



Greene County Supports
**The Future
of Aerospace**

The Dayton Region: The WRIGHT Place for AFIT

Dayton Region Community Support Meeting

Presented to

General Lloyd W. "Fig" Newton (USAF, Ret.)

The Honorable Samuel K. Skinner

2005 Defense Base Closure and Realignment Commission

August 2, 2005



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SUMMARY

- Wright-Patterson Air Force Base is the right military base for Air Force graduate education
- Ohio is the right state for Air Force graduate education
- AFIT provides more benefits to the Air Force at less cost than privatization



Wright-Patterson Air Force Base:

The Right Military Base for Air Force Graduate Education

*The Dayton Environment
is key to the success
of AFIT. The support
for AFIT cannot be
duplicated elsewhere.*

*Since 1990 State has
invested over \$50 million
in the AFIT*



“The WRIGHT Place for AFIT”

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Dayton Region: The WRIGHT Place for AFIT

Science and Engineering Organizations at Wright-Patterson

1. Aeronautical Systems Center (ASC)
2. Acquisition Environmental, Safety & Health (ESH) Division (ASC/ENV)
3. Aerospace Engineering Directorate (ASC/EN)
4. Engineering Standards Office (ASC/ENOI)
5. Major Shared Resource Center (ASC)
6. Manufacturing Development Guide (ASC/ENSM)
7. Headquarters, Air Force Research Lab (AFRL)
 - AFRL Air Vehicles Directorate (AFRL/VA)
 - AFRL Deployment and Sustainment
 - AFRL Human Effectiveness Directorate (AFRL/HE)
 - AFRL Materials and Manufacturing Directorate (AFRL/ML)
 - AFRL Power and Propulsion Directorate (AFRL/PR)
 - Sensors Directorate (AFRL/SN)
8. Wright Research Site (Det 1 AFRL/WS)

Largest concentration of
engineers & scientists in the
Air Force



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WPAFB Sponsors of Focused Research at AFIT (Fiscal Year 2004)

Sponsor Organization	Master's Theses	PhD Dissertations
National Air and Space Intelligence Center	5	1
Air Force Materiel Command	11	
Aeronautical Systems Center	8	
Air Force Research Labs/VA	8	3
AFRL/HE	5	
AFRL/IF	9	
AFRL/ML	6	1
AFRL/PR	10	
AFRL/SN	15	
DAGSI	1	



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Benefits of Colocation with Headquarters Air Force Materiel Command

- Students have immediate access to all the program offices, planning staffs and data libraries on Base.
- Headquarters staff have easy access to the students
- Experienced faculty are available to consult on the services' multi-billion dollar acquisition and logistics programs.



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WPAFB Primary Customers of AFIT

- Air Force Research Laboratory
- Aeronautical Systems Center
- National Air and Space Intelligence Center
- Headquarters Air Force Materiel Command



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Examples of Synergies Among AFIT and WPAFB Organizations

- AFIT and WPAFB share technical library
- AFIT student research assists the scientists at AFRL
- AFIT acquisition studies support the major weapon system program offices
- AFIT Operations Research students have provided real time support to the combatant commanders and the support agencies located at Wright-Patt



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AFIT State-of-the-Art Facilities

80% of Facilities built within the past 20 years

Gross SF	Description	Amount	Date
134,054	Faculty/staff offices, classrooms, lab spaces, student support spaces; used primarily by Graduate School of Engineering and Management	\$4M	1964
	Current construction (interior renovation)	\$13M	2005
82,718	Faculty/staff offices, classrooms; Academic Support administrative offices; used primarily by Graduate School of Engineering and Management and the Center for Systems Engineering	\$3.5M	1977
102,498	Administrative space, Command section, library, student support spaces, computer labs, and a large auditorium	\$12.8M	1989
53,594	Faculty/staff offices, classrooms, labs spaces, student services support, and an auditorium; used primarily by School of Civil Engineering and Services	\$5.5M	1994
26,622	Laboratory space, clean rooms, high bay space; used primarily by the Graduate School of Engineering and Management	\$7.4M	2000
399,486	Total	\$46.2M	
316,768	Total in last 20 years	\$42.2M	

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Unrestricted Buildable Land Near Schools
(According to Military Value Calculation)

WPAFB: 47.3 acres

NPS: 4 acres

Both Wings

Total Buildable Land at WPAFB: 408 acres



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“This [Memorandum of Agreement] solidifies the long-standing relationship and common goals that both organizations share, and allows us to more fully leverage our resources. Both organizations have a critical role in creating the Air Force of the future and together we can solve future challenges.”

— Major General Perry Lamy, Commander
Air Force Research Laboratory



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Examples of Mistakes in Military Value Calculation of WPAFB

- The distance to nearest large or medium airport is listed as 67.3 miles
- AFIT loses points for not having enough housing when there are numerous vacancies in WPAFB base housing
- AFIT loses points for not having housing specifically termed “student billeting” even though all housing is available to students
- NPS receives points for being 3 miles from a civilian research center; however, the closest comprehensive doctoral degree granting institution is the University of California at Santa Cruz, about 40 miles away
- NPS receives points for having 52 commands or organizations on the installation. Wright-Patterson is scored for only 6 organizations. That is simply impossible.



Examples of Mistakes in Military Value Calculation of WPAFB (continued)

- The value entered for the fraction of AFIT staff that is civilian (36 percent) is wrong and points were deducted.
- Dayton and Monterey are given the same score in assessing the distance to Washington, D.C.
- Points were deducted from WPAFB for having “negative capacity” because of a large projected student load – even though those projections are no longer valid.
- Points are scored for proximity to distance of the school from a Service Center of Excellence in Test and Evaluation, which is insignificant; however, there are no points given for proximity to a major Research, Development, and Acquisition facility.
- Numerous errors in arithmetic in compiling AFIT score.



