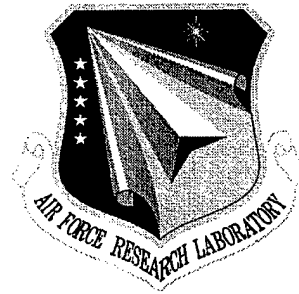


AFRL-IF-RS-TR-2000-69
Final Technical Report
May 2000



JOINT INTEGRATION TEST FACILITY (JITF)
PERFORMANCE MEASUREMENT PLAN,
VERSION 1.0

Synectics Corporation

Joanne M. Boucher

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| 13. ABSTRACT (Maximum 200 words) This report contains the performance measurement plan for Joint Integration Facility. This is an initial plan to comply with the Government Performance and Results Act of 1997, which requires all agencies to set goals and to use performance measures for management and budgeting in order to encourage greater efficiency, effectiveness, and accountability in federal programs and spending. The plan establishes six separate performance measurements, which correlate directly to customer satisfaction, Intelligence Mission Application (IMA) quality, and efficiency. All measurements were aligned with published goals of the Intelligence Community. | | | | |
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1.0 INTRODUCTION

This plan documents the Joint Integration Test Facility (JITF) Program Manager's (PM's) strategy for conducting performance measurement. Performance measures quantitatively provide important information about products, services, and the processes that produce them. This information is necessary to make intelligent decisions regarding the JITF program and assists the PM in meeting goals and objectives.

The JITF PM recognizes that there is increased attention on program performance and results. As the Department of Defense (DoD) and the Intelligence Community shift from managing acquisition to managing investment, the JITF program manager must demonstrate accountability and responsibility for program outcomes. The Clinger-Cohen Act of 1996, which was previously known as the Information Technology Management Reform Act (ITMRA), mandates this. The Clinger-Cohen Act states:

"The DoD must improve day-to-day mission processes and properly use information technology to support those improvements. Technology must be fielded in an orderly, fast and efficient way. ITMRA prescribes an information technology investment portfolio concept, which emphasizes the need to do a better job of prioritizing information technology capital investments and being accountable for results. This applies from each person individually up to mission commanders and Congress."

In every instance, the JITF Performance Measurement Plan attempts to align performance metrics with Department of Defense Intelligence Information Systems (DoDIIS) Management Board (DMB) mission/goal statements and the Intelligence Community Information Systems Strategic Plan. The purpose of the JITF Performance Measurement Plan is to demonstrate effectiveness of the process in supporting the missions of both customer and end-user organizations. The plan provides the basis for programmatic justification while at the same time developing the data with which to make both process design and technology decisions. The plan becomes an integral mechanism to assist all project stakeholders in the management of program resources and the prioritization of requirements and corresponding system design.

1.1 SCOPE

The Department of Defense Guide for Managing Information Technology (IT) as an Investment and Measuring Performance describes three distinct levels of management, each requiring different information to make an informed decision. These levels are:

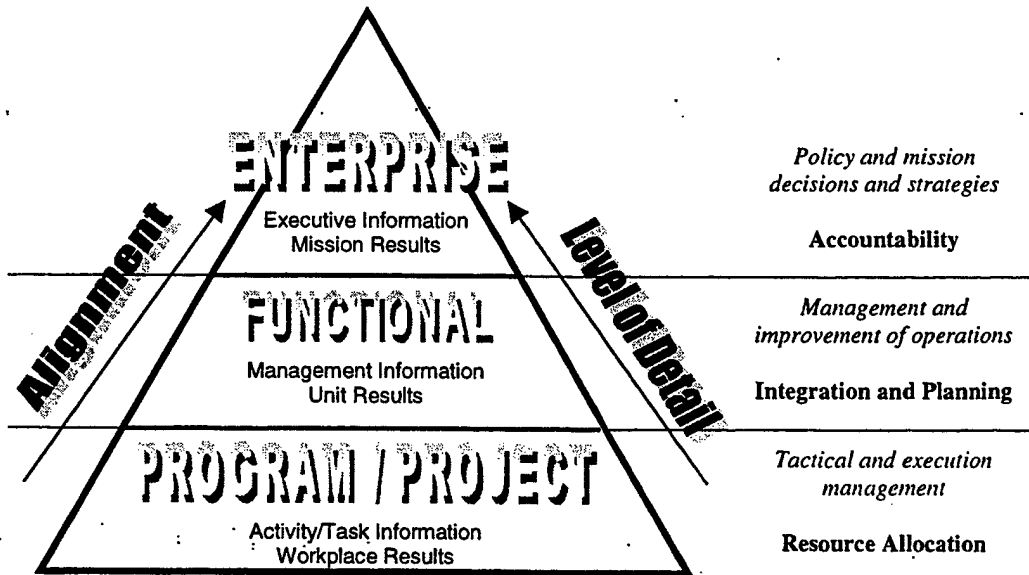
- Enterprise
- Functional
- Program/Project

The units of measure for these levels interconnect to form a pyramid (Exhibit 1). Program level measures start at the base. These are measures of individual units of products and individual elements of service. These measures focus on activity and task information and workplace results. They provide data, which is used for tactical and execution management.

Detailed information collected at the program level is used at the functional level for integration and planning, and is used at the enterprise level for policy and mission decisions and strategies. Information traveling up through the levels of management aligns goals and objectives and ensures that strategic initiatives are met.

Compliance with Clinger-Cohen facilitates the availability of critical performance information at all levels of management, from the project/program to the functional level through the enterprise level. For JITF, the project/program level includes 497th Intelligence Group DoDIIS Executive Agent (DExA) for Test and Evaluation (T&E), Air Force Research Laboratory (AFRL) Information Handling Branch (IFEB) and JITF personnel. The functional level includes the DMB and its individual members (such as Defense Intelligence Agency (DIA), National Security Agency (NSA), National Imagery and Mapping Agency (NIMA), Defense Information Systems Agency (DISA), and the armed services). The JITF's enterprise level consists of the Intelligence Community and DoDIIS.

Exhibit 1. Basic Feedback Loop for JITF Levels of Performance Measurement



The JITF Performance Measurement Plan focuses on the project level. While this information will be of interest to the functional and enterprise level managers, it does not attempt to identify

how this measurement information might be applied at higher levels. The performance measures proposed by this plan will be essential to the JITF PM in determining:

- If program goals are being met.
- If JITF customers are satisfied.
- If processes are under control.
- Where improvements are necessary.
- Input for JITF and IFEB Budgetary decisions.
- Requirements prioritization.

1.2 PLAN ORGANIZATION

Information in this JITF Performance Measurement Plan is organized into the following sections.

Section 1 identifies the scope of the document.

Section 2 identifies planning and guidance documents that define how the JITF program relates to the Intelligence Community, of which the DMB and its participating members are a part.

Section 3 provides an overview of the performance measurement process.

Section 4 provides detailed descriptions of the initial JITF performance measures.

Section 5 describes implementation criteria.

Section 6 identifies possible future activities that can be incorporated into the JITF Performance Measurement Plan.

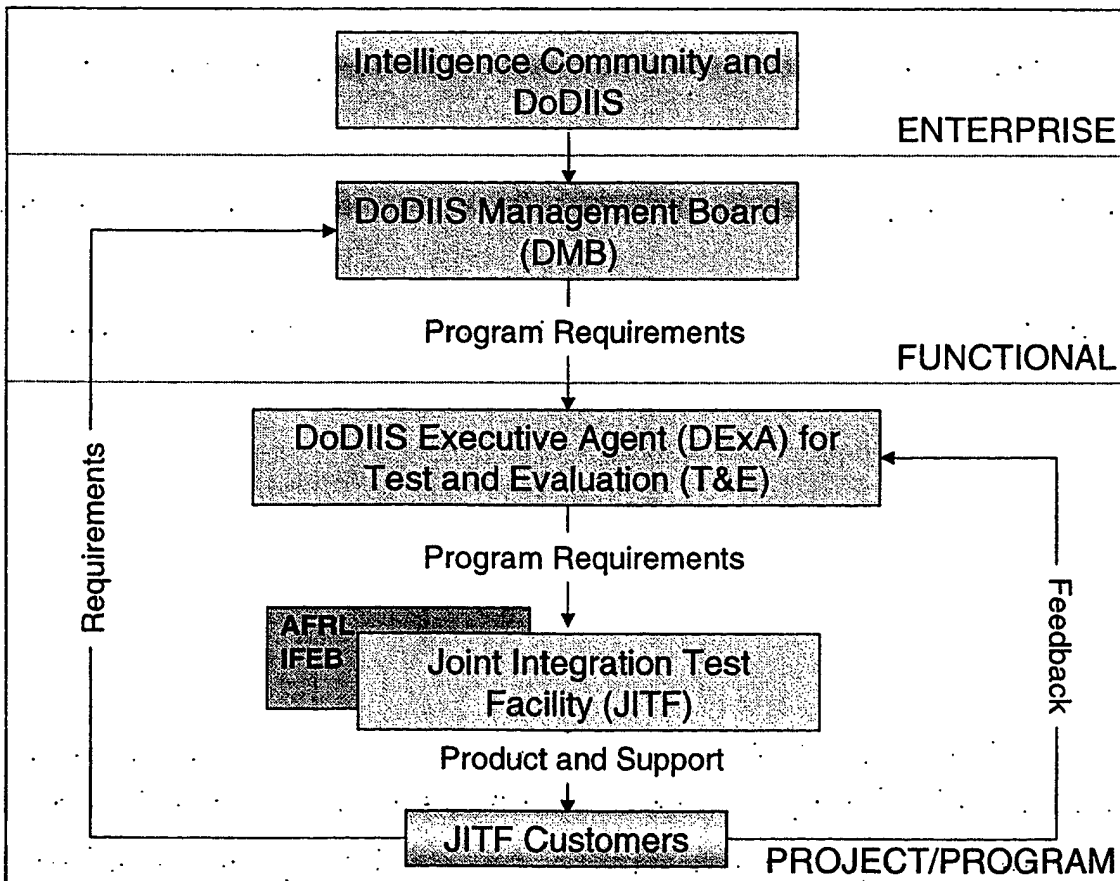
Section 7 provides a brief summary.

