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TRAINING IMPACT DECISION SYSTEM FOR AIR FORCE CAREER FIELDS: TIDES OPERATIONAL GUIDE

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The Office of Public Affairs has reviewed this paper, and it is releasable to the National Technical Information Service, where it will be available to the general public, including foreign nationals.

This paper has been reviewed and is approved for publication.

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The purpose of this Operational Guide is to describe the Training Impact Decision System (TIDES) and to explain how the system supports the Air Force training environment. The TIDES is a computer-based training decision support technology. It has been designed to provide crucial data needed by functional and career field managers when those managers must render decisions related to the utilization and training of personnel assigned to organizations and Air Force specialties (AFSs) under their control. This Guide describes TIDES capabilities to gather and analyze data applicable to AFSs and how that will give functional and career field managers the ability to simulate the impacts of planned changes to an AFS.

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EXECUTIVE SUMMARY

This Operational Guide was prepared to describe the Training Impact Decision System (TIDES) and to explain how the system supports the Air Force training environment. The TIDES is a computer-based training decision support technology. The system has been designed to provide crucial data needed by functional and career field managers when those managers must render decisions related to the utilization and training of personnel assigned to organizations and Air Force specialties (AFSs) under their control.

The TIDES provides capabilities to gather and analyze data applicable to AFSs and the environment using those AFSs, and to model: 1) current and alternative utilization and training patterns, 2) estimates of the resources required to conduct training in various training settings, 3) estimates of the costs associated with conducting training in various training settings, 4) estimates of the capacities of training settings to conduct training, and 5) estimates of the most cost-effective distribution of training hours for specified requirements across training settings.

The TIDES was conceptualized and developed under the guidance of personnel from the Technical Training Research Division of the Air Force Materiel Command, Human Systems Center, Armstrong Laboratory at Brooks AFB, TX. The TIDES has been successfully demonstrated during studies conducted for selected AFSs and is ready for expanded use across the Air Force.

1 INTRODUCTION

1.1 Scope

This Operational Guide has been developed to provide a comprehensive overview of the capabilities featured within the Training Impact Decision System (TIDES) and to explain how the system is intended to be used within the Air Force environment to support training decisions driven by proposed or planned changes in manpower, personnel, and training (MPT) policies and/or procedures. This Operational Guide describes: 1) the events that led to development of the TIDES; 2) the components that comprise the system and their corresponding functions; 3) the products provided by the system; and 4) the potential users of the system and the functions that should be performed by those users.

1.2 Background

Managers assigned to the Air Staff Directorate of Personnel Programs for Education and Training (DPPE), in concert with Air Staff and Major Command (MAJCOM) functional and career field managers, are responsible for decisions related to the utilization and training (U&T) of Air Force personnel. Circumstances frequently dictate that decisions be rendered within time periods which do not allow potential impacts of those decisions to receive due consideration. Not in all instances have data required to determine impacts of decisions been gathered and analyzed. In some instances data have been gathered and analyzed but are not readily available to decision makers. As a result, some decisions have been reversed after implementation due to unforeseen problems, such as ineffectiveness or a lack of resources. Recognizing this shortcoming in the Air Force system, in 1978 the Air Staff directed that the Air Force Military Personnel Center (AFMPC) Training Management Branch (DPMYME) and Air Education and Training Command (AETC) staff agencies jointly develop a request for personnel research (RPR) that described the need and functional requirements for automated decision support technologies.

Upon approval of the RPR, the Air Staff tasked the Air Force Materiel Command (AFMC) Human Systems Center (HSC) Armstrong Laboratory with responsibilities for planning, developing, and managing a program to result in the production of a prototype training decision support system. In September 1983, the Armstrong Laboratory awarded a contract for the design and development of a prototype system designated the Training Decision System (TDS). The development contractors were McDonnell Douglas Training System (MDTS) of St. Louis, Missouri and CONSAD Corporation, Pittsburgh, Pennsylvania. The design and development contract extended from September 1983 to September 1988.

1.2.1 Development of the Prototype Training Decisions System (TDS)

Functional requirements specified for the TDS included the gathering and analyzing of data applicable to an Air Force specialty (AFS) and the environment using that AFS, and the modeling of: 1) current and alternative U&T patterns for an AFS, 2) estimates of resources required to conduct training in specified settings, 3) estimates of costs for conducting training in specified settings, 4) estimates of capacities of settings to conduct training, and 5) estimates of the most effective distribution of training hours for specified performance requirements across training settings to minimize training costs.

The TDS was written in the Fortran programming language, consisted of a number of software programs designed to accomplish specific functions, and resided on a Digital Electronics Corporation (DEC) VAX mainframe computer. During development of the TDS, the data bases were populated using data gathered from four specialties: 1) Aerospace Propulsion, 2) Electronic Computing and

Switching Systems, 3) B1 Avionics, and 4) Aerospace Physiology. These data served as the basis for demonstrating the system modeling capabilities. To model alternative U&T patterns required data files to be manipulated, reports to be generated, and graphics for pictorial displays to be manually developed.

1.2.2 Operational Use of the Prototype TDS

Following successful demonstrations of the system, the TDS was used in 1992 and 1993 to support U&T decisions for the Aerospace Propulsion and Electronic Computing and Switching Systems specialties. The types of support provided varied by specialty.

Support for the Aerospace Propulsion specialty included: 1) modeling current and alternative utilization and training patterns, 2) identifying task modules corresponding to each job within the specialty, 3) identifying the hours of training received on each task module, 4) identifying core task modules for the overall specialty and for the journeyman and craftsman skill levels, 5) identifying formal courses available for the specialty and the career points at which members attended the courses, and 6) and identifying resources required for training task modules and the availability of those resources at representative sites. The models for alternative utilization and training patterns focused upon, at the request of the Air Staff functional manager, the estimated impacts should the Air Force elect to change aircraft maintenance levels from three (flightline, in-shop, and depot) to two (flightline and depot).

Support provided the Electronic Computing and Switching Systems specialty was the same as that provided for the Aerospace Propulsion specialty with two exceptions. First, aircraft maintenance concepts are not applicable to the Electronic Computing and Switching Systems specialty. Second, the Air Staff functional manager requested that alternative career field structures and the impacts of each alternative be modeled. Based on data provided by the TDS, decisions were made to restructure the career field to require subspecialties (i.e., shredouts) and training to be consolidated. The decision should result in reduced training costs, more relative training, and better retention of qualified members in critical jobs.

TDS analyses demonstrated that increased formal training costs (per individual) would be more than offset by reduced on-the-job training costs and by reduced on-the-job training needs resulting from longer job assignment periods. Thus, the AFS changes appear extremely cost effective.

