ABSTRACT
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INTRODUCTION
The purpose of the Directorate of Management Sciences is to provide a source of operations research expertise for the Headquarters, Air Force Logistics Command. Although we are a part of the Plans and Programs DCS, we perform most of our studies and analyses for clients in the other DCS's and two of the Centers located at the Headquarters (the Logistics Operations Center and the Logistics Management Systems Center). Our emphasis has been, and continues to be, on the application of mathematical modeling techniques to improve the management of logistics resources. In addition, we sponsor a limited amount of contract research through the Management Sciences Studies Program.

The Directorate includes three Divisions: the Assessment Applications Division, the Concept Development Division, and the Consultant Services Division.

Our objective is to identify specific actions which AFLC can take to provide the most substantial impact in terms of increasing combat capability or decreasing costs or both. We have focused our efforts on the development and enhancement of mathematical models which can relate logistics resource decisions to resultant impacts on aircraft availability rather than on more traditional, but less meaningful, measures such as fill rate.

In the next section we'll discuss eight of our current efforts.
condemnation pipeline. We are currently testing a new technique for handling weapon systems being phased in/out of the inventory; assisting in the necessary modifications to the DB41 data system to allow the release of long supply POS assets to satisfy WRM deficits; and investigating the concerns expressed by item managers about increased repair quantities and costs. Our work on this project is winding down.

The Weapons System Management Information System (WSMIS)

We are providing the technical direction on the WSMIS development and implementation issues. We are the Air Force technical OPR for Dyna-METRIC which is the heart of the WSMIS/SAM/REALM. It is used for both wartime capability assessment (Sustainability Assessment Module, SAM) and wartime spare requirements computation (Requirements Execution/Availability Logistics Module, REALM). During the past year, we have focused our attention on the three portions of WSMIS/SAM which most needed our attention. These relatively new features are the Tactical/Conventional Airlift Strategic assessment (T/CAS), Depot Spares and Engines assessment and Strategic Airlift assessment. T/CAS is basically the latest standard Air Force version of the model, Version 4.4, and is being phased in to replace the older Version 3.6.4. The Depot Spares and Engines feature involves changes to SAM that cover explicit depot modeling for an extended scenario (68 days) and the inclusion of engines and engine modules in both unit and theater level SAM assessments. The Strategic Airlift assessments involve the use of a non-standard version of Dyna-METRIC to address the unique characteristics of modeling C-5's and C-141's. When the contractor delivered T/CAS to the Air Force for implementation, we conducted the Acceptance Test and documented more than 41 significant errors and/or discrepancies. Most of these have been corrected and I might add, at no cost to the government. We did similar testing with the Depot Spares and Engines assessment and have recommended terminating the effort if the funds necessary for improvement are not available. Our greatest success for the betterment of WSMIS was in support of Strategic Airlift assessments, where we identified numerous problems and either described solutions or developed the solutions ourselves. Our involvement with WSMIS will continue into 1989.

Depot Repair/Modification (DEP REP/MOD)

Funding Allocation

The budget for DEP REP/MOD was drastically reduced in FY88 and the prospects for FY89 and beyond are no brighter. There are no tools currently available that allow tradeoffs of repair investment and weapon system availability. We feel that combining the DRIVE model (Distribution and Repair in Variable Environments) and Dyna-METRIC will provide a promising new approach to relating DEP REP/MOD dollars to aircraft availability. DRIVE will be used to compute the DEP REP/MOD requirement under various funding alternatives and Dyna-METRIC will be used to determine the capability resulting from that requirement. This project is just starting and we are very excited about it.

Engine Pipeline Analysis

This is a relatively new project. We are working with the Engine Systems Management Division in the LOC in assessing the current reporting and management of aircraft engine pipelines, and to assist in developing improvements in providing statistical and computer modeling capability. The major tasks are to identify deficiencies in the current Engine Pipeline Reports and to develop, prototype, and recommend changes that would improve the management of engine pipelines; to develop consistent criteria and methodology for establishing peacetime pipeline standards for aircraft engine management; and to develop methodology for establishing wartime pipeline standards based on peacetime baselines. Maintaining visibility and control over engine assets in all segments of the resupply pipeline is vital to providing and maintaining high aircraft availability rates and in keeping the requirements for expensive aircraft engines and modules at the lowest possible levels.

Combat Data Bases

Our objective in this project is to determine how war requirements differ from peace requirements, particularly in demand rates and what impact there is on maintenance. We will review, assess and exercise two war data bases to determine their usefulness in developing wartime factors for requirements and planning purposes. The data bases are the USAF Southeast Asia (SEA) data covering the Vietnam era, and a foreign data base covering selected weapons and data periods.

Modeling Reliability and Maintainability Improvements

We have recently taken on a task to determine how AFLC should model the effect reliability and maintainability improve-
ments have on combat capability. We have done some preliminary investigation and have an idea of what the model should do: (a) show a few 'big payoff' R&M improvements; (b) use a measure of effectiveness appropriate to the weapon system; (c) capture operator experience on the effort of subsystems on mission accomplishment; (d) capture maintainer experience on the contribution of subsystems to downtime and manpower requirements. We have reviewed two models MARGI (Methodology for Analyzing Reliability and Maintainability Goals and Investments) and ACCESS (Assessment of Combat Capability Expected from the System and Support Resources). We intend to look at more models; interview model developers and users; and compare a 'model of all seasons' to different models for different aircraft types.

Evaluating Aircraft Spares Forecasting Techniques

The objective of this study is to evaluate aircraft spares forecasting techniques. We are currently attempting to identify the various forecasting techniques being used, e.g., 2-year moving average and manual override by the item manager. We need to determine the frequency of usage, particularly the manual override by the item manager. We will develop a method for evaluating the various forecasting techniques and then evaluate the current techniques.

Aircraft Availability Maintenance Model (AAMM)

The AAMM will be a planning model that provides AFLC the capability to relate expenditures in repair dollars to available aircraft. It will be used to justify AFLC repair budgets by being able to demonstrate the impact of repair funding shortfalls on available aircraft. The AAMM will utilize data provided by the D041 requirements computation system and many of the concepts embodied in the D041 Aircraft Availability algorithms. It will produce tables relating repair dollars to the percentage of the fleet available in 1% increments. The information will be by weapon system for all weapon systems encompassing all BP1500 items. The tables will cover the apportionment year, budget year, and the first year of the POM.

SUMMARY

In summary, we have made a lot of progress in relating resource alternatives to operational effectiveness. For example, we're pretty smart about the effect dollars spent on spares has on readiness. At the same time, much remains to be done. For example, we cannot quantify the contribution of roughly 1,500 people at Hq AFLC to readiness and sustainability. None-the-less, I would like to think that they do contribute, since I am one of them.