Section 8 provides a detailed acronym listing.

2.0 DIRECTIVES GUIDING JITF MISSION

Enhanced performance begins with effective planning (Exhibit 2). As the Functional Managers, the DMB, the 497th Intelligence Group, and the Information Directorate of the Air Force Research Laboratory guide program planning for JITF. As the executive agent, the 497th Intelligence Group oversees requirements for the program. JITF is a critical component of DoDIIS. The DMB, along with representatives from the services, DISA, NIMA, NSA, and DIA, provide system-level requirements for programs operating at DoDIIS sites. Managers at NIMA and DIA, with responsibility for DoDIIS, align strategic plans to ensure Intelligence Community requirements are met. This allows JITF to focus on common goals and objectives in support of a diverse customer base comprised of intelligence analysts from DIA, the Air Force, Army, Navy, and Marines.

Exhibit 2. JITF Hierarchy



2.1 DODIIS MISSIONS

DoDIIS mission, paraphrased, is to:

Provide the right information at the right time to the right people.

To fulfill this mission, the JITF supports operational users, Intelligence Mission Application (IMA) program managers, and the DMB, through installation, integration, and infrastructure compliance testing and evaluation as defined by the IMA certification process. By performing this function, the Intelligence Community receives the highest quality products to process information.

The level of testing performed by the JITF verifies installation procedures, identifies resource conflicts, and assesses the operational impacts of applications functioning in a common DoDIIS environment defined (currently) as Client Server Environment (CSE). In the very near future, the common environment will be Defense Intelligence Infrastructure (DII) / Common Operating Environment (COE). DII COE will provide a common set of infrastructure services to applications, a common security environment for both sites and applications, and a common set of management tools for system administration and security management for DoDIIS. DoDIIS stands out as a leader in the community by initiating common infrastructures (e.g., CSE) many years ago. DoDIIS will continue this evolutionary path as DII COE matures to meet DoDIIS requirements. The JITF evaluates the capability of the IMA to operate in an environment in which computing resources including processors, configuration files, networking facilities, and administration facilities, are shared by many systems. The JITF evaluates the installation and operation of an IMA for its ability to function in the shared computing environment without affecting other applications that are operating simultaneously. In addition, JITF personnel and facilities support Joint Interoperability Test Command (JITC) interoperability testing and security certification testing in conjunction with JITF integration testing.

The JITF is located at Air Force Research Laboratory/Rome Research Site and is a program management office staffed by a combination of government employees and contractors. The name JITF represents the actual facility used to conduct IMA integration testing in addition to being the designation for the program office. JITF is also used to globally describe the integration testing process conducted in support of the IMA certification process. JITF testing is comprised of multiple test activities that reduce the risk of integrating new applications into existing environments.

2.2 GUIDANCE DOCUMENTATION AND RESOURCES

The following table identifies documents and publications that are related to JITF performance measurement activities. These guidance documents contain standards that are extracted by the

DExA for Test and Evaluation and translated into requirements and processes that must be met (e.g., development and architectural requirements, technology baselines including the use of Commercial Off-the-Shelf [COTS] products, IMA certification process).

Table 1. Guidance and Resource Documents

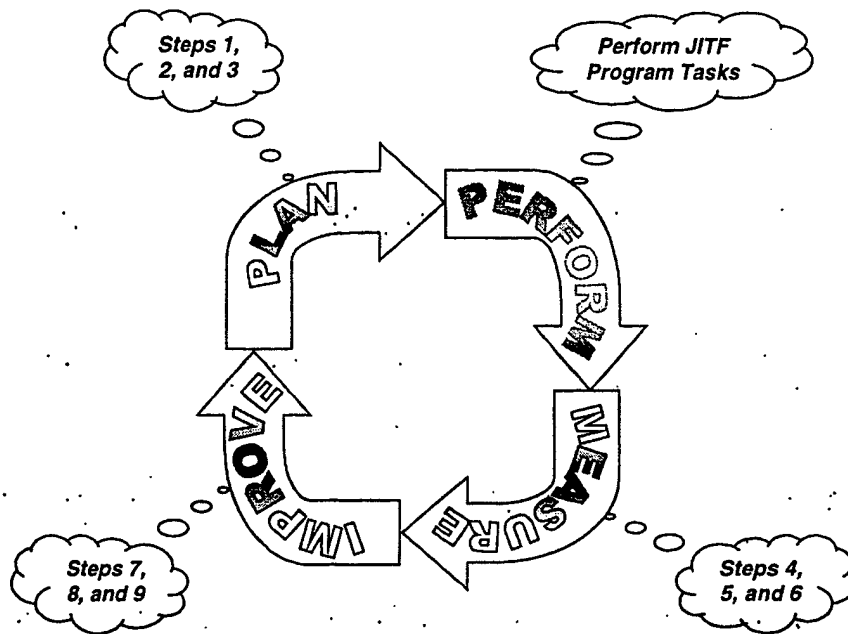
| SOURCE/DATE | DOCUMENT TITLE |
|------------------------------|---|
| USAF, 4/13/98 | "United States Air Force Strategic Plan: Volume 2 – Performance Plan" |
| AFRL-RRL, 3/1/1999 | "Common User Baseline for the Intelligence Community (CUBIC) Configuration Management (CM) Plan, Version 2.0" (DRAFT) |
| DISA, 7/1/1997 | "Defense Information Infrastructure (DII) Common Operating Environment (COE) Integration and RunTime Specification (I&RTS), Version 3.0" |
| DMB, 4/1/1999 | "Department of Defense Intelligence Information System (DoDIIS) Instructions" |
| DISA, 5/28/1998 | "DoD Joint Technical Architecture (JTA), Version 2.0" |
| U.S. Congress, 1993 | "Government Performance and Results Act (GPRA)" |
| ISB, 8/1997 | "Intelligence Community Information Systems Strategic Plan (1999 – 2003)" |
| AFRL-RRS, 4/4/1996 | "JITF Concept of Operations" |
| AFRL-RRS, 4/21/1999 | "Joint Integration Test Facility (JITF) DoDIIS Integration Requirements and Evaluation Procedures, Version 2.0" |
| JCS, 7/1997 | "Joint Vision 2010 " |
| DMB, 11/19/1995 | "Memorandum of Agreement Between the Joint Interoperability Test Command (JITC), DoD Intelligence Information Systems (DoDIIS) Management Board (DMB), the DoDIIS Executive Agent (DExA) for Migration Systems Test, and the DoDIIS Joint Integration Test Facility (JITF); SUBJECT: Interoperability Test and Certification of DoDIIS Migration Systems" |
| U.S. Congress, 1996 | "National Defense Authorization Act FY 1996, Division E: Information Technology Management Reform" (also known as the "Information Technology Management Reform Act (ITMRA)") |
| OUSD-AT, JLC-JGSE, 4/17/1998 | "Practical Software Measurement: A Foundation for Objective Project Management Version 3.1" |
| 497IG, 4/1/1999 | "Test and Evaluation Policy for Department of Defense Intelligence Information Systems (DoDIIS) Intelligence Mission Applications (IMA)" |
| DoD, 3/15/1996 | DoD Directive 5000.1, "Defense Acquisition" |
| DoD, 3/21/1988 | DoD Directive 5200.28, "Security Requirements for Automated Information Systems (AISS)" |
| DoD, 9/26/1991 | DoD Directive 8320.1, "DOD Data Administration" |
| DoD, 1/1973 | DoD Manual 5200.28-M, "ADP Security Manual" |
| DoD, 3/1994 | DoD Manual 8320.1-M, "Data Administration Procedures" |

| SOURCE/DATE | DOCUMENT TITLE |
|---|--|
| DoD, 4/1998 | DoD Manual 8320.1-M-1, "Data Standardization Procedures" |
| DoD, 3/1996 | DoD Regulation 5000.2-R, "Mandatory Procedures for Major Defense Acquisition Programs (MDAPS) and Major Automated Information Systems (MAIS) Acquisition Programs" |
| DoD, 1/1997 | DoD Regulation 5200.1-R, "Information Security Program" |
| DoD, 12/1985 | DoD Standard 5200.28-STD, "Department of Defense Trusted Computer System Evaluation Criteria" |
| Grady, Robert B. Prentice Hall, Inc, 1992 | Practical Software Metrics for Project Management and Process Improvement |
| IEEE, EIA | IEEE/EIA 12207, "Industry Implementation of International Standard ISO/IEC 12207: 1995: Information technology—software life cycle processes" |
| ISO, IEC | ISO/IEC 12207, "Information Technology—Software Life-Cycle Processes" |
| JITF, updated bi-monthly | JITF Intelink Virtual Test Folder Web Site web1.rome.ic.gov/jitf/vtf/vtf.html |
| JITF, updated bi-monthly | JITF Intelink Web Site web1.rome.ic.gov/jitf |
| JITF, updated bi-monthly | JITF Internet Web Site http://www.if.afri.af.mil/programs/jitf/ |
| DIA, 11/1993 | SC-2610-143-93, "DoDIIS Developer's Guide for Automated Information Systems (AIS) Security in DoD Intelligence Information Systems" |