2 DEVELOPMENT OF TIDES

Based on successful demonstrations and use of the technology featured in the TDS, the Air Force decided to pursue the development of a TDS-based system that could be installed on a personal computer and that employed current user interface technologies. The system was redesignated the Training Impact Decision System (TIDES). On 24 June 1993, the Armstrong Laboratory awarded a development contract to Metrica, Incorporated, McDonnell Douglas Training Systems, and CONSAD Corporation. The first accomplishment was the refinement of the process for conducting a study of an AFS. The TDS used a twenty-six step process (Mitchell, et al., 1989). Based on the lessons learned through that research and development effort, the process developed for the TIDES was reduced to thirteen steps. This process is portrayed in Figure 1.

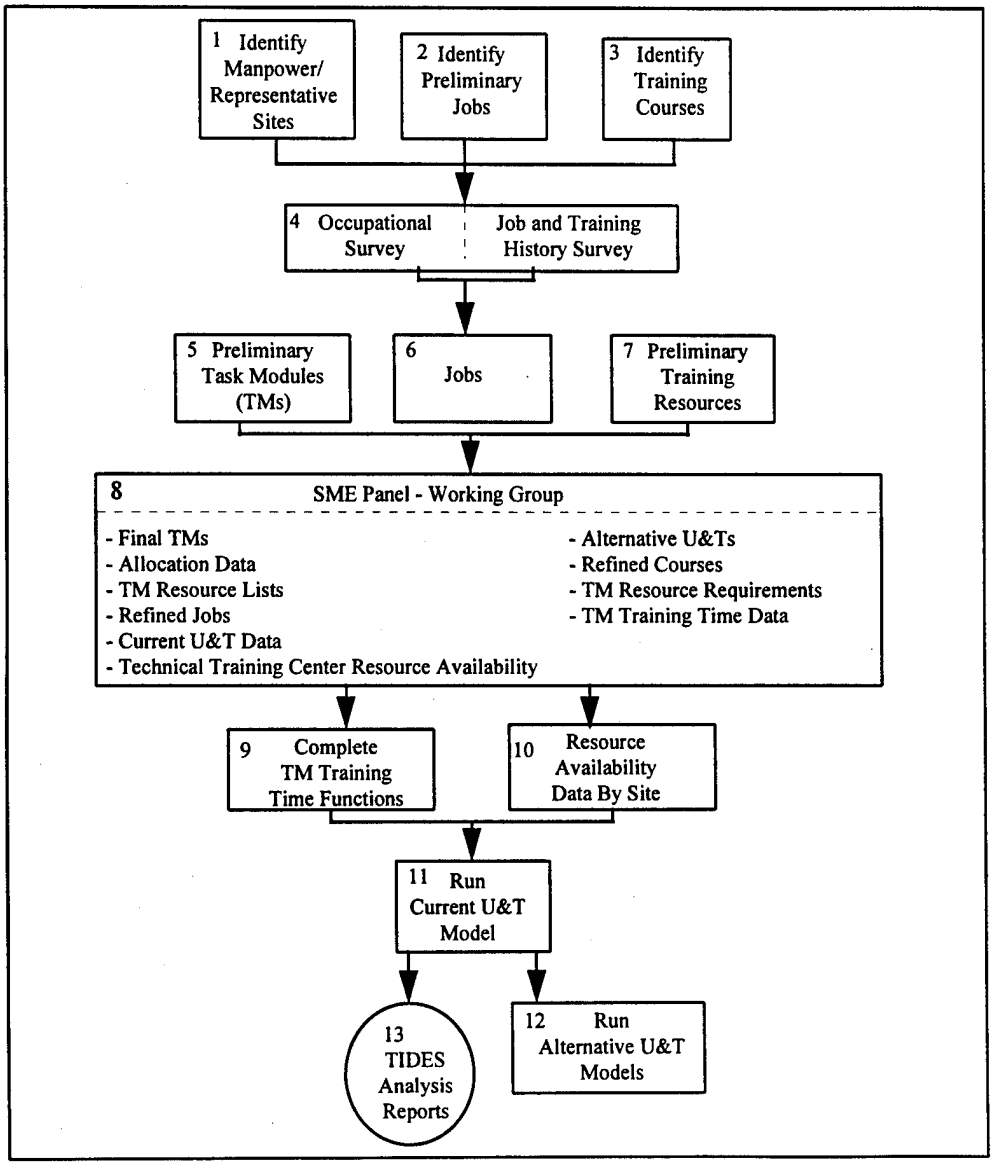

Figure 1. Integrated TIDES Study Process

Capabilities provided by the TIDES basically remain the same as those provided by the TDS, except for the addition of a capability that supports the generation of Career Field Education and Training Plans (CFETPs). A CFETP is an Air Force document that identifies the life-cycle education and training requirements for an AFS or civilian occupation series. Implementation of the TIDES differs from the TDS due to requirements to port the application to a different computer platform. Design decisions made during reengineering of the system to operate on the new computer platform resulted in the system components being organized and described differently than the TDS. The TIDES components and functions are portrayed in Figure 2.

