of approximately 1,667 FTE-hours and $\$32{,}500 + \$4{,}400 = \$36{,}900$.

IV. Investment Strategy Development and Implementation

The efforts of the investment strategy development phases are captured in Section 5 "Investment Strategy Guidance" of this report, and are organized across each of the initiatives. Including both human resource and equipment costs, AFIT's total investment across all six core initiatives involved includes an outlay of approximately 274 + 1,645 + 46 + 14 + 40 + 30 = 2,049 FTE-hours and $469,429 + $286,070. + $4,224 + $1,152 + $3,840 + $1,920 = $766,635.

V. Oversight and Administration

In addition to these efforts the steering committee and executive committee members invested time outside of the specific committee efforts in planning and communicating the efforts of the overall team. The steering and executive committees were especially involved throughout the investment strategy guidance portion of the initiative. The steering committee consisted of two faculty serving at an approximately 10% duty time in addition to efforts already captured in their committee work, $2\ FTEs \times 0.1\ FTE\text{-}years \times 2\ years \times \frac{\$200{,}000}{FTE\text{-}year} = \$80{,}000.$ The executive committee consisted of five senior leaders devoting approximately 0.01 FTE-years to provide guidance and final decision approval over the steering committee, $5\ FTEs \times 0.01\ FTE\text{-}years \times 2\ years \times \frac{\$250{,}000}{FTE\text{-}year} = \$25{,}000.$ Lastly, administrative support consisted of one admin devoting approximately 0.01 FTE-years for the purpose of reviewing reports, setting up meetings, and developing correspondence materials, $1\ FTEs \times 0.01\ FTE\text{-}years \times 2\ years \times \frac{\$100{,}000}{FTE\text{-}year} = \$2{,}000.$ Manpower investments made for administration and leadership of AFIT's Quality Initiative therefore totalled approximately 1,086 FTE-hours and $107,000.

VI. Quality Initiative Totals

Summing across all of the phases of the Quality initiative shows a total investment of 1,910 + 1,910 + 1,667 + 2,049 +1,086 = 8,622 FTE-hours (4.1 FTE-years) in time and effort invested into improving AFIT's institutional instructional capabilities. Translating the human resources into a dollar investment and including equipment, supply, and travel costs, a total of $210,793 + $164,000 + $36,900 + $766,635 + $107,000 = $1,285,328 was invested by AFIT and its parent organization, Air University. These investments demonstrated a concerted effort by the institution—from leadership down to the administrative staff—to improve instructional capability across the schools that make up AFIT.

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14. ABSTRACT

This report presents the investment strategy guidance emanating from the Air Force Institute of Technology's (AFIT's) Quality Initiative. This report culminates a two-year effort involving external discovery, internal discovery, gap analysis, and investment strategy guidance formulation. The overarching purpose of the Quality Initiative is to recommend investment strategy guidance with the intention of modernizing AFIT's instructional capabilities. Although this report provides an overview of the entirety of AFIT's quality initiative efforts, the two primary foci of this report are (1) discussing the six initiatives identified by the Gap Analysis Committee and (2) presenting investment strategy guidance.

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