3.0 PERFORMANCE MEASUREMENT PROCESS

The performance measurement process is a series of exact steps, which are implemented using a “plan, perform, measure, and improve” methodology (Exhibit 3). Assessing effectiveness and the degree of improvement is critical to the success of this approach.

Exhibit 3. Plan, Perform, Measure, Improve Method



1. *Establish performance goals/standards.* All performance measures are tied to a predefined goal or standard.
2. *Establish measures.* Identify individual measures.
3. *Identify responsible parties.* A specific entity (group or individual) is assigned the responsibilities for each of the steps in the performance measurement process.
4. *Collect data.* Tools to support data collection and collection techniques need to be identified. Timeliness and accuracy need to be ensured.
5. *Analyze performance.* Raw data are formally converted into performance measures. Reporting requirements are determined to ensure that measures convey information in an understandable form.
6. *Compare performance to target.* Determine if any variation exists between performance and targets/standards.

7. *Identify corrective actions.* Depending on the degree of variation some corrective action may be necessary.
8. *Institute changes to meet goals.* If required, changes will be implemented to reach goals. Planning, performing, and measuring are only of benefit when the organization's focus is on improvement.
9. *Identify new goals/measures, if necessary.* Goals and standards need periodic reviews to ensure they are in step with technology shifts and to focus on continued improvement.

4.0 JITF GOALS AND MEASUREMENTS

The initial performance goals for the JITF program map to the enterprise and functional level goals, objectives, and strategic actions. The enterprise level is described in the *Intelligence Community Information Systems Strategic Plan*. The functional level is described in *Test and Evaluation Objectives*, from the *Test and Evaluation Policy for Department of Defense Intelligence Information System (DoDIIS) Intelligence Mission Application (IMA)*.

Enterprise level goals and objectives are displayed in the first column of Table 2. Goal 1 (identify and provide information systems services based on customer needs), Goal 2 (evolve toward a fully integrated, distributed information space), and Goal 5 (improve cost-effectiveness of Intelligence Community information systems) of the *Intelligence Community Information Systems Strategic Plan* are mapped across the row of Table 2 to the specific measurements of this performance plan in column 4.

Functional level goals and objectives are displayed in the second column of Table 2. Performance goals and objectives defined in Section 2, *Test and Evaluation Objectives*, from the *Test and Evaluation Policy for Department of Defense Intelligence Information System (DoDIIS) Intelligence Mission Application (IMA)* are mapped across the row of Table 2 to the specific measurements of this performance plan in column 4.

Project level goals and objectives are defined in this Performance Measurement plan, Section 4.0. The actual goal and objective is defined within the measurement which are displayed in Table 2, column 4 and in the subsections of Section 4.0 of this Performance Measurement plan. All initial performance goals for the JITF program are directly related to the customers of the JITF. Table 2 provides a cross-reference of applicable enterprise, functional, and project goals and objectives to JITF performance measures.

The JITF's ability to perform testing and provide technical service to members of the Intelligence Community and customers of the JITF is critical to the success of the DoDIIS and Intelligence Community's missions.

Table 2. Mapping of Enterprise and Functional Goals to JITF Performance Measures

| ENTERPRISE LEVEL GOALS/OBJECTIVES | FUNCTIONAL LEVEL GOALS/OBJECTIVES | PROJECT LEVEL GOALS/OBJECTIVES | PROJECT LEVEL GOALS/MEASURES |
|---|--|--|--|
| <p>Intelligence Community Information Systems Strategic Plan, Goal 1 – Identify and provide information systems services based on customer needs. <u>Objective 1C</u> – Monitor, measure, and evaluate mission benefits and customer satisfaction obtained from Community-level investments in information systems, services, and technology.</p> | <p>Test and Evaluation Policy for Department of Defense Intelligence Information Systems (DODIIS) Intelligence Mission Applications (IMA), <u>Section 2, Test and Evaluation Objectives</u>: Ensure a thoroughly planned, understood, documented, comprehensive, and consistent test program to fully test and validate the DoDIIS IMA in support of DMB milestone decisions and user needs.</p> | <p>Maximize Customer Satisfaction.</p> | <p>4.1.1 Customer Surveys 4.1.2 Test Report Timeliness</p> |
| <p>Intelligence Community Information Systems Strategic Plan, Goal 2 – Evolve toward a fully integrated, distributed information space. <u>Objective 2E</u> – Migrate to a Community-wide information processing environment.</p> | <p>Test and Evaluation Policy for Department of Defense Intelligence Information Systems (DODIIS) Intelligence Mission Applications (IMA), <u>Section 2, Test and Evaluation Objectives</u>: Determine and document the degree to which IMA software conforms and performs to established standards and integration requirements, providing sufficient detail to allow assessment of the risk of integrating applications into the existing and planned infrastructures and platforms. Determine if the IMA software meets requirements mandated in the DoDIIS Instruction. Identify and document for resolution, instance of duplicate functionality within the IMA as mandated by the DoDIIS Instructions.</p> | <p>Increase IMA quality.</p> | <p>4.2.1 Requirements Met 4.2.2 Specific Requirements Not Met</p> |
| <p>Intelligence Community Information Systems Strategic Plan, Goal 5 – Improve cost-effectiveness of Intelligence Community information systems. <u>Objective 5A</u> – Maximize the effectiveness of Community-wide information technology expenditures.</p> | <p><u>No goals/objectives for cost effectiveness in DODIIS instructions or T&E Policy!</u></p> | <p>Maximize efficiency.</p> | <p>4.3.1 Schedule Volatility 4.3.2 Comments Against Test Reports</p> |

4.1 GOAL 1 – MAXIMIZE CUSTOMER SATISFACTION

Description – The JITF exists to support the user by improving the effectiveness of IMA use in complex operating environments. Focusing on customer satisfaction leads to an accepted, successful product and service. Since traditional methods of assessing success are not available (such as market share and growth), communication between the JITF and all classes of customers is critical to determining the value of the services and products provided by the JITF. Customers of the JITF's products and services are varied. The following is a partial list of the type of customers served by the JITF:

- Enterprise Managers – personnel charged with identifying IMAs to be tested, allocating resources, and defining test procedures/requirements.
- Project Managers – personnel charged with development and fielding of the DoDIIS IMA.
- Engineering and development staff – professional personnel charged with creating and modifying the DoDIIS IMA.
- Managers of Users – personnel (Site Managers, Military Commanders at all levels, and Civil Agency Managers) who oversee the use of DoDIIS IMAs.
- Users – personnel who use a DoDIIS IMA on a daily basis.

Relationship of goal to DoDIIS/DMB strategic plans – The JITF's purpose is to ensure that software implemented in the DoDIIS environment will function with other DoDIIS products. JITF personnel test and evaluate software for the DoDIIS Community in order to meet the *Intelligence Community Information Systems Strategic Plan's* goal of evolving toward a fully integrated, distributed information space. This, in turn, allows the customers to use multiple DoDIIS products simultaneously. By polling the customers, the JITF can demonstrate the effectiveness of the testing process in support of the Intelligence Community goals. Providing the customer with timely test reports speeds the process of deploying quality IMA to end users; thereby, increasing customer satisfaction.

4.1.1 MEASURE 1.A. – CUSTOMER SURVEYS

Responsible individual – Measurement analyst and JITF staff.

Performance measure description and objective – Customer surveys provide information on users' level of satisfaction with all aspects of the product or services being delivered. This information will be used to identify quality attributes that are important to customers, to improve

communication at all levels and to identify issues for resolution. Surveys will focus on the following areas:

- Information dissemination
- Quality attributes
- Subjective value
- Objective value

Data source – Contractor and JITF generated surveys distributed at conferences, at Joint Test Planning Meetings (JTPM), to customers at various stages in the integration testing process, and on Internet and Intelink web pages.

Frequency of collection – Surveys will be conducted continuously, and results will be analyzed quarterly. Surveys will be available on JITF Internet and Intelink web pages and will be focused on specific issues to reduce completion and analysis time. Periodic assessment on the level of participation by users in the survey process will determine if increased or decreased frequency or other methods or dissemination are warranted.

