Evaluation of the Intern Forecasting System

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THE OPERATIONS RESEARCH CENTER (ORCEN), A UNITED STATES MILITARY ACADEMY CENTER OF EXCELLENCE, CONDUCTED AN ANALYSIS OF THE INTERN FORECASTING SYSTEM (IFS). THIS WAS AT THE REQUEST OF THE DIRECTOR, CIVILIAN PERSONNEL MANAGEMENT DIRECTORATE, OF THE TOTAL ARMY PERSONNEL COMMAND. THE GENERAL RESEARCH CORPORATION (GRC) IS THE AGENCY CONTRACTED TO DEVELOP THE IFS, WHICH IS A COMPONENT OF THE CIVILIAN FORECASTING SYSTEM (CIVFORS).

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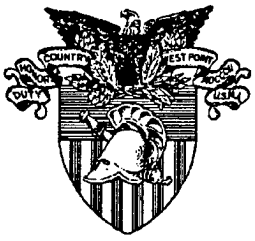

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EXECUTIVE SUMMARY

The Operations Research Center (ORCEN), a United States Military Academy Center of Excellence, conducted an analysis of the Intern Forecasting System (IFS). This was at the request of the Director, Civilian Personnel Management Directorate, of the Total Army Personnel Command. The General Research Corporation (GRC) is the agency contracted to develop the IFS, which is a component of the Civilian Forecasting System (CIVFORS).

The ORCEN's mission was to study the IFS to determine how it produces forecasts of intern personnel, and to determine some reasons why the IFS has not produced seemingly reasonable results to date.

The results of this study are that GRC has developed a technically adequate solution to the problem they faced, but they have not designed an appropriate solution that performs well in the user's environment and assures user satisfaction.

After several operational tests the IFS has not yet provided reasonable results. In fact for numerous career program and major command categories the IFS forecasted zero requirements across the entire Five Year Defense Plan. This is due in part to ineffective settings for conditional parameters that control which forecasting model to use, and seasonality parameters that enable the principle forecasting model, Winter's model, to forecast more accurately.

The output screens require the users to manually aggregate hundreds of data to achieve the results they need. This manual aggregation could be handled very effectively within the IFS. Additionally, the menuing systems requires that the user access multiple

levels of information before they can begin to aggregate this data manually. It is apparent that the user's needs and operating environment were given small consideration in the development of the IFS to date.

The Army Civilian Training and Education Systems (ACTEDS) branch of the Civilian Personnel Management Directorate is justified in being hesitant to accept the IFS in its current form. The IFS has not provided reliable results, and the results that it has provided require literally days of manual calculations to determine the needed information.

VITAE

Captain James L. Watson, Jr. was born in Harrisburg, Pennsylvania in 1959. He graduated from the United States Military Academy in 1981. He has served in a variety of field artillery assignments, including two tours as a battery commander. Captain Watson earned his Master of Science in Mathematics and Operations Research at the Colorado School of Mines. As an instructor in the Department of Systems Engineering as USMA, he has taught a course in Engineering Economy.

Major Robert K. Greenawalt was born in Mechanicsburg, Pennsylvania in 1955. He graduated from the United States Military Academy in 1978. He has served in a variety of signal corps assignments, including tours in Germany where he was assigned as the 3rd Infantry Division Automation Officer. MAJ Greenawalt earned his Master of Science in Engineering and his Master of Business Administration at the University of Pennsylvania. As an instructor and assistant professor in the Department of Electrical Engineering and Computer Science, he has taught courses in Database Management, Computer Graphics and Management Information Systems.

ACKNOWLEDGEMENTS

This report is the result of the cooperative efforts of many individuals from both the U.S. Army and the General Research Corporation (GRC). The assistance and patience of all involved is greatly appreciated. Also, we appreciate the opportunity to use the skills and education, for which the U.S. Government paid, in a way that is unique from the classroom.