Ohio:

The Right State for Air Force Graduate Education



"The WRIGHT Place for AFIT"

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Dayton Region: The WRIGHT Place for AFIT

Support from Wright-Patterson community enhances the effectiveness of AFIT

- Available base housing
- Available day care
- Large and well-equipped hospitals

Enhances student environment, particularly with families



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“Issues” Pointed Out by Education and Training Joint Cross Service Group

- Number of nationally accredited child-care centers within the community: WPAFB 43, Monterey 7
- “Monterey has limited (or non-existent) medical providers that accept TRICARE in the local community.”

|| changed MWR



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Difference in Cost-of-Living

- Basic Housing Allowance for a Captain with dependents at WPAFB is \$1081
- Basic Housing Allowance for a Captain with dependents at Monterey is \$2,291
- Median House Value in Dayton area is \$99,000
- Median House Value in Monterey is \$265,800
- GS Locality Pay in Dayton is 12.0 percent
- GS Locality Pay in Monterey is 24.2 percent



Dayton Region: The WRIGHT Place for AFIT

Dayton Area Graduate Studies Institute (DAGSI)

Members: AFIT, Wright State University, University of Dayton
Affiliate Members: The Ohio State University, University of Cincinnati
Associate Member: Miami University

"Joining forces to provide world class graduate engineering education"



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DAGSI Benefits to Air Force

- Increases course offerings for AFIT students
- Cuts down on redundant course offerings
- AFIT faculty have collaborated on ³⁵ research programs
- Educating skilled engineering graduates for the Air Force

-
- \$51M from the State of Ohio to DAGSI since 1996
 - Line item for AFIT in State Budget



Dayton Region: The WRIGHT Place for AFIT

Other Ohio Support for AFIT

- AFIT is connected to Ohio's Third Frontier Network—the nation's leading "superscale broadband" network. This allows AFIT faculty and students to share information and participate in collaborative educational programs throughout the state.
- AFIT is also a member of the Ohio Aerospace Institute, a state supported collaboration to support aerospace research



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United States Air Force:

The Best Way to Deliver
Military Graduate Education



"The WRIGHT Place for AFIT"



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AFIT provides more benefits to the Air Force at less cost than privatization

**1997 AFIT Privatization Survey — Annual Cost per Student
Real Market Test of AFIT Privatization**

University "A"	\$38,000-\$62,000
University "B"	\$52,000
University "C"	\$50,000
University "D"	\$34,000
University "E"	\$40,000
University "F"	\$25,000-\$40,000
University "G"	\$40,000

*Estimated annual cost of AFIT student:
\$31,000 - \$38,000*



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Booz-Allen and Hamilton Graduate Education Program Cost/Benefit Analysis (1998)

“The primary contributor to AFIT’s extreme benefit is its ability to focus on unique technologies that are key to the evolution of the USAF’s warfighting capacity. In analyzing the benefits of a program such as the [Graduate Education Program], the multisource or single-source alternatives cannot provide the unique benefits to the extent that a restructured AFIT can...Of the alternatives evaluated, a restructured AFIT provides the most cost-effective solution.”



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Report on Air Force Institute of Technology (AFIT) for Senate and House Armed Services Committees (2002)

“AFIT will continue to identify future AF and DoD needs in curricula development, research and consultation efforts. For instance, AFIT’s research efforts have kept pace with emerging scientific and technological trends. AFIT has also built appropriate support curricula in state-of-the-art fields including information operations and space operations.”



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Examples of AFIT Programs Tailored for Specific Air Force Needs

- AFIT tailored its Nuclear Engineering program to meet needs of AF/XOS, Army, Defense Threat Reduction Agency, and AFTAC in Chemical, Biological, Nuclear, and Radiological Explosives.
- AFIT created a Measurement and Signature Intelligence program to support scientific, technical, and operational activities of military intelligence for National Geospatial Agency, National Air and Space Intelligence Center (NASIC), civilian and other DoD intelligence organizations
- AFIT tailored fourteen Masters programs to the needs of field grade officers for Intermediate Development Education.
- AFIT developed two new graduate education programs, Aerospace & Info Ops and Space Systems Engineering in response to requirements of Air Force Special Projects Center and National Reconnaissance Office.



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Examples of Current Classified Classes at AFIT

- **OPER 676 Information Operations Research** — Awareness and Integration of relationships of IO and Warfare. Classified Modeling.
- **OPER 595 Issues in Defense Analysis** — classified seminar on current modeling, warfare simulations, and operations.
- **OPER 596 Applying Analysis to Defense Decisions** — classified seminar on information systems and their support to operations and combatant commanders.

The newly renovated AFIT building 640 contains classified laboratories and classroom facilities which will open up more opportunities to faculty members to use classified material, data, and analysis.



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Examples of AFIT Responsiveness to Air Force Immediate Needs

- AFIT was tasked to completely revise graduate program in Systems Engineering in June 2002. Forty students began the revised program in October, with all revisions completed by March 2003 and graduates in March 2004.
- AFIT initiated a military meteorology program to meet needs of the Air Force Weather Service. The program was built, faculty hired and students entered within one year.
- AFIT created, in under a year, an Information Assurance program to meet specific needs of the National Security Agency (NSA).



Dayton Region: The WRIGHT Place for AFIT

Research Assessment Questionnaire Results (FY04)

Estimated total cost avoided for all theses and dissertations sponsored	\$29.6M
Average cost avoided per thesis/dissertation by the sponsors	\$118,283
Average man-years of effort saved by the sponsors	.73
Percentage of thesis work judged by sponsor to contribute to a current Air Force or Defense Department project	97 Percent
Percentage of thesis work judged by sponsor to have some significance	100 Percent



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“I can assure you, in this increasingly complex and technical world, your education will prepare you to meet the challenges of the future, The skills you have learned here have armed you with the tools needed to meet these challenges head on. To succeed, you must be innovative, technically competent and creative -- in other words -- using all the capabilities that come from the solid education you received here at AFIT.”

— Air Force Secretary James G. Roche to the AFIT graduating class in March 2004



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“For twenty years the Air Force was built around pilots and more pilots. The next Air Force will be built around scientists.”