Standards/targets – Targets for customer satisfaction levels are determined for this initial sampling by the JITF Project Manager. The target levels for all customer issues are to receive not less than 90% satisfaction rating in any area in which 30 or more surveys are returned. Areas include requirements understanding, responsiveness, information dissemination, and customer relations.

Rationale for standard/target – On a 5 point scale (i.e. 1- extremely satisfied, 2 – satisfied, 3 – neither satisfied or dissatisfied, 4 – dissatisfied, 5 – extremely dissatisfied), the goal should always be to get a degree of satisfaction as opposed to indifference or dissatisfaction. The requirement of 30 valid samples is required to ensure minimal statistical validity.

Data requirements – Draft surveys will be reviewed by the JITF Project Manager before distribution. A majority of survey results for any given event must be displayed graphically. This will be considered when developing surveys.

Assumptions – The sample number for certain groups may not reach a statistically significant number. Satisfaction levels of statistically insignificant numbers may be used if the number of possible participants is limited by function. For example, there may only be 10 PMOs returning an entrance survey per year but there may be 50 returned surveys from a DoDIIS – wide event. In these instances, the fact that the number of responses does not represent a statistically significant number will be prominently displayed. The data may be weighted depending on the circumstances or characteristics but all data will be considered in the evaluation process.

4.1.2 MEASURE 1.B – TIMELINESS OF TEST REPORTING

Responsible individual – Measurement analyst and JITF staff.

Performance measure description and objective – This measure provides information on the responsiveness of the JITF staff. Customers of the JITF require timely test report completion in order to meet predefined schedules. Customer satisfaction is greatly impacted by the speed and quality of test reporting.

Data source – Configuration Management Database (CMDB) and JITF test records.

Frequency of collection – Monthly, reported quarterly.

Standards/targets – Targets for publication of the JITF Test Reports have been set in the *DoDIIS Joint Integration Test Facility (JITF) Concept of Operations*, dated 4 April 1999. The current standard requires the JITF personnel to perform the following:

- Provide a complete test report in draft form to the PMO and the DExA for T&E not later than 5 working days after testing completion.
- Distribute the final test report not later than 10 working days following completion of testing.
- Post the test results on the Intelink web site, “Virtual Test Folder”, not later than 10 working days after release of the final report to the PMO (which is the same as 20 working days after completion of testing).

Rationale for standard/target – The targets for this measurement were established in the documentation governing the operation of the JITF. The time requirements were developed through analysis of customer requirements and driven by management directives.

Data requirements – The data requirements are for each product (software, hardware, or combination) tested by the JITF. The minimum data required for each test are the following:

- Date of test completion.
- Date of draft test report delivery (electronically, FedEx, etc.).
- Date of final test report delivery.
- Date of test results posting on the “Virtual Test Folder”.

Additional data may be required based on the circumstance. Examples can be a request for extension by the IMA’s PMO, notification of delay based on unusual circumstances (i.e., natural

disasters, terrorist acts, declaration of post/base/Unified and Specified Command training holiday, etc.), and any other written requests (email or memoranda) to extend the initial established periods.

Assumptions – All dates will be considered firm dates in order to perform calculation for this measurement. It is assumed that reports were outside of required time limits if the JITF did not receive a predated request for extension of the due date or “suspense” date.

4.2 GOAL 2 – INCREASE QUALITY OF INTELLIGENCE MISSION APPLICATIONS (IMA)

Description – The JITF’s function of integration testing is a key component in the Intelligence Community’s goal of providing quality intelligence products. Testing in all stages of software development provides a two-fold benefit: increased cost effectiveness and increased product quality. Emphasis on compliance to directives prior to fielding an IMA saves the DOD incalculable resources. Compliance with the directives relating to the JITF mission causes the PMOs to develop a quality product. The two measurements in support of this goal demonstrate, first the compliance to the directives; and second the most common problems identified by the JITF during the testing process. By measuring these two items, the JITF can coordinate with and provide technical advice to PMOs in order to avoid the most prominent problems in the IMA development. Each defect in an IMA identified by the JITF enables the program manager to correct the software at a single location versus site assistance and trouble-calls for a worldwide system. This goal ultimately relates to increasing customer and end user satisfaction by identified (prior to fielding) defects, which must be fixed. In these cases, either the defect is repaired prior to release or workarounds are issued with the product.

Relationship of goal to DoDIIS/DMB strategic plans – The JITF mission entirely relates to the Intelligence Community’s Goal 2 – Evolve toward a fully integrated, distributed information space. **Objective 2E** – Migrate to a Community-wide information-processing environment. The DMB and the T&E DExA developed the following tasks for the JITF:

- to determine and document the degree to which IMA software conforms and performs to established standards and integration requirements, providing sufficient detail to allow assessment of the risk of integrating applications into the existing and planned infrastructures and platforms;
- to determine if the IMA software meets requirements mandated in the *DoDIIS Instructions*;
- to identify and document for resolution, instances of duplicate functionality within the IMA as mandated by the *DoDIIS Instructions*.

By identifying the requirements met by the product tested, the entire Intelligence Community can determine the quality of the product for use. By identifying the most frequent and prominent findings, the JITF can educate the PMOs and developers in problems to watch for, to avoid, and to correct. These steps increase the quality of each product tested in the JITF.

4.2.1 MEASURE 2.A – REQUIREMENTS MET

Responsible individual – Measurement analyst and JITF personnel.

Performance measure description and objective – The Requirements Met measure counts the number of defined requirements as defined in *Entrance and Exit Criteria for JITF Integration Testing*, Documentation, Installation and Configuration, Environment, Operation, User Interface, and Security requirements tables. This measure is an indication of the software design progress. It provides information on the number of requirements met and the percentage of requirements met per software application tested. Furthermore, it demonstrates the value of independent integration, installation, and configuration testing of DODIIS IMAs.

Data source – CMDB and JITF Testing Reports.

Frequency of collection – Monthly, reported quarterly.

Standards/targets – Increase the average percentage of requirements met by 5% within one calendar year after implementation of this performance measurement plan. Initial research needs to be conducted on the current year's (FY 1999) average percentage of requirements met in order to determine the baseline for the performance goal.

Rationale for standard/target – This is an initial target. The target will be refined as significant quality increases are realized. Once PMO incorporate the new processes into the development, the window for increased quality will be limited.

Data requirements – The number met requirements, as defined in *Entrance and Exit Criteria for JITF Integration Testing*, will be determined by the test reports provided at the end of a test. A percentage value will be assigned per IMA tested. Format of the data may be changed by the JITF as required.

Assumptions – As the objectives of the performance plan are realized, the target of increasing the percentage of requirements met will be adjusted to progressively smaller percentage increases due to the fact that a target of 100% compliance is not realistic.

4.2.2 MEASURE 2.B – REQUIREMENTS NOT MET

Responsible individual – Measurement analyst and JITF personnel.

Performance measure description and objective – This measurement provides information on the impact of test findings and the most frequently found test findings.

Data source – CMDB.

Frequency of collection – Monthly.

Standards/targets – Initial research needs to be conducted on the impact of defects on the end-users. For the initial target, all defects identified in the JITF test findings will be entered into the CMDB. The target is to present the five most frequent test findings during the JTRR in order to reduce the frequency of the most common defects by 5% within a twelve-month period following the findings initial identification and presentation in JTRR format.

Rationale for standard/target – The JITF's primary goal is ensure the greatest customer satisfaction by providing the highest quality products to end-users. Reduction of the occurrence of the most common problems will reduce end user dissatisfaction.

Data requirements – Test findings are identified in *Entrance and Exit Criteria for JITF Integration Testing*, Documentation (DOC-1 through DOC-29), Installation and Configuration (INST-1 through INST-39), Environment (ENV-1 through ENV-7), Operation (OPS-1 through OPS-28), User Interface (GUI-1 through GUI-13), and Security (SEC-1 through SEC-14) requirements tables. For each IMA tested, each test finding will be identified with its requirement number (e.g. DOC-27) and its associated impact code. Test findings are assigned impact codes to document the severity of each finding. Impact codes are defined in the *CUBIC CM Plan*. The following defines the four (4) types of impact codes used by the JITF:

- Impact Code 1 – A finding that, without resolution, either
 - ◆ prevents the application from proceeding further in testing or operation;
 - ◆ prevents either the application or another application or component of the infrastructure from operating properly;
 - ◆ creates a security vulnerability in the mission application or site architecture that can be exploited by a general user without taking advantage of other vulnerabilities or capabilities; or
 - ◆ excessively increases the level of effort of site personnel to install, manage, or use the mission application or other applications.
- Impact Code 2 – An urgent impact code that applies whenever significant mission support degradation occurs, or, if necessary to:

- ◆ prevents the application from proceeding further in its testing or operation;
 - ◆ has a significant effect on the operation of either the application or on another application or component of the infrastructure; or
 - ◆ creates security vulnerability in the application or site architecture that could be exploited by a general user only if the user is able to take advantage of other vulnerabilities or capabilities not typically available to him or her.
- **Impact Code 3** – A finding that, without resolution, has a significant effect on the operation of either the application or on another application or component of the infrastructure. the finding can be temporarily resolved by a workaround that is implemented as a change in procedure or configuration. The successful implementation of the workaround does not require technical expertise that is not expected of general users, or the workaround does not cause significant level of effort by site administrators. The workaround does not cause significant delay in integration testing; instead, it can be proposed and evaluated during integration testing at the JITF.
- **Impact Code 4** – A finding that does not prevent the application from proceeding further in its testing or does not significantly affect the operation of the application or another application or component of the infrastructure. The finding can be resolved by a workaround that can be implemented as a change in procedure or configuration during integration testing without a significant level of effort, or the finding can be left as is. Even though the finding has some affect on the configuration or operation of the application or of other components of the site architecture, the general user will be able to perform mission functions, and the administrator will be able to manage the application. Findings in this category are of lesser importance, but the accumulation of Impact 4 findings may result in an overall finding at a higher Impact level.