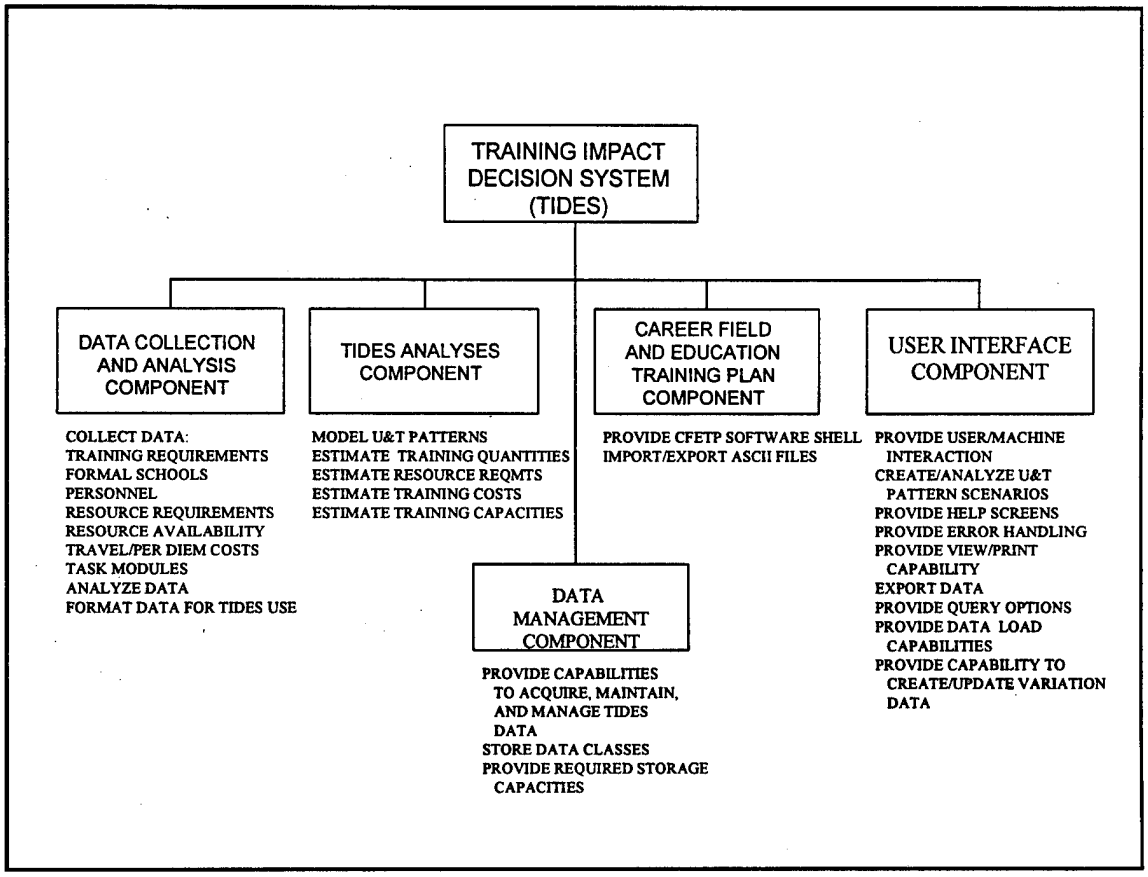

Figure 2. TIDES Components and Functions

The following paragraphs in this section contain descriptions of each TIDES component, the functions performed within each component, and, when applicable, the products generated by the components. The intended uses of products are also discussed.

2.1 Data Collection and Analysis Component

The overall purpose of the TIDES Data Collection and Analysis Component is to provide all data needed for the TIDES to model current and alternative utilization and training patterns for a given specialty and impacts of proposed or implemented decisions. This component is imperative to the overall functionality and performance of the TIDES.

Data gathering functions applicable to this component are actually performed outside of the TIDES software. This is necessary because adequate automated capabilities for data collection and verification are not currently available. Depending on the status of an occupational survey conducted by the Air Force Occupational Measurement Squadron (AFOMS) at the time a TIDES study of a AFS is initiated, data are gathered using one of two methods. If a study is initiated after an occupational survey has been administered and the analyses leading to publication of an Occupational Survey Report (OSR) have not been completed, then data are gathered through interfacing with subject matter experts and administering separate TIDES surveys, are analyzed with data gathered via the occupational survey, and then loaded to the TIDES data base as portrayed in Figure 3.

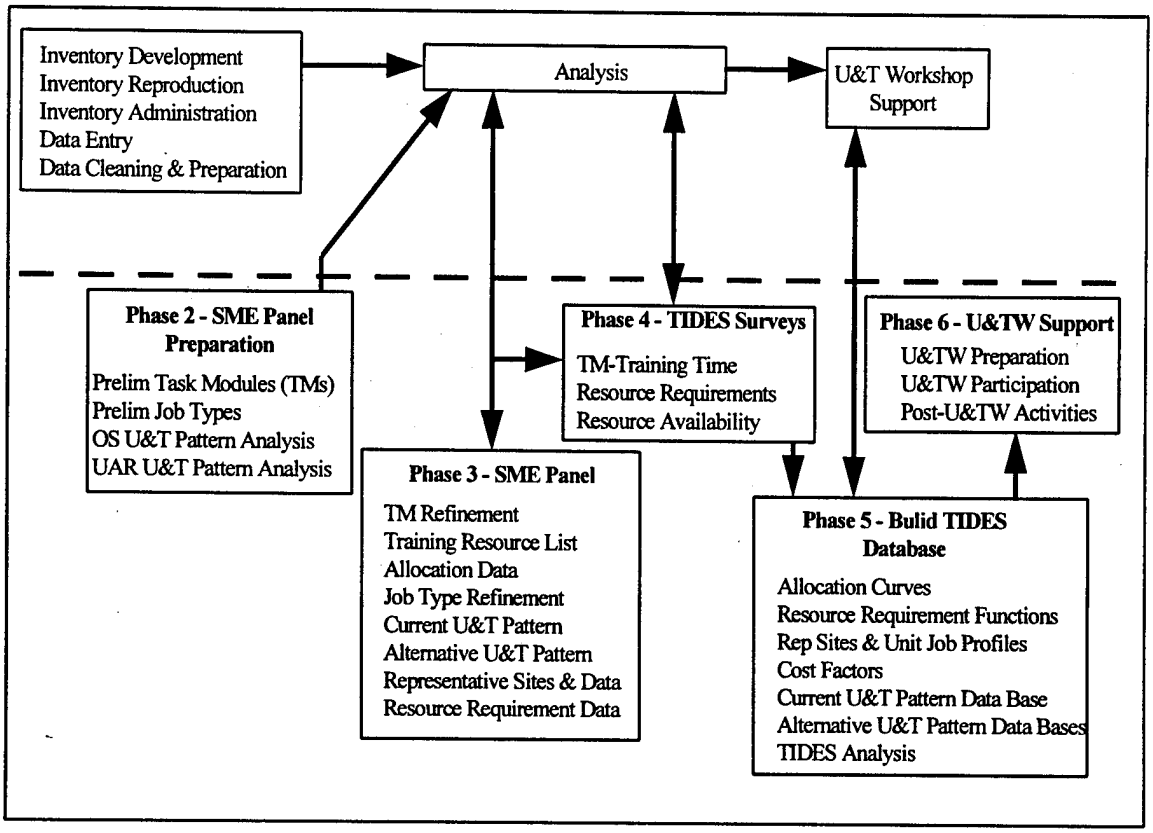

Figure 3. TIDES Data Gathering, Post Occupational Survey

If the analyses leading to publication of an OSR has been completed then analyses of TIDES data are conducted separately. If initiation of a TIDES study of an AFS corresponds to the schedule for an occupational survey for the same AFS then the occupational survey instruments will be expanded to accommodate gathering of background data required for TIDES. The remainder of TIDES data will be gathered through interfacing with subject matter experts and administering TIDES surveys. TIDES data will be analyzed with data obtained via the occupational survey and then loaded to the TIDES data base as portrayed in Figure 4.