- General Henry “Hap” Arnold, Commander of the Army Air Forces in World War II and a founder of the modern U.S. Air Force



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“AFIT has met the changing needs of the Air Force over many years in an exemplary fashion. An institution like AFIT, that is Air Force-run, is more adaptable to the changing academic needs of the Air Force than are civilian institutions.”

— General Robert T. Marsh, commander of
Air Force Systems Command from 1981 - 1984



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CONCLUSION

- Wright-Patterson Air Force Base is the right military base for Air Force graduate education
- Ohio is the right state for Air Force graduate education
- AFIT provides more benefits to the Air Force at less cost than privatization



**Air Force Institute of Technology (AFIT) and Naval Postgraduate School (NPS):
An Evaluation of the Comparison of the Military Values Scored by the Education and
Training Joint Cross Service Group for the 2005 Base Closure Process**

I. Introduction

For purposes of this study, the chosen attributes and measures are retained, even though it may be questioned as to whether they are reflective of the values dictated by Undersecretary Wynne by letter dated October 14, 2004.

This study was conducted in two parts. In the first, the scoring was done by applying the scoring ranges apparently used by the Education and Training Joint Cross Service Group (E&T JCSG). This led to a number of discrepancies. While the effect of each of these is quite modest, they are cited here as they raise some question as to the accuracy and applicability of the final results. In the second part of this study, areas were identified in which the scoring range or the interpretation of the measure of the attribute appears to be inappropriate.

II. -Apparent Errors in Application of BRAC Scoring Methodology.

Location, Measure 2 Distance to nearest large or medium airport. AFIT at 67.3 miles is found to be closer than NPG (72.1 miles) Since the scoring is linear, with the closer receiving maximum score, the NPG score should be $3(67.3/72.1) = 2.8$, rather than 2.928 originally given.

Location, Measure 3 Distance from a Test and Evaluation (T&E) facility seems questionable as a metric for graduate education. It would seem that a Defense Department research laboratory would have been more appropriate. In consequence, both sides are scored at zero. But the *absence* of a measured military value has been allowed to receive a maximum score. It is appropriate to reduce both scores to zero from the maximum of three.

Location, Measure 4 Distance to a civilian research center. WPAFB is evaluated at 2 miles, Monterey as 3. Accepting these values, the score of 3 for the closer school (AFIT) is correct. However, since the scale is linear, the score for the more distant (NPG) should receive 3 (2 miles/3 miles) = .2, rather than 2.984848485.

Educational Output Measure 2 The percent of graduates receiving JPMEI is scored for AFIT as zero. It is curious that this is the only metric for which an average is specified over a time base. The newly instituted IDE program gives a fraction of about 1/3 for FY04 and 40% for FY05. The number completing IDE by other means is not available, but an average of 1/3 by all means seems reasonable. In consequence, the AFIT score is $6(1/3) = 2$, that of the NPG unchanged.

Facilities Measure 1 The expandability metric assigns a maximum score of 6 only to a facility with 150 acres available, and a score of 0.6 for 20 acres, with a linear scale. With 47.3 acres available, the AFIT score should be $6[0.1+0.9(47.3-20)/130] = 1.734$ (rather than 1.58). With four acres available, the NPS score should be $0.6(4/20) = 0.12$ (rather than 0.6).

Facilities Measure 4 The metric is the percentage of military specific laboratories (apparently organic) that can not be outsourced. With a percentage of 2.93, the NPS score should be $6 * 0.0293 = 0.1758$, rather than 0.2637.

Educational Staff Measure 2. The value entered for the fraction of AFIT staff that is civilian (36%) appears to actually be the fraction that is military. Recomputation gives a score of $2 * (0.64) = 1.28$, rather than 0.72.

Quality of Life Measure 1 The assignment of a zero score to AFIT may have resulted from the absence of any housing specifically termed "student billeting." As there is no substandard housing on WPAFB, and all housing is available to students (within grade limitations), the appropriate score for AFIT is the maximum value of 2.

Quality of Life Measure 5 At present, there are numerous vacancies in WPAFB base housing. Thus, the wait time is zero, and a maximum score of 2 should be assigned to AFIT, rather than 0.

Quality of Life Measure 6 The metric assigns a score of one to the maximum (in this case minimum wait) wait time for child care with a linear scale. Accordingly, AFIT should receive the maximum score of 1, rather than 0.7) and the NPS a score should be $(1) * 7/23 = 0.3043$, rather than zero.

Summary: The individual impact of each of these corrections (see attached spreadsheet, columns headed Original Metrics, Corrected Numerics) make only minor differences in the military value scores for the two institutions. The combined effect, however, is significant. In the original scoring, NPS = 74.7, AFIT = 52.0. After incorporating the changes noted above, the scores are NPS = 70.3, AFIT = 56.2. ***The changes, taken together, however, reduce the difference between the two institutions by 38%.***

III. Apparent Inappropriate Interpretations of Measures of Military Value

Location, Measure 1 In assessing the distance of the school from Washington, D.C., it is time away from station that is critical. A more rational scoring might therefore use time, rather than distance, and give maximum to, say, less than 30 minutes, 0.5 to places from which single day visits are possible, and 10% to places from which overnight trips are necessary. The AFIT score is then 0.5, and NPG 0.1.

Location, Measure 2 While the Dayton International Airport is not classified by the Federal Aviation Administration (FAA) as a large airport, it has 107 daily departures (compared to 52 at Monterey). Further, Monterey has nonstop service only to LAX, SFO and SJC, whereas Dayton has nonstop service to virtually every major city east of Denver. This, together with its ease of access, combine to make it about as useful to the traveler as San Jose SJC, but the distance from AFIT to DAY is about $\frac{1}{4}$ the distance from Monterey to San Jose. As one of the nation's 10 largest cargo airports, the Dayton International Airport also provides outstanding

service for rapid shipping and receiving of equipment. The AFIT score should remain at 3, but NPG score should be lowered to $3(18/72)$ or 0.75.