Assumptions – The greatest assumption of this measurement’s target is that PMOs will heed the advice of the JITF during JTRR and attempt to eliminate the most frequent findings from their product prior to testing.

4.3 GOAL 3 – MAXIMIZE EFFICIENCY

Description – As with any organization, the JITF management tries to use the funds allocated with the most efficiency. The measurements under this section relate to using people and other resources with the highest effectiveness. The measurement concerning the schedule volatility relates to the most efficient scheduling of personnel, equipment, and facilities in order to avoid lag time and overtime. The measurement concerning the number and type of comments against test reports relates to the quality of the primary output of the JITF.

Relationship of goal to DoDIIS/DMB strategic plans – Accurate scheduling and optimizing quality of test reporting all directly relate to the *Intelligence Community Information Systems Strategic Plan*, Goal 5 – Improve cost effectiveness of Intelligence Community information systems. Objective 5A is to maximize the effectiveness of Community-wide information technology expenditures. Funding of the JITF is a community-wide information technology expenditure.

4.3.1 MEASURE 3.A – SCHEDULE VOLATILITY

Responsible individual – Measurement analyst and JITF staff.

Performance measure description and objective – Schedule variations are a primary cause for inefficiency. This measurement will determine the average length of time of schedule changes, whether the dates were moved up or back, and the primary causes for volatility.

Data source – The schedule maintained by the JITF and CM and the various documents (emails, memoranda, and records of phone conversation) justifying schedule changes.

Frequency of collection – Monthly, reported quarterly.

Standards/targets – The initial data will be collected during the first performance plan implementation period. Initial research can be done to determine the average length of time for schedule changes. Data collection for the primary causes for schedule changes is being established during this period. After this period of baseline establishment, the target level will be to reduce the schedule volatility by 5% per quarter. Volatility is defined as the number of days the test is moved (either further into the future or closer to the current date). For example, if 20 days of change occurred in October 1998, the 5% reduction would be realized if 19 (or less) days of change occurred in October 1999.

Rationale for standard/target – This is an initial target. The target will be refined as significant quality increases are realized. Once PMOs and the JITF staff incorporate the new management and schedule estimate processes, the window for increased quality will be limited.

Data requirements – The following items must be provided at the beginning of the measurement period:

- The test schedule calendar for the coming calendar quarter will be provided not later than the first day of the quarter. The calendars will be provided for the first quarter of the fiscal year NLT October 1st, for the second quarter NLT January 1st, for the third quarter NLT April 1st, and for the fourth quarter NLT June 1st.

- The schedule for the coming month will be provided not later than the 1st day of the month. For example, the projected schedule for October 1st through October 31st must be provided no later than October 1st.
- The actual occurrences for the previous month will be provided no later than the 10th of the succeeding month. For example, all testing/actions having occurred in the month of October must be provided no later than November 10th.
- Either copies of documentation of the request for change or a synopsis of each reason for schedule change for the previous month will be provided with the previous months actual occurrences no later than the 10th of the month.

Assumptions – As the results of the performance plan are realized, the target of increasing the percentage of requirements met will be adjusted to a maintenance level or smaller percentage increases due to the fact that a target of 100% or more compliance is not realistic.

4.3.2 MEASURE 3.B – COMMENTS AGAINST TEST REPORT

Responsible individual – Measurement analyst and JITF staff.

Performance measure description and objective – This measurement is to determine the quality of the primary output of the JITF. The number of comments against the draft test report will show a combination of typographical errors (or general word-smithing) and technical inaccuracies in the report.

Data source – Document Review Reports against the draft test reports.

Frequency of collection – Monthly, reported quarterly.

Standards/targets – No more than 3 typographical (editorial) comments and 5 technical comments against the draft test report. No typographical errors in the final test report.

Rationale for standard/target – Reduction of the number of comments against test reports will reduce the amount of time to produce the final reports; thereby, increasing the overall effectiveness of the test reporting process.

Data requirements – The number of comments against each report documented within the month of reporting.

Assumptions – The assumption that a technically and typographically correct test report will receive no comments against it is unrealistic. Individuals reviewing the draft will continue to

comment in order to meet internal wording practices; therefore, a 100% reduction of all comments is not possible.

5.0 PLAN IMPLEMENTATION

This plan implements Steps 1, 2, and 3 of the performance measurement process detailed in Section 3. Collection of data (Step 4) has begun for some of the identified measures.

5.1 MEASUREMENT VALIDATION

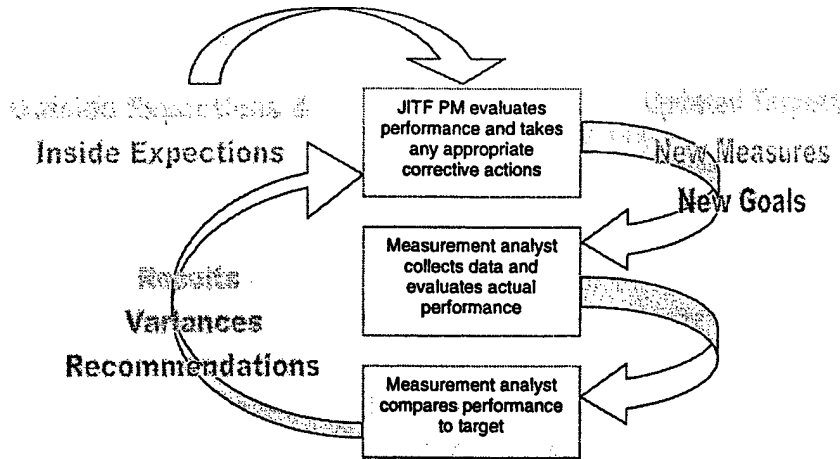
Ensuring that the measures identified in this plan are valid and will provide needed information for the JITF PM is critical to the success of the performance measurement process. Acceptance of this plan by the JITF PM is the initial validation of the selected measures.

All selected measures have been tied to strategic goals for the organizations responsible for the JITF program. As performance measurement expands beyond the project level, or as enterprise goals and objectives change, recurring validation of the selected measures will also be required. Fundamentally, the six measures selected for JITF performance measurement are basic in their orientation and a majority should apply for the duration of the JITF program.

5.1.1 FEEDBACK – CHECK AND ACT

Performance measurement is designed to collect critical information to allow management to make informed decisions. This decision making process creates a cultural focus on continual improvement and also provides the manager with justification for resource allocation and go/no-go actions. Exhibit 4 outlines the feedback loop designed to ensure the JITF PM takes appropriate corrective actions when necessary, including response to direction from organizations outside the immediate JITF enterprise.

Exhibit 4. Basic Feed Back Loop for JITF Performance Management



5.2 DATA COLLECTION

All data sources need to be educated on the performance measurement process. This includes members of the JITF, the JITF PM at Air Force Research Laboratory, Rome Research Site, and CM (i.e., CUBIC). A high level of cooperation is required among these groups and the measurement analyst to ensure the receipt of accurate and timely data from the source. It is critical to the success of the JITF performance measurement process that all sources understand that the data collected will be used to improve the decision making process and not to assign blame.

Before data collection is begun, a clear understanding of the definitions associated for each measure needs to be reached. Analysis and recommendations lose value when the definition of a measured item is not clearly presented at the outset. An example of this is lines of code count to determine defect density.

The measurement analyst will be responsible for collecting all data from the source.

5.3 DATA ANALYSIS TOOLS

Initial tools will be simple to use, with low learning curves. A database has been developed to track survey results. This database will be modified to accommodate future surveys. Spreadsheets, scheduling, and word processing packages to report results will also be used. The CMDB is also considered a tool for use in the performance measurement process.

Initial reporting will use Microsoft Office products and Project Control Panel. Additional tools may be added as the amount of data and the type of metrics reported changes.

5.4 SCHEDULE

Several of the measurements included in the plan are to be collected over multiple test events. It is recommended that these measures be collected for 12 months to provide adequate time for educating the JITF PM and related organizations. This will also allow for the development of trend data. During that time, feedback and careful analysis of how the performance measurement process is working is required. Additional measures can and should be added during this initial performance period. A formal review of the costs and benefits of the performance measurement activity should occur at the end of the 12-month period.