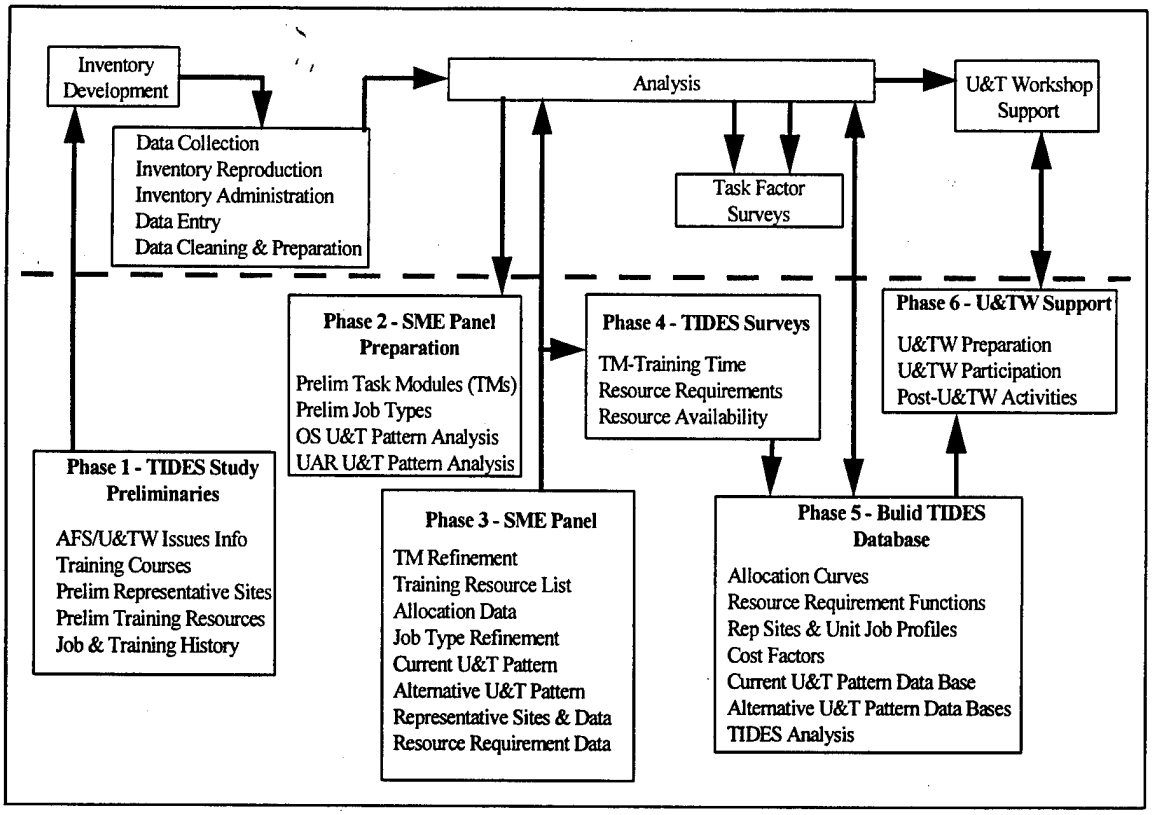

Figure 4. TIDES Data Gathering, Pre-Occupational Survey

The types of data gathered within this component include: 1) job and training history for members assigned to the applicable specialty; 2) task modules applicable to the specialty and each job within the specialty; 3) resources required to train each task module and the availability of those resources in training settings; 4) estimates of time required to train task modules to full proficiency; 5) organizations and locations where members are assigned; 6) representative training sites and the organizations represented by those sites; and 7) salary, travel, and per diem costs.

Three methods of data gathering are used to obtain data required to support studies of specialties. First, interviews are conducted with subject matter experts assigned to the specialties. Second, surveys are administered to a representative number of persons assigned to the specialties. Third, data are extracted from automated Air Force data bases such as the Personnel Data System (PDS) and Comprehensive Occupational Data Analysis Programs (CODAP).

To increase TIDES effectiveness, it is critical that a qualified analyst validate all data gathered prior to that data being loaded to the TIDES data base.

2.2 TIDES Analyses Component

The TIDES Analyses Component provides capabilities to estimate: 1) job flows and training requirements for both current and alternative utilization and training patterns, 2) resources required for training specified task modules, 3) resource availability by types of training settings, 4) overall costs associated with conducting training, and 5) capacities of training settings to conduct training. Capabilities are also provided to model utilization and training patterns, resources, costs, and capacities. The model overview is portrayed in Figure 5, followed by discussions of the capabilities provided within this component.

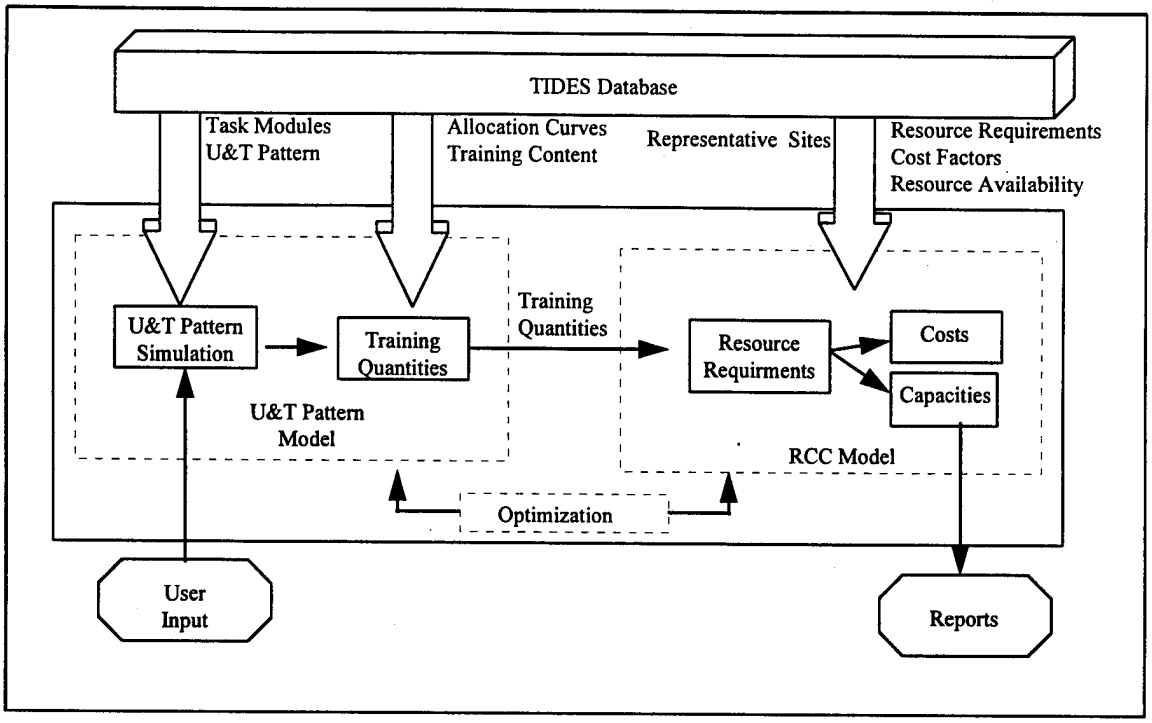

Figure 5. TIDES Modeling Overview

2.2.1 Utilization and Training Pattern Model

The Utilization and Training (U&T) pattern modeling capability performs two functions:

- Estimate average numbers of enlisted personnel flowing through jobs and training courses per unit time, and account for the various Task Modules (TMs) that might be performed in each job. These estimates consider the number of personnel entering an Air Force Specialty (AFS) per unit time, the probabilities of moving from a given job to another job at reassignment points, the probabilities of taking various training courses at various job and career points, lengths of time spent in various jobs and training courses, attrition rates, and probabilities that an enlisted person will perform each TM in each job

- Estimate average training quantities per unit time for formal training courses and for on-the-job training (OJT). For formal training, these estimates reflect numbers of people taking each formal course per unit time, as well as the number of hours devoted to each TM using each training delivery method within each formal training course. For OJT, the estimates reflect the numbers of enlisted personnel per unit time receiving OJT on each TM in each job, and the total number of hours of OJT on each TM in each job. In addition, the estimates reflect the total numbers of enlisted personnel per unit of time receiving OJT in each job (for these latter estimates, if an individual receives OJT on multiple TMs in a job, he or she still represents only one person among the total number receiving OJT for the job).