Location, Measure 3 As to the distance from the school to a Service Center of Excellence in T&E, a more appropriate measure for graduate programs would be the distance from a major Defense Department Research, Development and Acquisition facility. WPAFB meets this criterion, while nothing with 200 miles of NPG does. A scoring of $AFIT = 3$, $NPG = 0$ is more appropriate.

Location, Measure 4 As to the distances from a Civilian Research Center, such were identified at a distance of 2 miles from AFIT and 3 miles from NPG. However, as there does not appear to be a comprehensive, doctoral degree granting closer to NPG than the University of California, Santa Cruz, at about 40 miles. Ohio's Wright State University (WSU) is almost contiguous to AFIT, and both are members of the Dayton Area Graduate Studies Institute (DAGSI) educational consortium, exchanging courses and research support. In the case of AFIT, it is only 1 mile to WSU and 5 miles to the University of Dayton. In the case of the NPG, it is about 40 miles to University of California, Santa Cruz. A scoring of $AFIT = 3$, $NPG = 3(1/40) = 0.075$ then results.

Educational Output Measures Once adjusted for the earning of JPMEI credit, these measures, although perhaps somewhat arbitrary, appear to be generally justifiable. However, Educational Output Measure 2, completion of JPMEI is actually a surrogate measure of rank, as junior officers are not eligible. In the case of Educational Output Measures, the current degree productivity (EO3) of AFIT is approximately double that for the time base used to obtain the value used in the study.

Facilities Measure 1 The measure of expandability presumes 150 acres are necessary. Since no foreseeable expansion could require more than, say, about 9 city blocks, or about 40 acres, such a value should be assigned a maximum score. With a linear scale, the AFIT score then becomes 6, and the NPG, with 4 acres, 0.6.

Facilities Measure 3 A reported measure of 52 commands or organizations on the NPG installation providing support appears to be impossible. While there is one component of the Naval Research Laboratory, the Marine Meteorology Division, this would be more comparable to one directorate of the Air Force Research Laboratory (AFRL). There are six AFRL directorates on WPAFB (each of which has many divisions), in addition to the headquarters Air Force Materiel Command (AFMC), Aeronautical Systems Division (ASD), Armed Services Technical Information Agency (ASTIA), and the Shared Resource Center. It would appear that AFIT has access to about 10 such organizations and the NPG one. A more appropriate linear scoring would then be $AFIT = 6$, $NPG = 0.6$.

Educational Staff Measure 5 As a measure of educational value, a high faculty to student ratio should be more desirable than low. The faculty/student ratio at AFIT is reported as 0.39, whereas the faculty/student ratio at NPS is 0.17. The original scoring algorithm is particularly arcane, being an assignment of maximum value to the school with the lower faculty student ratio (R_{MIN}) and a value to the school with the higher (R_{MAX}) given by

$$\text{Score} = \text{Weight} \frac{1 - R_{\text{MIN}}}{1 - R_{\text{MAX}}}$$

A more appropriate comparison might be the simple linear scale, with the maximum value given to the school with the higher ratio, and the other school receiving the fraction $R_{\text{MIN}}/R_{\text{MAX}}$ of that value. This leads to scores of AFIT= 2, NPG = $2(0.17/0.39) = 0.8718$.

Quality of Life Measures Once the availability of quality housing at WPAFB is accounted for, and a minor scoring error accounted for, the measures (although quite arbitrary) are generally satisfactory. While it may be questioned if the contribution to quality of life (1 point) of a major military hospital complex and a dental clinic (1 point) are truly the same, or if the adequacy of the civilian pay differential, rather than the amount, should be the metric, these issues receive low weight, and have negligible impact on the overall scores.

Summary: Changes in the interpretation and scoring of the measures in Educational Output and Quality of Life as discussed in this section do not affect the scoring for the two institutions, and changes in the interpretation and scoring of the measures in Educational Staff have only a modest effect. The consequence of changes in measures and scoring for the Location and Facilities measures, however are significant. The most significant of these factors are reviewed separately below, in declining order of significance.

In the original scoring of Facilities Measure 3, the NPS was considered to have 52 commands/organizations with which to share facilities and expertise, and AFIT 6. This led to scores of 6 and 0.69 respectively. As it would appear that the laboratories, program offices, and other organizations at WPAFB outweigh those at Monterey by a factor of at least ten to one, a scoring of AFIT 6 and NPG 0.6 lowers the NPG score by 5.4 while raising the AFIT score by 5.31. ***This change in relative scores of 10.71 can account for one half (47%) of the difference (22.7) between the two institutions in the original scoring.***

In the original scoring of Facilities Measure 1, the substantial advantage that WPAFB has in available land was largely negated by the award of full value only if 150 acres are available. Replacing this value with a projection of possible need for 40 acres, and using a simple linear scale, raises the AFIT score from 1.734 to 6 and that of the NPS from 0.12 to 0.6. ***This change in relative scores of 3.786 can account for 17% of the difference (22.7) between the two institutions in the original scoring.***

In the original scoring of Location Measure 2, the Cincinnati airport was used in the comparison. Recognizing the outstanding access available to the Dayton International Airport, and the wide range of flights available, retention of the score of 3 for AFIT but reducing the comparability score for NPS to 0.75 increases the advantage to AFIT by 2.05. ***This change in relative score can account for 9% of the difference (22.7) between the two institutions in the original scoring.***

In the original scoring of Location Measure 4, the distance from the NPG to a civilian research institution was taken as 3 miles. Using University of California at Santa Cruz as the basis for comparison with Institutes near AFIT, rather than a lesser institution at a distance of 3

miles, lowers the NPG score to 0.075. *The resulting change of 1.925 in relative score can account for 8.5% of the difference (22.7) between the two institutions in the original scoring.*

In the original scoring of Educational Staff Measure 5, a low faculty to student ratio was taken as an indicator of educational value. Since costs are accounted for by other means in this study, it is a high faculty to student ratio that should be regarded as an indicator of educational merit. Recognizing this, as using the reported ratios, the AFIT score is increased from 1.47 to 2 and the NPG score is reduced from 2 to 0.872. . *The resulting change of 1.658 in relative score can account for 7.3% of the difference (22.7) between the two institutions in the original scoring.*

IV. Impact

The Military Value of the two institutions, after adjusting for the apparent errors in the application of the BRAC methodology and using the more appropriate interpretations of measures, are as evaluated in the columns headed Revised Metrics and Corrected Numerics of the attached spreadsheet.