Ms. Sherry Rashleigh and Mr. Lee Mudd, the primary level users of the Intern Forecasting System (IFS) at the Army Training and Education Systems (ACTEDS) branch, provided valuable information concerning their needs and expectations of the IFS, as well as the background information necessary to understand the intern management process. Their supervisor, Mrs. Edie Coutcher, also provided great assistance in understanding the background and development of the IFS. Finally, we would like to thank Mr. Joseph E. Galbraith who took time from his very busy schedule to meet with MAJ James Armstrong.

GRC opened their facilities and documentation to us in a very generous manner. In particular, we would like to thank Mr. Bill Bartlett and Ms. Lisa Kallaur for patiently going through every detail of the IFS. In addition, Mr. Dave Moore, the original author of much of the IFS process, took a special trip to meet with us to assist our understanding.

We hope that this effort will result in a better understanding of the needs and requirements of the IFS, as well as its successful completion and acceptance.

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1. OVERVIEW

a. Background

The Intern Forecasting System (IFS) is a component of a larger government contract known as the Civilian Forecasting System (CIVFORS), the civilian component to the Headquarters, Department of the Army Decision Support System (HQDA DSS). The contract to develop and field CIVFORS, including the IFS, was awarded to the General Research Corporation (GRC).

The IFS was initiated in May 1989, when the revised Statement of Work was signed between GRC and the Army Civilian Training and Education Development System (ACTEDS) Branch, Directorate of Civilian Personnel Management, Total Army Personnel Command (TAPC). The IFS is intended to provide systematic forecasts of future intern needs.

In May 1991 an operational test of the IFS was conducted by GRC. The results of this test provided some incentive for ACTEDS branch personnel to seek outside technical assistance to determine how the IFS operates, and if its output is valid.

The Civilian Personnel Management Office, TAPC asked the Operations Research Center (ORCEN), a Center of Excellence at the United States Military Academy (USMA), to conduct this technical analysis. ORCEN personnel made two trips to TAPC. The first trip was planned to become familiar with the key personnel involved with the IFS from both ACTEDS branch and GRC, as well as the IFS model itself. During the second trip, ORCEN personnel conducted a thorough, detailed analysis of the IFS operating method with all key

personnel from both ACTEDS branch and GRC in attendance. This report is the result of this work and some continued analysis conducted at USMA.

b. Purpose

This report has two purposes. First, to provide ACTEDS branch personnel with the results of the detailed analysis that the ORCEN conducted. Second, to provide ACTEDS branch personnel a description of the IFS operational method in non-computer terms. The second purpose is provided in Appendix A. It is the hope of the ORCEN that this report can be used as a stepping stone toward a cooperative and useful completion of the IFS development.

2. EVALUATION

a. Methodology

This effort focuses on four issues related to designing successful systems which are the subdivisions of this report (Rouse, 1991). They are as follows:

Has the right problem been formulated?

Has an appropriate solution been designed?

Has the IFS been developed to perform well?

Does the IFS assure user satisfaction?

These issues reflect the "users" point of view which is the perspective held throughout this report. Since the users of the IFS are people assigned to ACTEDS branch, the structure of the discussion focuses on human-centered design.

Human-centered design has recently gained increased attention in the world of systems analysis. Dr. William B. Rouse describes a framework to study a system based upon human-centered design in his book, Design for Success - A Human-Centered Approach to Designing Successful Products and Systems. He describes the tenets of human-centered design as being focused on three objectives. First, a system should be designed to enhance human abilities, adding speed to operations humans would do manually. Second, a system should be designed to overcome human limitations, providing efficient means to overcome common human errors. When one designs a system that is to be used by people, these first two objectives not only make common sense, they are essential. Following naturally from the first two objectives, the third objective is to foster user acceptance. Understanding the user's concerns and preferences is not enough. Implementing a design that satisfies those concerns and preferences in a highly usable, "friendly" format is the important point of human-centered design.

b. Results

This report focuses on each question separately, providing analysis and conclusions based upon the objectives of human-centered design. Additionally, each question is answered with respect to the database management and the forecasting components of the IFS.

(1) Has the right problem been formulated?