The model parameters defining a U&T pattern come from the TIDES database. The U&T Pattern Modeling Component performs the functions described above for both the current U&T pattern in an AFS and various alternative U&T patterns that users may define in the TIDES database.

2.2.1.1 Utilization and Training Pattern Simulation

The U&T pattern simulation estimates various job and training histories of airmen as they enter new jobs. The enlisted personnel are required to be fully proficient on TMs associated with these new jobs. This job and training history information permits previous TM-specific training, both formal training and OJT, to be considered in the estimation of OJT quantities required in various jobs. The U&T pattern simulation provides information on the numbers of enlisted personnel flowing through the specialty, jobs, and training courses per unit time.

The U&T pattern simulation includes the following elements: TMs, jobs, training courses, career paths, and entry/attrition rates. A job is characterized by lengths of time that an airmen holds each job and by TMs on which an airmen in each job must be fully proficient. Formal training courses are characterized by their lengths and contents (time allotted to specific TMs and delivery methods). Career paths are characterized by the probabilities of being assigned to each job, given that an airman is at a particular career point. Training courses are also characterized by their probabilities of being taken by enlisted personnel in particular jobs, at particular career points, or both of these factors. Entry rates reflect numbers of enlisted personnel entering the specialty per unit time. Attrition is reflected by probabilities of leaving the specialty (e.g., leaving the Air Force or cross-training) at various career points.

The Alternative U&T patterns are described within the same framework as the current U&T pattern. This allows TIDES to compare the current U&T patter with the Alternative U&T patterns described. The changes made might reflect possible training improvements or reflect Air Force management plans, expectations, and recommendations about the future structure of an AFS.

2.2.1.2 Training Quantities

The TIDES estimates formal and on-the-job training quantities required to support a specialty. These training quantity estimates are based on estimated personnel flows through various jobs and training courses provided by the U&T pattern simulation. These training quantity estimates are used to estimate training resource requirements, costs, and capacities.

Formal training quantity estimates reflect the expected number of enlisted personnel taking each formal course in a U&T pattern per unit time. Such quantity estimates also reflect the number of training hours devoted to each TM using each training delivery method in each formal training course.

OJT quantity estimates reflect the expected number of enlisted personnel in each job receiving OJT on each TM per unit time, as well as the expected number of OJT hours on each TM in each job per

unit time. These OJT quantity estimates also reflect the expected numbers of airmen receiving OJT on each combination of TMs in each job. TM OJT hour estimates take into account previous training that an airman typically has received on a particular TM using various training delivery methods, and are based on results from the U&T pattern simulation. In addition, these OJT hour estimates take into account TM-specific allocation curves (learning curves) relating training hours to proficiency achieved with various training delivery methods.

2.2.2 Resource, Cost and Capacity Modeling

The Resource/Cost/Capacity (RRC) modeling capability estimates the following:

Estimate quantities of resources required to accomplish specified quantities of formal training and OJT, annual variable cost of accomplishing such training quantities, and capacities to accomplish such training quantities. Training quantities for which such estimates are made come from the U&T pattern modeling. For formal training courses, training quantities are expressed in terms of numbers of airmen per unit time taking each course, and time in the course devoted to each TM in each training delivery method. For OJT, training quantities are expressed in terms of numbers of airmen per unit time receiving OJT on each TM in each job, and total numbers of OJT hours devoted to each TM in each job.

Estimate training resources that are likely to have a significant impact on variable training costs or training capacities. Such resources, termed consequential resources, include both labor resources (student and instructor) and non-labor resources (e.g., equipment items required to conduct training on a TM). Cost estimates reflect annual variable costs. Such estimates include student and instructor labor costs and travel/per diem costs. Capacity analysis indicates whether sufficient resources are available for training at important training sites to meet all training requirements and estimate the impact of resource shortages on the ability to meet training requirements, if shortages exist.

Resource quantities are estimated for training resources that are likely to have a consequential and substantial impact on variable training costs or training capacities. Such resources, termed consequential resources, include both labor resources (student and instructor) and non-labor resources (e.g., equipment items required to conduct training on a TM). Cost estimates reflect annual variable costs. Such estimates include student and instructor labor costs and travel/per diem costs. Capacity analysis indicates whether sufficient resources are available to meet all training requirements at representative training sites and estimates the impact of resource shortages on the ability to meet training requirements, if any shortages exist.

2.2.2.1 Resource Requirement Estimation

The resource requirement estimation estimates quantities of resources required per unit time to provide specified training quantities. Resources include student labor, instructor labor, and non-labor resources. The non-labor resources include training equipment and operational equipment used for training. Resource requirement estimates consider possible TM and training delivery method differences in resource requirements, as well as student-instructor ratios. For formal training states (training courses), estimates indicate the quantity of each resource required for each formal course per unit time. These estimates consider possible sharing among students of non-labor resource items. OJT resource estimates reflect quantities of each resource required per unit time to provide specified OJT quantities within each job and representative site. Input training quantities are estimated for each TM and job. The OJT resource estimation allocates these input training quantities to representative sites.

2.2.2.2 Cost Estimation

The cost estimation estimates annual variable training costs, including student and instructor labor and travel/per diem costs. Costs are estimated by applying costs factors to resource quantity estimates from the resource requirement estimation sub-component. For formal training states (courses), costs are estimated for each course represented in terms of resource requirements estimates. Travel and per diem costs are estimated where appropriate, based on the geographic location(s) where a course is taught and where enlisted personnel who are assigned to take a course are stationed. For OJT, cost estimates reflect student and instructor labor and are computed for each job at each representative site.

2.2.2.3 Training Capacity Analysis

The training capacity analysis evaluates the capacities of representative sites to fulfill the training resource requirements for those sites that have been estimated by the resource requirement estimation sub-component. Capacity analysis is applied to non-labor resources in relation to OJT requirements. The capacity analysis involves two steps:

- The pre-screening identifies constraining resources, where the available quantity of each type of consequential resource at a representative site is compared to the quantity of that resource required for conducting the training designated for the site.