With these changes, the military value score of the Air Force Institute of Technology (69.7) is found to be greater than that of the Naval Postgraduate School, 60.3, a reversal of the original ranking, with nearly reversed scores.

However, the most appropriate conclusion to be drawn from this is that there is no significant difference between the Military Values of the two institutions. The results of such comparisons are driven less by the attributes of the schools than by the arbitrary selection of attributes, the arbitrary assignment of weights, the arbitrary selection of metrics and parameters, and by the accuracy and understanding exercised when organizations supplied the requested data.

It should be recognized that the Naval Postgraduate School has certain advantages in military value, largely accruing from its larger scale and greater excess capacity, and that the Air Force Institute of Technology has certain advantages, largely arising from its location in a much larger center of military research and development and civilian education, and somewhat to its location in a larger urban and industrial center.

There is, however, one further weakness in these assessments of military value. While the methodology applied may have some limited value in a side-by-side comparison of a set of two or more institutions, as was done here, (note that many institutions could have been selected so that either of these two would have appeared as clearly superior), the results of this evaluation may not be compared with military value scores obtained for other organizations. This is a specific consequence of using in 11 out of 25 cases a relative, or A-B, comparison rather than an absolute measure. In the A-B comparison the higher ranking organization is automatically granted the maximum score possible for that measure, regardless of absolute merit. This leads to higher scores when the comparison is between two organizations than when the comparison is between, say, ten organizations.

Thus, the military value scores obtained in this study, by whatever the measures and metrics may be used, should not be compared with any organizations other than those to which they were directly compared. A high score resulting from a comparison of two organizations is not necessarily indicative of more military value than a lower score for another organization if that score was obtained through comparison with a larger number of organizations.

V. Conclusion

Correcting for mathematical errors and allowing for subjective interpretation of the certified data used in the base closure process, there is no significant, conclusive difference in the military value between the Air Force Institute of Technology and the Naval Postgraduate School.

**Air Force Institute of Technology (AFIT) and Naval Postgraduate School (NPS):
Review of Cost of Base Realignment (COBRA) Analysis for Consolidation**

1. Overview

Scenario E&T 0022 (Education and Training Joint Cross Service Group) is to consolidate the Air Force Institute of Technology (AFIT) and Naval Postgraduate School (NPS) Professional Development Education (PDE) functions at NPS. The two actions are to disestablish AFIT graduate education function at Wright-Patterson Air Force Base, and consolidate AFIT graduate education function with NPS, Monterey, California. Key features¹ of the proposal are the:

- a. Elimination of 53 civilian positions at AFIT (no officer or enlisted are cut) and realignment of 67 civilian positions, 149 officers and 1 enlisted from AFIT to NPG
- b. Realignment of 1097 student positions from AFIT to NPG
- c. A \$62 million one-time cost, including a \$39.57 million MILCON at NPG
- d. A claimed net annual savings of \$5.286 million starting in 2009.

Each of the above is to commence in FY 2006 and be completed in 2008. All costs of MILCON, moving, RIFs, retirements, etc. occur in 2006 and 2007. Steady state cost savings claimed are \$5.3 million beginning in 2008, with payback of all one-time costs not being achieved until 2020. In this scenario, AFIT continuing education remains at WPAFB.

2. Comments:

a. A total of 270 positions appears correct for the AFIT Graduate School of Engineering and Management (GSEM). The civilian faculty is about 70. That is presumably the 67 that are targeted for realignment. This would suggest that all the civilian positions to be eliminated are from the academic support positions. Since there are about 70 military faculty positions, the other 80 military positions must all be non-faculty. This suggests the current support positions in GSEM must be about 133, with a 53 civilian and 80 military mix. As there are actually only about 10 military admin support personnel in the GSEM, many of the realigned officer positions must be coming from elsewhere with AFIT. Apparently, it is then presumed that the unrealigned or terminated civilian support staff (about 70) can be reassigned within the Institute.

b. Student realignments are 959 in 2006, 92 in 2007 and 46 in 2008. The "trailing" students may be Ph.D. students finishing degrees. Seventeen faculty are to remain at AFIT through 2007, possibly because of these students.

¹Determined from COBRA run of 7/25/2005 with data as of 12/28/2004; Scenario file E&T 0022 (Baseline) MOD 28 DEC; Option Package E&T 2002; Std Factors File BRAC 2005.SFF.

c. The MILCON is somewhat surprising in view of the alleged excess capacity at NPG. It may also account for why there is a lack of clarity whether 4 or 16 acres of land are available at NPG². Included in the MILCON are a 58,000 sq ft instruction building (\$24.5 million), a fitness facility (\$2.687 million), a child care center (\$3.670 million), roads (\$3 million), and a 1,400 car parking lot (\$5,696).

d. The net savings (\$5.286 million/year from 2009 on, all in 2005 dollars) are presented in the summary report as follows:

Reduced personnel cost at WPAFB:	\$4.956M/year	
Increased Personnel Cost at NPG	\$3.449M/year	
Net Personnel Savings;		\$1.507 M/year
Reduced overhead at WPAFB	\$10.844M/year	
Increased overhead at NPG	\$6.253M/year	
Net overhead savings:		\$4.591 M/year
Other costs at NPG (TRICARE)		(\$0.812) M/year
Total Savings:		\$5.286 M/year

3. Details

A more complete breakout of the increases in costs at NPG and reductions at Wright Patterson is to be found on page 2 of the detail report. That information is regrouped in the table below, and also shows an annually recurring savings of \$5.286 million.