GRC has developed a model that does provide a solution to the problem of systematically determining a forecast for civilian intern requirements for the budget year and the Five Year Defense Plan (FYDP). Included in the problem is reading the current personnel strengths for interns in all career programs (CP), Major Commands (MACOM), and paygrades (PG), from the HQ DSS database, which is updated on a monthly basis. With respect to the database management, GRC understood the problems associated with obtaining the raw data and manipulating it into a form which could be easily accessed and used by the model. They went to great lengths to identify and use all data which could be applicable to the model. The database module is followed by the IFS forecasting modules which provide forecasting rates from the given data.

The functional requirements listed in the Statement of Work indicate that the problem to be solved was understood at first, at least in a broad perspective. Appendix B describes how the IFS does not include many of the requirements listed in the Statement of Work.

(2) Has an appropriate solution been designed?

As previously stated, the IFS does provide a forecast of Intern personnel requirements. However, the scope of the solution which the IFS provides leaves much of the problem unsolved. Specifically, because the IFS focuses its forecasts on a level that is detailed down to the career program, MACOM *and* paygrade, this data must still be aggregated to meet the needs of ACTEDS branch. What ACTEDS branch needs are personnel forecasts that are aggregated across all paygrades of interns, yet retain the detail by career program and MACOM. GRC claims since this is not specified in the Statement of Work, then they are not obligated to provide the data in this form. While this may be

legally true, it also seems a waste to provide a forecasting model that produces output that requires hundreds of simple additions and subtractions to compute the desired forecasts.

The solution developed by GRC to obtain the data and transform it into an appropriate format is very good. GRC has been faced with the task of obtaining transaction data which may not always contain accurate fields, usually caused by data entry errors, or which may be several months old. GRC has designed what appears to be a very thorough and well thought out solution to the likely problems they would encounter with the data they received.

The IFS uses two models to make forecasts. If conditions using two parameters, "Small Cell Size" and "Sufficient History", are met, then the IFS uses Winter's Approximation Model (Winter's) to make the forecast. If either of the conditions are not met, then the IFS uses a simple Weighted Moving Average (WMA) model. While both methods are valid forecasting techniques, neither is necessarily the best model for this situation.

Different forecasting models are suited to different trends in the past data. Specifically, the WMA model relies on the stability of past data. It is best used when the data vary randomly around one stable point. On the other hand, Winter's model can be used on data that have had a trend upwards or downwards, and have the added facet of seasonality. Seasonality is the natural cycle of increases followed by decreases that some data sets demonstrate. A cycle begins as the data increase, peak out, go through a decrease, stabilize, and stops as the data begin to increase again into the next cycle. The number of cycles within a prediction interval determines the number of "seasons" to include in the model parameters.

All mathematical forecasting models determine future values based upon the way the data behave in the past. Consequently, relying on the forecasts of these models is not unlike predicting where a train is heading, while looking out the back of the caboose. The point is that forecasting models rely heavily upon past data.

Thus, to forecast one must understand what trends the data have exhibited in the past to decide which model to use. Unfortunately, GRC has never conducted a plot of the data for any category of career program, MACOM, and paygrade (Bartlett, 1992). Their rationale for not doing so has been that although Winter's model may not be the most appropriate model to forecast intern personnel strengths, it is the most flexible model, covering any trend and seasonality the data may exhibit (Moore, 1992). This rationale demonstrates that GRC has fit a model to a problem, but has not focused sufficiently on the problem they have been contracted to solve. It is the characteristics of the data itself that should determine which model to use.

(3) Has the IFS been developed to perform well?