- For each site where the first step indicates that effective capacity limitation prevails, and for allresource types that the first step has determined are not available in sufficient quantities at that site.

The linear programming method estimates the maximum number of enlisted personnel that can be trained with the available resources, up to the total requirement and subject to resource constraints.

2.2.3 Optimization

The TIDES performs optimization analysis. The objective function that is optimized is total training costs (formal training plus OJT costs), which are minimized. The decision variables are hours of training on specified TMs using specified training delivery methods, and assignments of individual simulated personnel to specified formal training courses. Optionally, constraints can be imposed based on non-labor resource quantities available for OJT at representative operational sites. The TIDES outputs the values of the objective function, decision variables, and constraint functions, if any, at the optimum solution. It also outputs statistics to aid in evaluating and interpreting the preceding results. The TIDES also maximizes or minimizes other objective functions, as additional optimization problems are identified for analysis.

2.3 Career Field Education and Training Plan Component

The TIDES Career Field Education and Training Plan (CFETP) Generation Component provides support for the development and generation of Air Force CFETPs. A CFETP is a document that identifies the life-cycle education and training requirements for an Air Force specialty or civilian occupation series. The contents of a CFETP is organized into two parts with appropriate subordinate paragraphs as prescribed by Air Force Manual (AFM) 36-2245, Managing Career Field Education and Training. The format for CFETPs is described below. Explanations of the contents are also provided.

Part I. This portion of the CFETP provides comprehensive career field information. It contains the Preface, Abbreviations and Terms Explained, and four sections.

Preface. Contains a general overview of the AFS and briefly describes the contents of the CFETP.

Abbreviations and Terms Explained. Provides standardized definitions found in the CFETP.

Section A, General Information. Contains general information on CFETP purpose and use, and procedures for coordinating and obtaining approval for updating and publishing the CFETP.

Section B, Career Field Progression and Information. Identifies career progression information which includes a specialty description, skill and career progression, training decisions, Community College of the Air Force (CCAF) degree program requirements, and career field education and training flows

Section C, Skill Level Training Requirements. Provides a broad, general correlation of each skill level to specialty knowledge and skills requirements, and to mandatory requirements for entry into, award of, and retention of each skill level.

Section D, Resource Constraints. Identifies resource constraints limiting or precluding training such as funds, manpower, equipment, and/or facilities to include specific constraints for skills training, exportable training, and proficiency training.

Section E, Transition Training Guide. Used only when two or more specialties are merging.

Part 2. Provides a comprehensive listing of training courses and standards available to support career field training requirements. There are five sections in Part II.

Section A, Specialty Training Standard (STS). Contains the entire STS. A STS is a contract for training between Air Education and Training Command (AETC) and the Major Command (MAJCOM) users of that training. A STS identifies knowledge and performance requirements to be trained in basic, advanced, lateral, and other skill-level awarding specialty courses; levels of knowledge and proficiency to be obtained in those courses; and core tasks required for award of the journeyman and craftsman skill levels. STSs also provide space for recording training of identified requirements conducted on the job.

Section B, Course Objectives Lists. Lists training objectives identified for the specialty to be trained in formal schools. Training objectives will be correlated to corresponding formal courses.

Section C, Support Materials. Lists available support materials that are relevant across the specialty. Support material is any training package designed to enhance the learning process at any level of training. Examples of training materials which may be listed include qualification training packages (GTPs), computer-based instruction (CBI), computer assisted instruction (CAI), and correspondence courses.

Section D, Training Course Index. Lists all mandatory Air Force in-residence, field, ECI, and exportable courses used to support training for the specialty.

Section E, MAJCOM Unique Requirements. Lists training requirements unique to specific MAJCOMs, when applicable.

2.3.1 Data Gathering

There are available sources from which some data required to be included in CFETPs can be acquired. These sources include Subject Matter Experts (SMEs) assigned to applicable specialties, Air Force publications, and the TIDES databases. The following identifies the data requirements and the corresponding sources.

- Data to support the development of career progression requirements to be included in Part I, Section B of a CFETP are available in Air Force Manual (AFM) 36-2108, Airman Classification. AFM 36-2108 contains a description for each enlisted specialty. The TIDES modeling capability may be applied to generate data required for applicable flow chart development and to support training decisions. Data required for the TIDES modeling will be gathered from SMEs and entered into the TIDES database. The data generated by TIDES will reflect current and projected U&T patterns by specialty, job type, and skill level. Data relevant to CCAF degree program requirements are available at Air Force Education Services Offices (ESOs).

- Data to support the identification of knowledge and skill requirements to be included in Part 1, Section C of a CFETP may be acquired from AFM 36-2108 and the TIDES database as described above.

- Data to support identification of resource constraints to be included in Part 1, Section D of a CFETP may be acquired from the TIDES database. The data generated by TIDES will reflect resources required to conduct training for each specialty Task Module (TM), the availability of resources by TM and training delivery method, and estimated personnel and travel costs associated with conducting training at specified locations.

- Data to support the development of STSs to be included in Part 2, Section A of a CFETP may be acquired from existing STSs and from the TIDES database. Existing STSs will serve as examples for STS content. STSs are published in hard copy and distributed to users by Publication Distribution Offices (PDOs). Published STSs are listed in Air Force Index (AFIND) 8, Numerical Index of Specialized Education/Training Publications and Job Qualification Standards (JQSs). The TIDES will identify TM identification numbers and titles applicable to specialties, TMs currently trained in formal schools, and candidate core TM requirements.

- Course control documents (e.g., Training Plans, Plans of Instruction (POI), and Lesson Plans) developed for each applicable specialty course should be reviewed when users are identifying course training objectives for inclusion in Part 2, Section B of a CFETP.

- Lists of approved JQSs and Qualification Training Packages (QTPs) to be included in Part 2, Section C of a CFETP are contained in AFIND 8. SMEs assigned to MAJCOMs should identify MAJCOM indices that list other available training materials.

- Descriptions of applicable formal training courses to be included in Part 2, Section D of a CFETP are contained in AFCAT 36-2223, Formal Schools Catalog. CDCs are listed in the Extension Course Institute (ECI) Catalog. The ECI Catalog is available from ECI and Base Training Offices (BTOs). There are currently only three PME courses available to enlisted personnel: 1) Airman Leadership School (ALS), 2) Noncommissioned Officer Academy (NCOA) and 3) United States Air Force Senior Noncommissioned Officer Academy (SNCOA).

2.3.2 CFETP Development and Generation

The TIDES provides a CFETP shell that contains, in the proper format and sequence, all major parts and paragraphs specified for a CFETP. Users are provided options to access the CFETP shell, select parts and paragraphs for development, and generate the product at any point in development. The TIDES provides a text editing capability for use in developing CFETPs. A capability to convert CFETPs into an ASCII format is provided to enable users to transfer the data to a word processor or graphics generator of their choice for incorporating desired format modifications. The TIDES features an on-line help function to identify sources of data that support the development of CFETPs.