	<u>Increases at NPG</u>	<u>Decreases at WPAFB</u>
Civilian Salary	\$0.489M	-\$3.560M
Basic Allowance Housing	\$2.960M	-\$1.396M
Subtotal: Personnel	+\$3.449M	-\$4.956M
Sustainment	\$0.213M	
Recap	\$0.342M	
BOS	\$3.227M	-\$10.844M
Misc Recurring	\$2.470M	
Subtotal: Overhead	+\$6.252M	-\$10.844M
TRICARE	+\$0.812M	
Grand Total Recurring Costs:	+\$10.515M	-\$15.801M

When displayed in this manner, it may be seen that the overhead cost at WPAFB appears to be significantly greater than that at the NPG.

² In the Military Values analysis for PDE, NPS was scored as having 4 acres available for expansion. However, a briefing presented by Mr. Mike Dominguez to the E&T JCSG Principals Meeting, January 5, 2005, referred to 16 unrestricted buildable acres at NPS.

From this table it may also be seen that an error has been made in the computation of civilian salaries. Sixty-seven positions, evidently the civilian faculty, were realigned at the NPG. The average faculty salary (FY2005) is \$122,000. Accounting for the 12% higher differential at NPG³, the increased salary cost should be $(67)(\$122,000)(12\%) = \$981,000$ rather than \$489,000 as given above as taken from the table on page 6/9 of the detail report (see above).

The Basic Allowance for Housing (BAH) as given in the table (also from page 6/9) is only for AFIT faculty moved to the NPG, i.e. (150 at about \$20,000). No allowance has been made for increased housing costs for students. If about one-half of AFIT students being realigned to Monterey qualify for BAH, the total cost would be approximately the same, as the BAH rate is approximately doubled at each grade. However, if all 1097 students qualify for BAH, then the annual cost of realignment at NPS has been underestimated by between 10 and 15 million dollars annually. While a precise computation may not be made without knowing the rank distribution and which students have dependents, it is likely that at least 80% will qualify for BAH. The BAH⁴ for majors and captains at WPAFB is \$1294 and \$1101 per month, respectively, and at NPS it is \$2355 and \$2291 per month, respectively. Assuming that 40% of students are majors with dependents, that 40% are captains with dependents, and that the remaining 20% do not qualify; with a student base of 1097 the total increase in housing cost over that at WPAFB can be expected to be about 11.853 million dollars a year.

4. Discussion

The original analysis suggested an annual cost savings of \$5.286 million per year. Taking into account the actual faculty salaries in computing the influence of the higher locality pay at the NPG reduces this cost savings by \$492 thousand dollars per year. Using estimates of the number and grade of students qualifying for the Basic Housing Allowance, the cost savings are further reduced by 11.853 million dollars a year. *In consequence, this realignment can be expected to produce a net recurring cost to the Department of Defense of 7.059 million dollars per year. Moreover, the start up cost can never be recovered.*

5. Conclusion

A realignment brought about by transferring all graduate programs from AFIT to NPG does not meet the BRAC criterion of pay back within 20 years. In consequence this option should receive no further consideration.

³Data for relative locality pay taken from BRAC analysis of comparative military values of AFIT and NPG.

⁴Data for Basic Housing Allowance from <http://usmilitary.about.com/od/housingallowance/a/05bah.htm>

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The Air Force needs graduate scientists and engineers, but does it need its own graduate school?

AFIT

Under the Gun

By Bruce D. Callander



that all the nation's colleges and universities are available for the Air Force, why should USAF be running its own graduate school for scientists and engineers?

In the 1990s, USAF leaders decided they did not have an acceptable answer to that question, and they proposed to end in-residence graduate training provided at the Air Force Institute of Technology, located at Wright-Patterson AFB, Ohio.

The plan was soon scrapped, but it already had slowed enrollments at AFIT and raised questions about USAF's commitment to the whole area of Science and Technology. Since then, there has been an ongoing debate over whether USAF is overemphasizing current readiness at the expense of long-range development of USAF's S&T base.

Gen. Robert T. Marsh, USAF (Ret.), commander of Air Force Systems Command from 1981-84, is one of those concerned.

"There has been a de-emphasis in this whole area," said Marsh in a recent interview, "and it's unlike any prior period of our history in the Air Force. I think that, despite very austere times, we've always kept that forward vision of the Air Force and always protected our corps of technically oriented officers working on the future. That's really been de-emphasized today as I see it."

For the moment at least, the threat of eliminating AFIT's in-residence graduate programs has abated. Last May, Air Force Secretary F. Whitten Peters gave AFIT high marks for its past accomplishments and said that the Air Force would continue to support it as an in-house institution.

In a written answer to queries about his decision, Peters said, "AFIT students have provided invaluable research in many areas within the Air Force while attending school. AFIT graduates are some of the best in the country, and they are the best because of the programs we are able to offer. We totally support AFIT as an agency within the Air Force and plan to keep it a vital and viable institution."

The Toughest Job

That said, however, the Secretary conceded that enrollments in AFIT programs have fallen sharply in recent years because of force cuts, poor retention, and growing mission demands.

"One of our toughest jobs," he said, "is deciding on the best use of our resources-whether those resources are planes and materials, or our most valuable resource, our people. While it is an easy task to identify where we would like to have AFIT graduates, in this time of personnel shortages, it is much more difficult to pull officers away from real-world, mission-critical positions for two to three years, or longer, depending on their degrees."

Peters went on, "This is not a choice we like having to make. However, we do make the choice and that's why this year we have a little more than 3,000 of our line, JAG, medical, and chaplain officers either attending, graduating, or inbound to AFIT programs, both in residence in Dayton or at civilian institutions around the country."

Col. George K. Haritos, commandant of AFIT, says the cuts also have created difficulties within the institute itself.