Simply, the IFS has not performed well yet. On the first test run in May 1991, a number of CP/MACOM/PG categories had all zeroes forecasted for the entire FYDP. This is a highly unlikely event, and even more unlikely across many categories. Again, the reason for the unusual zero forecasts is because several of the IFS parameters are not adjusted properly. Consequently, even with the flexibility of Winter's model, the IFS typically does not use it. During the analysis of the IFS, several parameters and forecasting sequences were tested. As mentioned before, these parameters control which forecasting model to employ, Winter's or WMA. The parameters were found to be too strict, causing most of the forecasts to be generated from the simple Weighted Moving Average model (White Paper, 1991). Additionally, because the scope of the forecasts is so detailed, the overall results are

often skewed downward. Again, the scope should be broader, to provide not only better forecasts, but also, to satisfy better the needs of the user, ACTEDS branch.

One other note should be made about Winter's model. Its reliability depends heavily upon the number of seasons in a prediction period. The forecast of interns is analyzed on a yearly basis. Thus, to use Winter's model properly, one would have to know the number of seasons there are in the data in a year. GRC has assumed that the number of seasons is 4, but they have not plotted the data or even asked ACTEDS branch personnel to verify this (Bartlett, 1992). In discussions with ACTEDS branch personnel there is no one seasonality that could be generalized across all career programs, MACOMs, and paygrades. Many career programs tend to have an increase in June, after high school and college graduations, and another increase in the fall months around September (Coutcher, 1992). However, this indicates that the past data generally have had 2 seasons per year. Unfortunately, GRC has arbitrarily assumed 4 seasons per year. The overall reliability of the forecasts generated by the IFS can be improved by more accurately knowing the number of seasons for each data set.

GRC was asked if they conducted any performance testing or validation of the IFS against actual intern needs between the last forecast (May 1991) and January 1992. In other words, they were asked if they validated the forecast the IFS provided for the months between May 1991 and January 1992 against the actual requirements experienced. Their response was no. Further, they said they would not do such a test without a Request for Engineering Support (RES) (Bartlett, 1992). This response seems to indicate that GRC may realize that the IFS has not performed well. Additionally, it may indicate GRC's belief that although they may have provided a technically adequate solution, they may not have developed it to assure user satisfaction.

Once the models have provided the forecasting rates, the next step is to analyze the sequence in which the rates are applied to the data. For example, for any CP/MACOM/PG category there are loss and gain rates that are provided by the model based upon the data history. These rates are multiplied with the current population strength to determine the loss or gain to the population strength of the future. This product is then subtracted or added to the current population. Then, the next transaction rate is multiplied with this updated version of the current population strength, and so on. The trouble with this procedure is that the sequence of transaction rates effect the population strengths significantly. In other words, another application sequence of loss and gain rates would produce a uniquely different forecast. When questioned as to the logic of the sequence that the IFS imposes, GRC could not remember their logic for choosing that particular order (Moore, 1992). They did, however, offer to provide ACTEDS branch with a memorandum describing the sequence of transaction rates as they are in the IFS now.

Finally, the IFS program does take a long time to run. This is partly due to the processing of the incoming data to check for validity and to place it into the format used by the IFS forecasting models. This, however, appears to be necessary due to the format and error rate of the data provided by the HQ DSS. Also, the code written by GRC personnel is well documented, making it easy to follow and maintain.

(4) Does the IFS assure user satisfaction?

Given that the IFS has not yet provided reasonable forecasts, it can be concluded fairly that it does not assure user satisfaction. However, user satisfaction goes beyond providing just a forecast of data.

GRC has done a good job of managing the database information. They appear to have taken great care in performing these functions, possibly at the expense of some computer efficiency. However, as far as the user is concerned, the database portion of the model is transparent.

What is visible to the user is a menu system between the IFS and the user, which is not very "friendly" or state-of-the-art. The menus are cumbersome to use, requiring the user to negotiate numerous levels of information to obtain the forecasts. This portion of the model should have received more thought and effort. GRC's response to this is that they were limited to using Cross System Product, a menuing language available on the HQ DSS computer. This could be used to explain most of the clumsiness. However, more thought and foresight still could have been placed into the menuing system to make the IFS more "user-friendly". A simple prototype approach, where users review draft screens, would have alleviated this problem.