2.4 User Interface Component

The User Interface (UI) allows AF managers and other users to interact with the TIDES. These users are provided the capability to input data from the Data Collection and Analysis Component into the TIDES.

The UI performs the following functions:

- Allow managers and analysts to interact with the TIDES.
- Provide status information to the user during processing.
- Enable the user to ask for context-sensitive help at any step in a task.
- Provide on-line help and documentation, including a tutorial on how to create TIDES scenarios.
- Provide the user with output and documentation concerning the executed TIDES scenarios implemented by the user.
- Provide a query capability for the database in the TIDES system. The query method will allow for quick access to the TIDES data.
- Provide an interactive method for loading new career field data files into the TIDES system.
- Provide a method for updating data for existing AFSs in the TIDES system.

2.4.1 Interaction With The TIDES Model

The TIDES UI aids users in creating and analyzing Utilization and Training (U&T) pattern scenarios. The UI aids users in translating MPT policy issues into U&T pattern specifications. The UI guides the user in the conversion of user inputs and questions into analysis formats which execute the TIDES analyses. The user interface provides an electronic data interchange method to allow importing and exporting of the TIDES data to ASCII files.

As the user makes changes or additions to particular data elements, the interface, as appropriate, identifies other types of data elements that may need to be changed. For example, a change in course content, depending on the nature of the change, may imply changes in other course-related data elements, such as the course length or the probabilities of taking the course. The TIDES UI aids users in considering these changes, so that a user can intelligently translate policy issues into TIDES U&T pattern scenarios and interpret the TIDES output.

2.4.2 On-line Help and Documentation

The UI provides help screens that define the function of the screen the user is working with and provide definitions and formats for each of the data elements to be entered. The UI instructs the user on how to formulate and run TIDES analyses.

The TIDES provides error handling capabilities. The TIDES ensures each item entered by the user is semantically and syntactically correct for storage and subsequent data processing. The TIDES error messages inform the user that a data entry error has occurred, the nature of the error, and how to recover. These messages provide clear, concise instruction and are not limited to 'do so-and-so' statements.

The UI includes a tutorial that outlines the steps necessary for the user to formulate and run a TIDES analysis. The tutorial provides the user with step-by-step instructions concerning operations of the TIDES software, including initialization procedures necessary to execute the software, user inputs, inputs from other sources (e.g., external databases), termination procedures, restart procedures, and system outputs, including error messages.

2.4.3 Output From The TIDES Model

The UI provides the user with output from the various scenarios executed by the user. The scenario output includes user-provided comments, model parameter values, date of execution and the actual results of the scenario. The user is able to view or print a scenario output. Output provides comparisons with a baseline scenario to determine changes relative to the baseline. The formatting of the printed products generated from the TIDES accommodates ease of understanding for the product recipients.

The TIDES provides the capability to export data to other external sources via ASCII data interchange files.

The UI generates the analysis reports listed below by category.

Utilization and Training Pattern:

- Entity entry and exit information to display the flow of personnel through the simulation
- Information by job to summarize the simulation flow sorted by job.
- Summary of training information by formal course.
- Summary attributes of the personnel associated with each TM.
- Summary of months-of-service distribution of personnel by time increment.

Training Quantities:

- Summary of hours of training in each formal course by TM and training delivery method.
- Computed course attendance for each month of the simulation.
- Computed summary of OJT trainees by TM
- Computed hours of OJT for each TM by job.
- OJT summary of training required by job.
- Proficiency constraint summary of the highest proficiency achievable by TM if less than 100%.

Resource Requirements and Cost Estimation:

- Consequential training resource requirements for OJT by job and representative site.
- Total student training hour requirements by course.
- Total student OJT hour requirements by job and representative site.
- Instructor hour requirements by course.
- Summary of annual AFS training costs for formal courses including direct trainee costs, direct trainer costs, per diem costs, travel costs, and total costs.
- Summary of total training costs for OJT by job and representative site by trainee, by trainer, or aggregated by job.
- Summary of training resources and estimation of training capacity by representative site.

Optimization Summary:

- Display adjusted parameters and values for scenario.
- Summary of optimum training hours by representative site, by TM, or by course.
- Summary of results achieved by alternative scenarios for an AFS.
- Summary of training/trainer capacity analysis results.

2.4.4 Querying Capability

The UI provides the user with a query option to select, view, and print data within the TIDES. This capability allows the user a broad utilization of the data in the TIDES system. The user is able to view the current and alternative U&T pattern parameters of the AFS without accessing the modeling capabilities of the TIDES.

2.4.5 Loading and Updating New Data

The UI allows the user to load new AFSs into the TIDES database. The user has the capability to create variations from the original data set and update the original data set, for alternative analyses. The original data set remains unchanged in order to provide a baseline for comparison of all subsequent scenarios analyses.

2.5 Data Management Component

The TIDES provides capabilities to acquire, maintain and manage all data required to fully support the TIDES model. The TIDES accepts data collection inputs from the user, using capabilities of the User Interface.

The TIDES uses a relational database model. The TIDES data management functions act as an information management system to store, access, update and delete data. It also provides report generating options and interactive query options.

2.6 System Interfaces

The TIDES has been designed and developed to operate on personal computers (PCs). At this time, no requirements for electronic interfaces with external systems have been stated nor developed. As discussed in Section 2.1, data required to conduct a study of a specialty is gathered from subject matter experts or extracted from existing Air Force data bases. Data gathered via interviews and surveys are currently updated to the TIDES via a user-machine interface. Data extracted from automated Air Force data bases are currently transferred via floppy disks.

3 TIDES OPERATING ENVIRONMENT

This section identifies the organizations and personnel that are targeted to be the primary users and maintainers of the TIDES technology. Suggested uses of the technology and benefits to be derived from its use are also discussed.

3.1 Using Organizations

The primary personnel and organizations targeted to use the TIDES technology are Functional Managers and Career Field Managers assigned to Air Staff and MAJCOM Directorates, and Training Managers assigned to Technical Training Wings (TTWs) aligned under AETC's 2nd Air Force and to operational job sites. A critical role of Functional and Career Field Managers at Air Staff and MAJCOM Directorates is to provide new or revised direction and implementation procedures to operational organizations under their control. New or revised direction frequently effects how personnel within the organizations are utilized and trained. Training Managers at TTWs are the primary developers of documents that control formal training required for personnel to accomplish requirements imposed by new or revised directions. Training Managers assigned to operational job sites are responsible for the development of training programs that enable personnel to build upon skills and knowledge acquired in formal training and to achieve full proficiency in assigned jobs and duties.