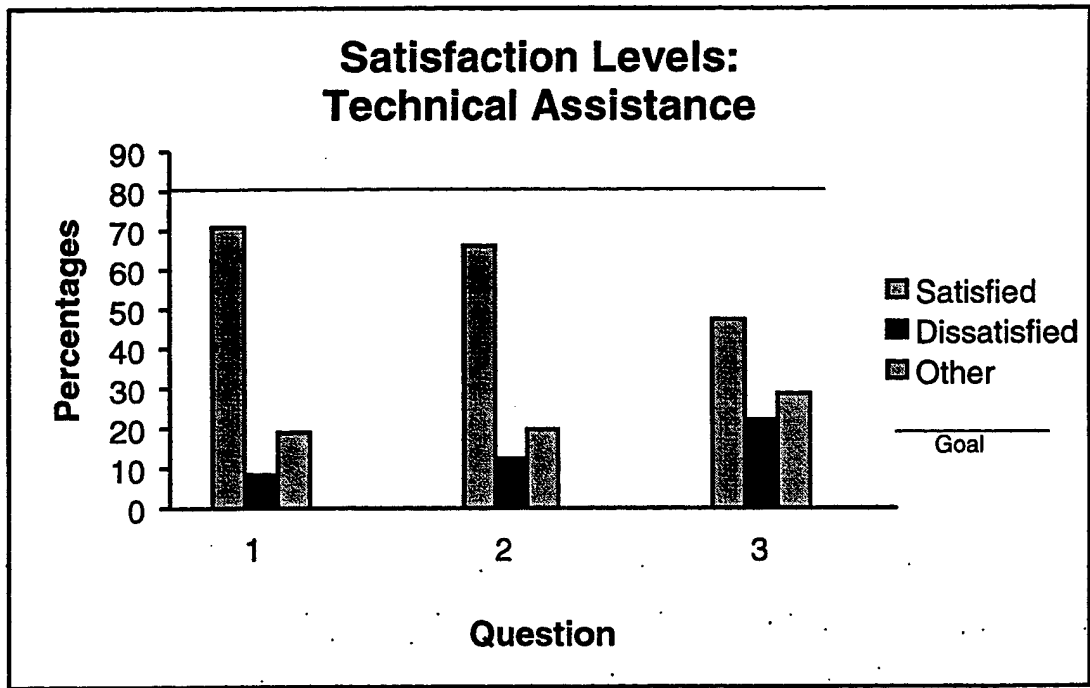
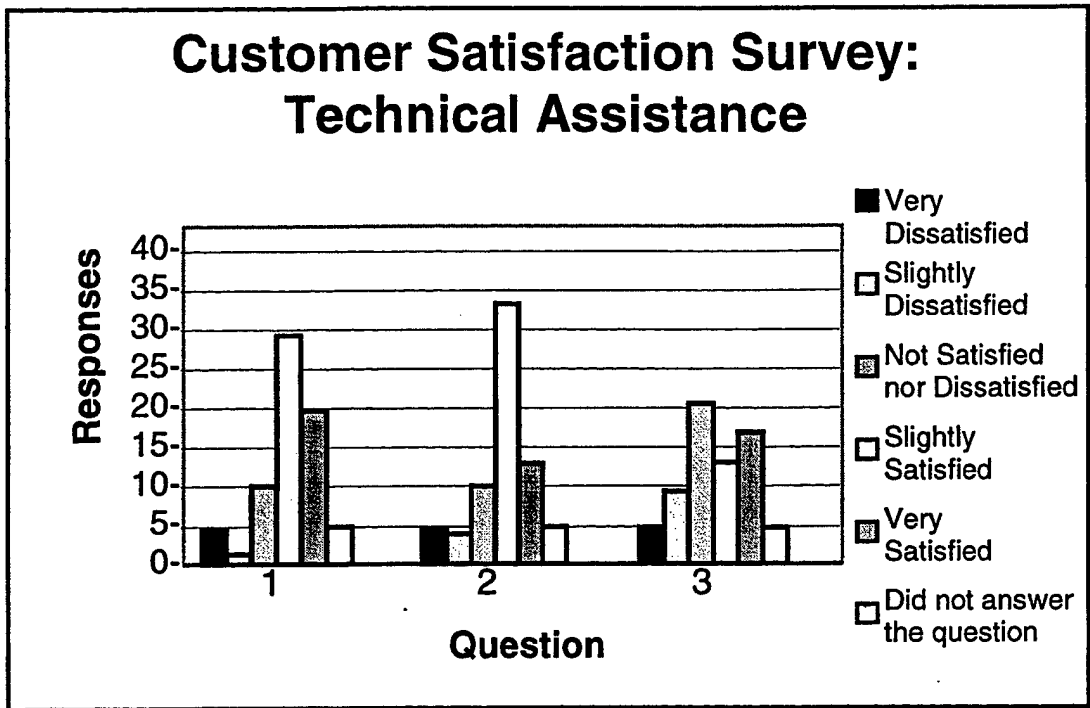
5.5 COMMUNICATING RESULTS

Whenever possible, results will be displayed in appropriate graphical format, although textual reports will be required to complete the analysis for various items. All reports will be produced quarterly at a minimum, monthly if otherwise required. Recommendations will be included in result presentations. This is also part of the feedback and improvement process. Table 3 identifies the anticipated formats for reporting measurement results.

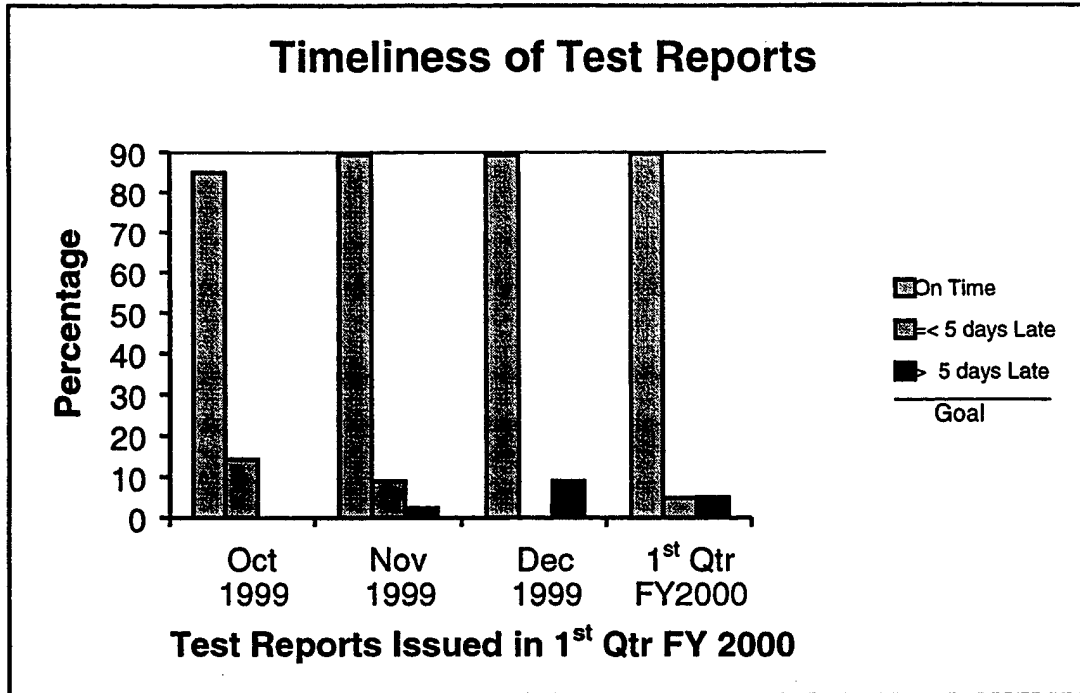
Table 3. Reporting Formats

| MEASUREMENT NUMBER AND DESCRIPTION | ANTICIPATED FORMAT |
|------------------------------------|---|
| 1.A. Customer Surveys | Bar graph formats where possible. Textual report for analysis of results and recommendations. |
| 1.B. Timeliness of Test Reporting | Bar Graph formats displaying the report timing. Textual report for exceptions and waivers to the standards. |
| 2.A. Requirements Met | Bar Graph formats showing percentages met per product tested. |
| 2.B. Requirements Not Met | Bar Graph formats showing number of each type of finding. Textual report for descriptions of most common findings. |
| 3.A. Schedule Volatility | Gantt chart for both projected schedules and actual schedules. Line graph for showing variation. |
| 3.B. Comments Against Test Report | Bar Graph formats showing number of comments per test report produced. Textual report for descriptions of most common types of comments. |