As alluded to previously, the forecasts are displayed in a manner that is too detailed. ACTEDS branch personnel must aggregate the forecasted data, by hand, to conduct analysis of intern planning and costs. It would be a small matter to aggregate the forecasted data in the IFS program itself, alleviating the need for ACTEDS branch personnel to aggregate it manually. Unfortunately, GRC has insisted that to modify the way the IFS displays the output would require an Engineering Change Proposal (ECP), which will require more funding (Bartlett, 1992). This is just another example of how GRC can do a better job of designing a system to ensure user satisfaction.

Even with the questionable results provided by the first tests of the IFS, GRC maintains that they have fulfilled the requirements of the Statement of Work (Bartlett,1992). Further, ACTEDS branch personnel would have to accept the IFS as is,

before any ECPs to modify the IFS model could be accepted to bring the IFS forecasts into a more usable format.

Another important part of assuring user satisfaction for a computer-based system is an easy to read and understand user's manual. The documentation that GRC provides with the IFS is very inadequate. It is difficult to read and hard to understand.

3. CONCLUSION

The General Research Corporation has provided a product to ACTEDS branch which they claim fulfills their contract obligations as outlined in the Statement of Work agreement. Located in Appendix B are many instances of items listed in the Statement of Work that are not addressed by the IFS in its current state. These items of difference have been brought to GRC's attention previously. They have responded with a paper explaining why certain items have not been included. However, the question remains that if they agreed to a Statement of Work, then should not all items listed on it be satisfied?

This report illuminates several issues about the IFS model which can be used to improve its reliability and usefulness. If GRC adjusts the condition parameters of the IFS that dictate which model, Winter's or Weighted Moving Average, as they stated they would do during the second ORCEN meeting, then perhaps the IFS may provide more reliable results. However, to date there has been no evidence of this adjustment.

ACTEDS branch personnel are justified in being hesitant to accept an expensive forecasting model that has not proved to be reliable, and is very difficult to use. As mentioned, the output screens of the IFS report data at a level of detail which requires

manual aggregation over numerous paygrades and MACOMs. Unfortunately, GRC has made it clear that they do not intend to do other than minor parameter adjustments to the IFS. They expect the U.S. Army to accept their model, even if it is practically better for ACTEDS branch personnel to conduct the forecasts manually.

In summary, there are a number of relatively straight forward improvements GRC can make to the IFS. As already stated, GRC has declared their intentions of adjusting the condition parameters which the IFS uses to determine which forecasting model to use. By working more closely with ACTEDS branch personnel, GRC could gain a better understanding of the seasonality of the data, and correct the seasonal parameters in Winter's model. Additionally, the scope of the IFS should be adjusted to provide forecasts at the level of detail that ACTEDS branch personnel can use more readily. Lastly, GRC could easily improve the screen displays with the intent of providing the user with a display that they can easily understand.

As a final note, it is believed that GRC knows the right problem to be solved, and how to solve it. They truly have the talent and the resources to do it. Unfortunately, they have not completed designing an appropriate solution simply because the IFS does not yet meet the needs of the user . They have not developed the IFS to perform well in the user's environment as demonstrated during the operational tests. Lastly, but no less importantly, they have not assured the user's satisfaction. In actuality, they appear less interested in satisfying the needs of the user, and more interested in getting ACTEDS branch to accept the IFS in its current form.

APPENDIX A (Functional Description)

1. Overview

This appendix provides a functional description of the IFS in non-computer terms. A reader not schooled in the terms of computer languages should be able to understand the way the IFS operates from reading this alone.

The IFS has three main components; Database Management, Forecasting, and Screen Display. The components interact as depicted below:

IFS COMPONENTS

figure 1

Each of these components work together to provide the end result, which is a forecast of the number of interns required by career program (CP), Major Command (MACOM), and paygrade (PG).

2. Data Management

The IFS first reads the data for all the CP/MACOM/PG categories for the past 48 months. The data reveal the numbers of interns by CP/MACOM/PG category that have been assigned, or transferred in or out of the army. The IFS reads the data for each

category from the Headquarters U.S. Army, Decision Support System (HQ DSS) computer located in the basement of the Pentagon. The HQ DSS data, which have been gathered from all the MACOMs, often have errors that require correction. The Data Management component reads all the data, and edits data that obviously are in error. Once the data have been read and corrected, they are sent to the Forecasting component.