The TIDES technology provides support needed to determine the effects of proposed decisions prior to finalization and implementation. Functional and Career Field Managers regularly convene Utilization and Training Workshops (U&TWs). Field representatives of the applicable specialties, TTW representatives, and representatives from the Air Force Occupational Measurement Squadron normally attend as well. The primary purposes for convening an UT&W is to discuss changes in Air Force MPT systems, weapon systems, equipment, and/or procedures and determine the impacts those changes will have on applicable specialties. Typically, decisions are rendered related to performance requirements germane to overall specialties and specialty skill levels, deletion or addition of formal training courses, contents of formal training courses, and resources required for training. Documents governing training for specialties are typically developed or revised during the period of an U&TW which reflect results of decisions, (e.g., Specialty Training Standards (STSs), Course Training Standards (CTSs), Plans of Instruction (POI), specialty descriptions. It is at, or during preparation for, this type of forum that the TIDES technology is most useful.

The TIDES capability to produce current utilization and training patterns for specialties enables managers to visualize how members within specialties are currently being assigned and trained. The TIDES capability to produce alternative utilization and training patterns based on proposed changes (e.g., decreases or increases in manpower, training, assignment lengths, maintenance procedures) enables managers to visualize how utilization and training patterns would differ from the current patterns. The TIDES can then produce data which indicate impacts associated with each alternative. These include estimates of: 1) increases or decreases in job performance requirements; 2) percent of personnel across specialties and jobs which would require training; 3) resources required to conduct training; 4) capacities of training settings to conduct training, based on resource availability; 5) costs for conducting training within specified training settings; and 6) the most effective distribution of training hours for specified performance requirements across training settings, to minimize training costs. Managers may specify scenarios to be considered by the TIDES. An illustration of the TIDES modeling process is presented in Figure 6.

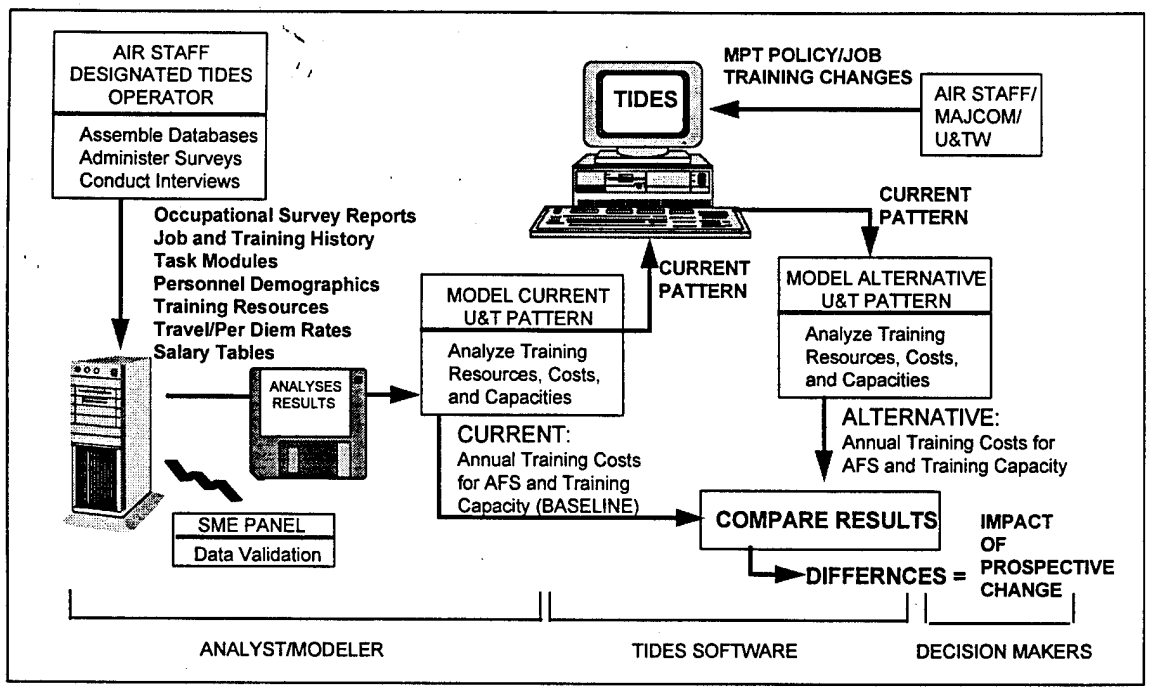

Figure 6. TIDES Modeling Process

Feedback received from Functional Managers, Career Field Managers, and Training Managers indicate wide support for the TIDES CFETP Shell. Air Force users have found the CFETP Shell to be extremely beneficial when constructing CFETPs and documents contained therein (e.g., STSs, CTSs, specialty descriptions), in that the formats and information provided simplify development and have resulted in the savings of many development hours.

3.2 System Maintenance Organization

Currently, the Instructional Systems Research Branch (AL/HRTD) is the organization responsible for maintenance of the TIDES technology, and provides support to system users. As such, this organization will modify the system source code, as required, provide guidance to users on system operations, and coordinate user requests for data.

3.3 Benefits

The most significant benefit to result from continued use of the TIDES technology is that the Air Force training system should become much more effective and efficient. This is based on the availability of sufficient data on which to base sound decisions related to what to train, where to train, how to train, and when to train.

4 ABBREVIATIONS/ACRONYMS

AAR	- Airman Advanced Resident (Course)
ABR	- Airman Basic Resident (Course)
AF	- Air Force
AFCAT	- Air Force Catalog
AFCFM	- Air Force Career Field Manager
AFI	- Air Force Instruction
AFIND	- Air Force Index
AFM	- Air Force Manual
AFR	- Air Force Regulation
AFS	- Air Force Specialty
AFSC	- Air Force Specialty Code
ALR	- Airman Lateral Resident (Course)
AT	- Advanced Training
AZR	- Airman Intermediate Resident (Course)
BO	- Behavioral Objective
CCAF	- Community College of the Air Force
CDC	- Career Development Course
CFETP	- Career Field Education and Training Plan
COL	- Course Objective List
CTG	- Career Training Guide
CTS	- Course Training Standard
FT	- Formal Training
FTD	- Field Training Detachment
ISD	- Instructional Systems Development
JQS	- Job Qualification Standard
MAJCOM	- Major Command
OA	- Occupational Analysis
OJT	- On-the-Job Training
OSR	- Occupational Survey Report
PDO	- Publications Distribution Office
PME	- Professional Military Education
PDS	- Personnel Data System
QTP	- Qualification Training Packages
RPR	- Request for Personnel Research
SEI	- Special Experience Identifier
SME	- Subject Matter Expert
STS	- Specialty Training Standard
TDS	- Training Decisions System
TIDES	- Training Decision Impact System
TM	- Task Module
U&TP	- Utilization and Training Pattern
U&TW	- Utilization and Training Workshop

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