"The problem is that we had to size the graduate school, back in the spring of 1998, to accept 230 master's students and 35 Ph.D. students every year," he explained. "We combined two graduate schools [the Graduate School of Engineering and the Graduate School of Logistics and Acquisition Management] into one. We let go half the faculty from the L&AM school, going from 30 professors down to 16. And we cut some faculty from the School of Engineering. In all, we cut 43 positions, saving \$3.1 million a year in pay.

"Now, the school is sized to accommodate that student load, but, because of the problems with not having enough scientists, engineers, and officers overall, the Air Force has not been able to fill our classes."

He went on, "So, we are not receiving the number of students we need to meet the Air Force requirements and to operate efficiently. When you expect 230 master's students and you get 175 as we did last year, and when you expect 35 Ph.D. students and you get 16, obviously there are problems. Plus you produce fewer graduates for yet another year, making the shortage of people available to fill advanced academic degree billets even more severe."

AFIT grants master's and doctoral degrees to those in its resident program, supervises students in graduate programs at civilian universities, and oversees officers in education with industry programs. Its Civilian Institution Programs places students in more than 400 civilian universities, research centers, hospitals, and industrial organizations in the United States and other countries. Other resident programs offer short, nondegree courses for professional continuing education and provide consultation services to Air Force commanders and staffs.

Back to McCook

The institute began in 1919 as the Air School of Application, located at McCook Field, Ohio. It had six officers in training. Some early graduates were sent on to the Massachusetts Institute of Technology to take aeronautical engineering. Among them was Lt. Jimmy Doolittle, who earned both a master's and doctoral degree there.

Over the years, the institution underwent several organizational and name changes. In 1950, its jurisdiction was shifted from Air Materiel Command to Air University, and, four years later, Congress authorized the AU commander to grant degrees to graduates of the in-residence programs.

In 1967, AFIT became a member of what is now the Southwestern Ohio Council for Higher Education, an association of colleges, universities, and industrial organizations in the Dayton, Ohio, area. AFIT also is active in other community and interinstitutional programs, including the Dayton Area Graduate Studies Institute, a consortium of the engineering schools of AFIT, the University of Dayton, and Wright State University.

In its more than 80 years of existence, the institute has trained some 300,000 DoD personnel, including dozens of general officers and many astronauts, 11 of whom earned their degrees in residence.

In the mid-1990s, however, Air Force leaders began to question whether the Air Force needed or could afford to continue in-residence AFIT training. The then-Air Force Secretary Sheila Widnall, a former professor of engineering, proposed closing the in-house schools and contracting more training to civilian institutions. AFIT cut its planned enrollments and prepared to shut down a substantial portion of its operations.

Haritos recalls the period. "It was very late in 1996 when the tentative decision to shut down the graduate school became public," he said. "Immediately afterwards, we were charged to explore alternatives for educating the graduate students. Nobody said that graduate education was not important. They just said that we can't afford to do it in-house."

He continued, "So, the commandant at the time received the order to explore the question: After AFIT is gone, what is the best way to educate people? We explored two possibilities. One was to privatize AFIT, locate it at or near Wright-Patterson, and work with several universities in Ohio to deliver Air Force-related formal graduate education and the research that goes with it. That was an unsolicited proposal from the state of Ohio. The second alternative was to send students

to civilian universities, use a select group of quality graduate schools both state and private with demonstrated ability."

Haritos noted that it took more than a year to finish the study and evaluate alternatives, and then compare them with the in-house AFIT.

"We used criteria that were identified in conjunction with AU at the time," he said. "The criteria were quality of education, expected focus of curricula and research to Air Force needs, responsiveness to evolving Air Force requirements, and cost."

Peters Decides

The findings were presented to Peters in early 1998. He concluded that keeping AFIT clearly was the correct choice. That is when he decided AFIT would stay open.

A little later, Air University hired the consulting firm of Booz-Allen & Hamilton to perform an independent cost-benefits study of the alternatives. That analysis again showed AFIT's in-house program to be superior.

"I remember the figures," said Haritos, "because I was heavily involved with finalizing the numbers. The AFIT in-house cost of graduate education was \$19.9 million per year. Going to a select group of good universities was \$18.6 million per year. So we are talking about \$1.3 million per year."

Widnall, now back in her position as professor of aeronautics and astronautics at MIT, still defends privatization. In a written response to questions, she said, "With the dramatic budget cuts faced by the Air Force--and I understand it's getting worse--we must continually re-examine the way we do things, especially those things which are supportive of but are not actually our core mission.

"You have seen privatization initiatives across the entire range of support activities in the Air Force, from base housing, to food services, to research and development. These privatization efforts have assured the Air Force that it was getting best value for its dollar and have set a standard for in-house activities to measure themselves against and to compete with world-class external firms.

"In some cases, public-private partnerships have resulted, enriching both partners, not with money but with knowledge and experience. It is very important that Air Force personnel have access to higher education in science and engineering and other core specialties. How they do this is a subject for constant re-examination. Cost and quality are both issues.

"Weighing unique Air Force needs against the importance of access to the best in higher education is also important. When the multiple of the effective cost of in-house AFIT tuition for a comparable engineering degree gets too large, say a factor of five, then I do think a serious re-examination is in order for those programs that are comparable to those offered by civilian universities. We will always have unique needs because of our arcane business methods."

Air Force Needs Come First

Marsh disagrees. In an interview, he said, "Those of us on the other side have long argued that AFIT has met the changing needs of the Air Force over many years in an exemplary fashion. An institution like AFIT, that is Air Force-run, is more adaptable to the changing academic needs of the Air Force than are civilian institutions."

Although Marsh earned his own master of science degrees in instrumentation engineering and aeronautical engineering under AFIT at the University of Michigan, he says that AFIT's in-house programs have a flexibility that civilian institutions can't match.