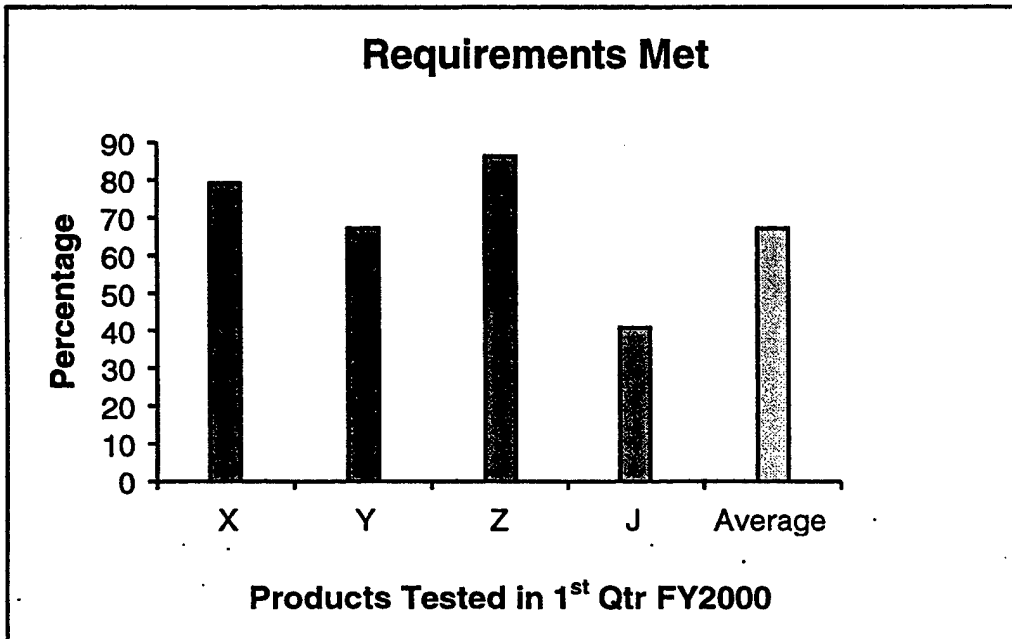
5.5.1 MEASURE 1.A – CUSTOMER SURVEYS



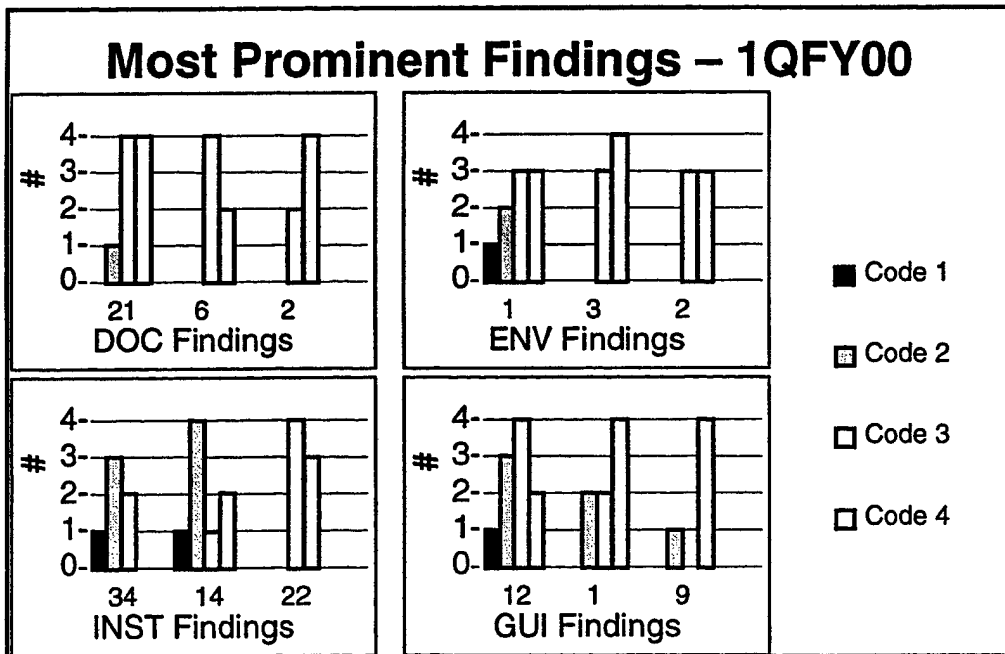
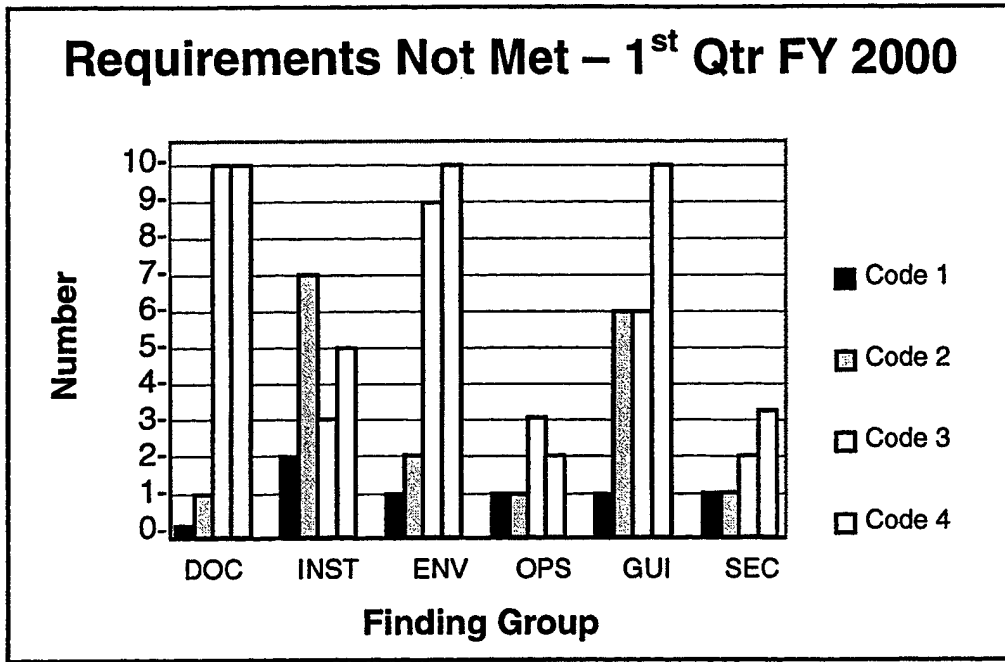
5.5.2 MEASURE 1.B – TIMELINESS OF TEST REPORTING