3. Forecasting

The Forecasting component has two modules as depicted in figure 2; the Inventory Projection Module (IPM), and the Accession Computation Module (ACM).

Forecasting Modules

figure 2

The IPM takes the provided data, and analyzes each category, searching for the following transactions:

Projected Accessions

MACOM Transfers

Retirements

Other Losses

Career Program Migrations

Promotions

For each transaction type the IPM notes the number of that type of transaction that has occurred in the past 48 months. This is then added together into the respective quarters that the months make up. At this point the IPM conducts two condition tests to determine which forecasting model to use. The condition tests are called "Small Cell Size" and "Sufficient History". Again, it should be noted that the IPM do these tests for each CP/MACOM/PG category, and for each transaction type within each category.

CONDITION TESTS

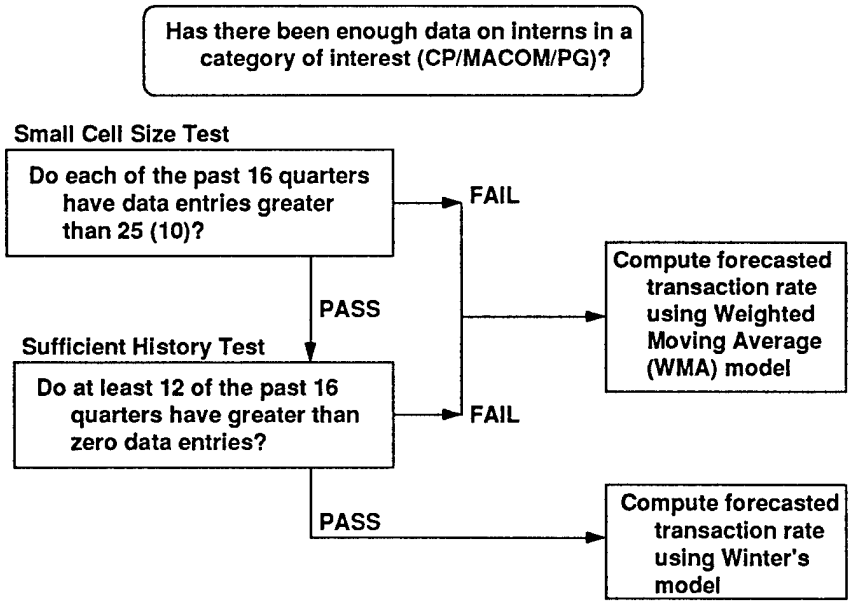

figure 3

The Small Cell Size condition checks each of the 16 past quarters to see if any of the quarters have less than 25 (which GRC claims they have changed to 10) entries. Next, the Forecasting component checks the Sufficient History condition by checking each of the past 16 quarters to see if at least 12 of them have entries that are greater than zero. If the data

for a particular CP/MACOM/PG category and transaction type passes both of the condition tests, then a forecasted transaction rate is computed using Winter's Approximation Model (Winter's). If either condition fails, then a forecasted transaction rate is computed using the simple Weighted Moving Average Model (WMA).

Once the IPM has computed transaction rates for each type of transaction by CP/MACOM/PG category, these rates are then used to compute the projected losses for each category. This is done by multiplying the rates, in the sequence described above, by the current intern inventory by category. The resulting product is then subtracted (or added in the case of projected accessions) from the current inventory of that category, and the next forecasted transaction rate is multiplied in. The IPM does this process for all categories.

Once completed the IPM compares the resulting inventory to the beginning inventory to determine the projected losses. These losses are reported to the Accession Computation Module (ACM). Lastly, the IPM compares the current intern inventory with the required strength as dictated by the Total Army Authorization Document (TAADS) and reports the differences to the ACM.