"To institute even a new course out in the civilian institution world, it takes years to get the faculty all to agree that there's even a need for a new course, to get it structured, and to approve the curriculum," said Marsh. "By contrast, as the Air Force evolved and we saw needs for our people to understand stealth technology, laser and directed-energy technology, and new sensor technology, ... as we saw those needs developing, the Air Force leadership insisted that AFIT develop curricula to deal with those new subjects."

He went on, "Another point is that AFIT has provided the opportunity for the Air Force to accomplish a lot of important research and engineering that was applicable to Air Force needs through the graduate thesis program of students. We have, if you will, vectored students toward subjects of important interest to the service. ...

"There have been attempts to quantify those contributions over time and they have shown that pretty impressive sums have resulted. It has been good research because most of it was performed in conjunction with the Air Force laboratories there at Wright-Patterson. They could take advantage of the opportunities right there at the base to do work that had important relevance to the Air Force."

Another AFSC commander (1984-87), Gen. Lawrence A. Skantze, USAF (Ret.), also stresses the importance of AFIT's research capabilities. Skantze earned his master's degree in nuclear engineering in residence in 1959. In an interview, Skantze recalled his reaction to the proposed shutdown.

"I wrote a letter to the Chief of Staff," he said, "and pointed out that, as a graduate of AFIT, I saw the unique educational opportunity that was provided within an Air Force environment. You couldn't duplicate that elsewhere because of the proximity of the laboratories and the active program offices [at Wright-Patterson]. In other words, as you did your research work, you had the real world of Air Force acquisition and Science and Technology taking place all around you, and you could immerse yourself in that part of the environment to understand it."

Board of Visitors Report

While the prospect of privatization has diminished, defenders of scientific and technical education see other, more serious dangers to AFIT. Last March, for example, the institute's

Board of Visitors took a hard look at the institute as a whole and concluded that it had major problems. In its written report, the board concluded:

- AFIT's low production rate is a major factor "in the eroding scientific and technical base of the Air Force."
- AFIT is in "passive but inexorable shutdown mode despite the Secretary of the Air Force decision to keep it open."
- Failure to meet enrollment targets has resulted in underuse of faculty and facilities and increased costs per student.
- There is no evidence that USAF has addressed the importance of AFIT to the service.

The board complained, too, that its past recommendations for improvements "appear to be languishing in the bureaucracy process."

Summing up its findings, the board said it had found two major causes of "the run down of AFIT and its capabilities." One is what the board called "the extraordinary emphasis on readiness." This, the report said, has resulted in a persistent reduction in investment for AFIT and endangered its ability to survive as a first-quality institution. The other is that USAF and AFIT have been forced to "adapt in a dysfunctional manner, creating a faculty that is misaligned with student load, a student body that is persistently undersized, and a graduation mix that is not meeting USAF needs."

For the near term, the Board of Visitors called for the Secretary of the Air Force and Chief of Staff jointly to order increased enrollment in AFIT. For the long term, it said, the Air Force should decide on "core graduate education requirements" that will provide a steady stream of expertise into critical skill areas. In the absence of a clear-cut commitment to Science and Technology-educated officers, the board's report said that USAF must accept a less capable future force, ranging from lower skilled manning in USAF labs to lack of smart uniformed buyers in its acquisition corps.

The Board of Visitors noted, too, that until the late 1980s, the commandant of AFIT had been a two-star general officer. The position was later demoted to one-star rank and, more recently, to colonel. "Curiously," the report said, "all formal education institutions in the USAF other than AFIT 'earn' a flag command billet, ... the Air Force Academy (three stars) and Air University (four stars). Lack of a general officer billet is a clear institutional signal of AFIT's lower level of importance."

Skantze cited other evidence of USAF's neglect of AFIT and of Science and Technology in general. Recalling the 1992 consolidation of Air Force Systems Command and Air Force Logistics Command, he said, "Before the merger, the commander of Air Force Systems Command was the one who defended the need to invest in Science and Technology and in AFIT education. That 800-pound gorilla no longer exists. So, the dependency is falling on the commander of Air Force Materiel Command to fight for both S&T and AFIT while at the same time he is not only burdened with overseeing the acquisition of new systems but with providing the logistics support for the current fielded system. That is an awful lot for one man to have on his plate."

"An Essential Element"

Marsh agrees that AFIT needs more top-level support. "You have to have a corporate decision that such an institution is vital to the future of the Air Force," he said. "It's an essential element, just as the Air University is. We recognize that professional development is essential to the Air Force no matter what its size or structure. I think we have to recognize that a technical development institution also is absolutely essential.

"You have to make that decision. Then, you have to enunciate it to the whole force, ... make it a matter of policy, ... and then, obviously, you have to allocate the necessary resources. We're not talking about enormous resources to operate AFIT. You have to justify them to the Hill, of course, but that is not a problem. But it takes a determination on the part of the Air Force that the acquisition and retention of technically qualified officers are essential and to use this institution to achieve that objective."

Commandant Haritos is hopeful about AFIT's future. "I am optimistic," he said. "The Secretary has gone on record that he thinks AFIT is important. I also have seen a list of [Air Force Personnel Center] initiatives designed to help with our enrollment problem. So, I am hopeful that, in the near future, we will be getting the number of students we should be getting.

"I know we have a lot of people who believe it would be a grave error to shut down AFIT. It's not the kind of error you can reverse. It's not like saying, 'OK we have no money for the F-22 this year, so we won't buy any. We know it's going to cost more next year, so we'll put up a little more money next year and the program will still be OK.'

"But, if you shut down AFIT, all the professors go off and find other jobs. All the staff leave and find other jobs," said Haritos. "You can't just decide you made a mistake. It's gone forever. You can't just start a university from the ground up. If we decide, as corporate Air Force, that we don't need graduate education, we had better be absolutely certain that we are making the right decision."

Bruce D. Callander, a regular contributor to Air Force Magazine, served tours of active duty during World War II and the Korean War. In 1952, he joined Air Force Times, serving as editor from 1972 to 1986. His most recent story for Air Force Magazine, "The Recruiting and Retention Problems Continue," appeared in the June 2000 issue.