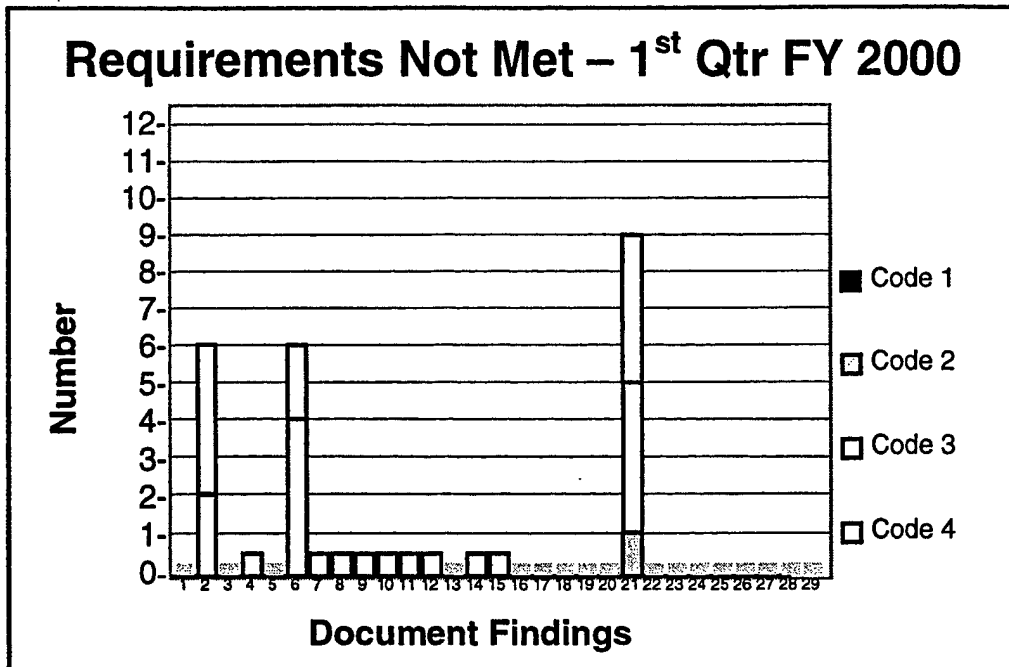


5.5.3 MEASURE 2.A – REQUIREMENTS MET

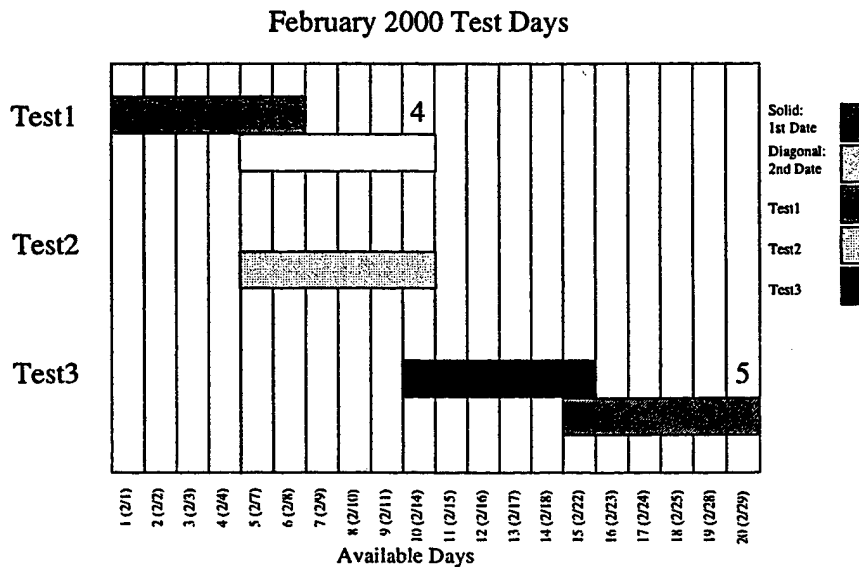


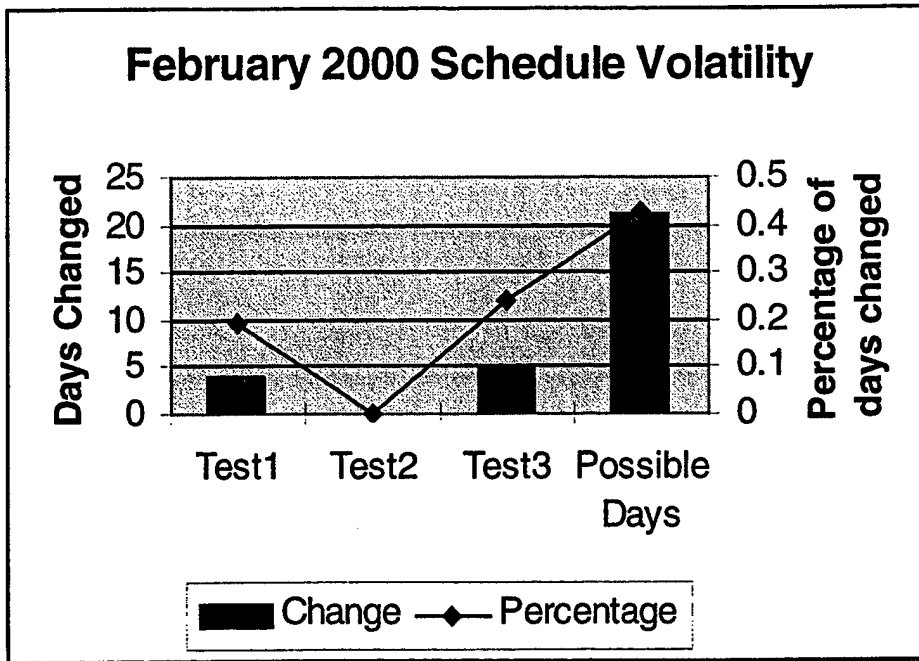
5.5.4 MEASURE 2.B – REQUIREMENTS NOT MET



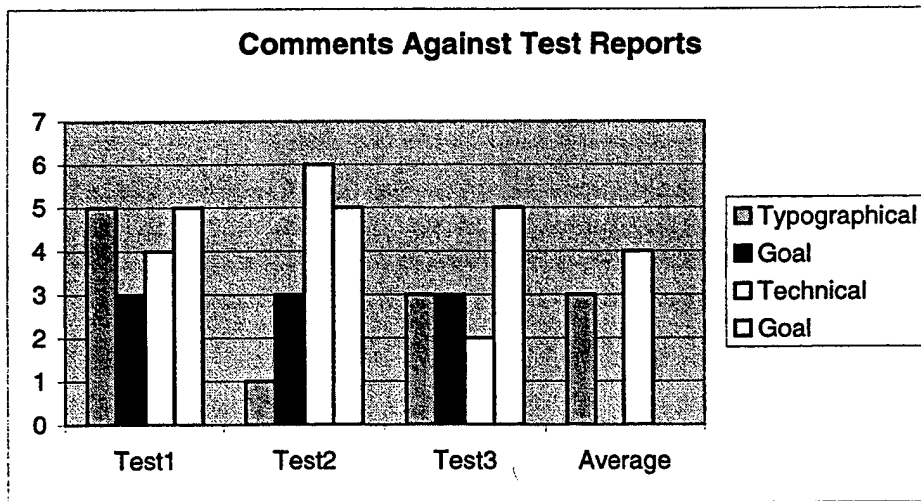


5.5.5 MEASURE 3.A – SCHEDULE VOLATILITY





5.5.6 MEASURE 3.B – COMMENTS AGAINST TEST REPORT



6.0 FUTURE CONSIDERATIONS

Most project-specific issues fall into one of six common areas.

- Schedule and Progress
- Resources and Cost
- Growth and Stability
- Product Quality
- Development Performance
- Technical Adequacy

The initial performance measures outlined in Section 4 touch on three of these six areas: Schedule and Progress, Resources and Cost, and Product Quality. Additional measures relating to these three areas may be taken as the performance measurement activity matures for the JITF program. This analysis will identify factors that contribute to the decision making process, which need to be institutionalized across the enterprise. Identifying Intelligence Community requirements will be critical to the success of the JITF performance measurement activity and will ensure the Intelligence Community's ability to leverage JITF's expertise in performance measurement for future integration testing, and the development of independent verification and validation testing capability.

Cost measurements that provide Return on Investment (ROI) and demonstrate effectiveness and efficiency within the project will be of interest to all levels of the enterprise. These types of measures will be challenging to collect, but are necessary to justify budgets and demonstrate the value of JITF. Clinger-Cohen focuses on effectiveness and efficiency. Intelligence Community strategic plan emphasizes these factors as well. It is not possible to demonstrate efficiency and effectiveness without calculating the costs and benefits of the JITF program. Future versions of the JITF Performance Measurement Plan will need to include these types of measures.

Included in the performance measurement activity is the acknowledgement that performance measurement itself, is a measurable process. Analysis also needs to be conducted on the cost and benefits of collecting measures. This activity is embedded as part of the feedback loop described in Section 3.1, but also needs to be formalized and reviewed periodically. Conducting this analysis will ensure that resources are not expended on collecting data that are not used or add no value to the enterprise.

6.1 SUGGESTED ACTIONS

The following is a suggested list of actions that might be taken by the JITF PM to further understanding of the performance measurement process and increase the level of sophistication and maturity of the JITF enterprise.

- Attend training on Practical Software Measurement (PSM) methods. The Joint Logistics Commander (JLC) Joint Group on systems engineering sponsors PSM. The JLC is comprised of members from each of the services who work on issues applicable to all parts of the DoD.
- Coordinate with a software developer in industry (e.g. MicroSoft) to review their software testing facilities for process improvement.
- To determine a snapshot of the testing process, contract with a measurement company (e.g. GartnerMeasurement) to perform benchmarking for comparison of the JITF to similar corporations conducting software testing.
- Coordinate with other military or government organizations (e.g. Army Research Laboratory), which have successful performance measurement programs, to review lessons learned and to acquire performance measurement process improvements.

7.0 SUMMARY

The JITF PM is unique in the intelligence arena for exploring and implementing performance measurement. By law, government organizations are required to collect and act on measurements designed to improve and document performance. Initial measurements are for primary use by the JITF PM. As further understanding of the benefits of the measurement process is gained, expansions in measurement techniques and reporting will be implemented. This will benefit all levels of the JITF enterprise.

8.0 ACRONYM LIST

| <u>ACRONYM</u> | <u>DEFINITION</u> |
|----------------|--|
| 497IG | 497 th Intelligence Group |
| AFRL | Air Force Research Laboratory |
| CM | Configuration Management |
| CUBIC | Common User Baseline for the Intelligence Community |
| DCI | Director of Central Intelligence |
| DIA | Defense Intelligence Agency |
| DISA | Defense Information Systems Agency |
| DMB | DoDIIS Management Board |
| DoD | Department of Defense |
| DoDIIS | Department of Defense Intelligence Information System |
| EIA | Electronics Industries Alliance |
| IEC | International Electrotechnical Commission |
| IEEE | Institute of Electrical and Electronic Engineers |
| IF | Information Directorate of AFRL |
| IFE | Information and Intelligence Exploitation Division of IF |
| IFEB | Information Handling Branch of IFE |
| ISB | Intelligence Systems Board |
| ISO | International Organization of Standardization |
| IT | Information Technology |
| ITMRA | Information Technology Management Reform Act |
| JCS | Joint Chiefs of Staff |
| JGSE | Joint Group on Systems Engineering |
| JLC | Joint Logistics Commanders |

| <u>ACRONYM</u> | <u>DEFINITION</u> |
|----------------|---|
| NIMA | National Imagery and Mapping Agency |
| NSA | National Security Agency |
| OUSD-AT | Office of the Under Secretary of Defense for Acquisition and Technology |
| PMO | Program Management Office |
| ROI | Return on Investment |
| T&E | Test and Evaluation |