The ACM computes the required intern accessions by subtracting the losses from the current inventory, and determining the number of interns graduating during the current period. Next, the ACM accounts for journeymen positions to be filled with interns. This causes a loss of interns at the grade of GS-09 and GS-11. GRC claims that their code only accounts for the locally-funded and centrally-funded interns to fill journeymen requirements.

Screen Display

Finally, the ACM combines all the provided information and provides the projected ıired intern accession to the output screen for the users to view. In addition, projected es can be displayed to the output screen. Since the users of the IFS are already familiar ı the screen display, no further description is offered.

Disclaimer

In the way of a disclaimer, the above description is how the IFS works as understood he Operations Research Center personnel. This description was prepared based upon a e reading of the provided White Paper, an examination of the computer code for the IFS, interviews with GRC personnel. Additionally, this disclaimer highlights the need for software product to have a configuration management plan. For example, the version FS evaluated by the ORCEN will hopefully be followed by a new and improved version of . There has been some confusion as whether the version evaluated already incorporates e changes to parameters. Each version of IFS needs to be documented and labeled so the users and developers can maintain current, accurate copies.

APPENDIX B (Statement of Work Discrepancies)

1. Overview

Task Order Number CIV-18A-87, The Army Civilian Forecasting system (CIVFORS), Contract MDA903-87-C-0860, paragraph 6.2 states:

> Prepare Functional Description/System Specification for the Intern Forecasting System (IFS) in accordance with DoD Standard 7935.1-S.
>
> Design and develop the modules described by the system specification.
>
> Test, modify and implement the IFS to ensure the accuracy of data generated and operational capabilities of the system to provide "what if" capabilities.
>
> Provide all necessary operations, maintenance, training, analysis and documentation support to the IFS user community.

The following paragraphs are organized by the functions specified in paragraph 2.2, System Functions of the IFS System Specification. They describe what has been found to be either inadequate or unfulfilled. This is only a partial listing. Other requirements within the Systems Functions have not been totally fulfilled as well. Only the major shortcomings have been stated here.

2. Strength Management Capabilities

A. Provide data on the national labor market to assess constraints on the supply of available labor.

-Not included in the delivered product.

B. Develop projections by various combinations of MACOM/IRA, occupational series, career program, grade, academic discipline, gender, race/national origin, age and service computation date.

-Not all combinations available in the delivered product.

3. Analysis and Presentation Capabilities

A. Provide an interactive, user-friendly, quick response Decision Support system (DSS) equipped with a data retrieval capability to present historical and projected data. The system must provide both tabular and graphic displays which can be reproduced in hardcopy form.

-Graphic displays are not available in delivered product.

B. Support various program/functional areas within TAPC-CPS by allowing the users to interact with the system at various points by exercising input/control options such as:

1. modification of separation, promotion, and transfer rates.

2. specifying workforce level constraints on the career program workforce.

3. specifying budget constraints on the ACTEDS branch funding levels available for the intern program.

4. specifying the length of internships.

5. model "priority of fill" given a budget scenario and projected supply constraints.

-Not all options available in the delivered product.

C. Provide work force profiles on an "as-needed' basis.

-Not available on the output screen.

D. Provide quarterly, semi-annual, and annual reports to support analysis of the intake and retention of interns by source of intake, race/national origin, academic discipline, gender, and education level for total Army and each MACOM/IRA. This includes an analysis of intern losses (during the internship and after graduation for each year) by loss reason, career program, race/national origin, academic discipline, gender, and educational level for total Army and each MACOM/IRA by geographic region.

-Not all reports are provided in the delivered product.

4. Training Management Capabilities

A. Provide reports on the number of interns who are past their graduation date but who are still counted against HQDA authorizations.

-This capability is not provided in the delivered product.

5. Conclusion

One can easily determine that the IFS did not contain a number of capabilities described in the systems specifications listed in the Statement of Work . GRC has provided reasons for the exclusions to ACTEDS branch. In general, GRC's reasons do not seem to adequately explain their shortcomings.

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