DoD
AUTOMATIC TEST SYSTEMS
EXECUTIVE DIRECTORATE

DoD AUTOMATIC TEST SYSTEMS
PROGRAM PLAN

2006

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DoD ATS Program Plan

1. Purpose and Background

This document details the Services' plans for the implementation of the Department of Defense (DoD) Automatic Test System (ATS) acquisition policy and ATS modernization strategy. It reviews DoD's ATS policy and the implementation of that policy in each of the Services. It discusses the DoD ATS Framework and test technology development projects that will be the basis of Service ATS modernization efforts. Finally, it presents the Services plans for modernizing their current testers, including a discussion of acquisition planning.

Additional details may be found at the DoD ATS Executive Directorate's web site (http://www.acq.osd.mil/ats), specifically in the DoD ATS Master Plan and the DoD ATS Selection Process Guide which are available at this web site.

2. DoD ATS Policy

Partially in response to the 31 March 2003 General Accounting Office (GAO) Report Number GAO-03-451 entitled "*DOD Needs to Better Manage Automatic Test Equipment Modernization*", USD(AT&L) memorandum of 28 July 2004 reestablished the ATS-related policy that was removed from DoD 5000.2-R when it was downsized in 2001. The policy memorandum states the following: "To minimize the life cycle cost of providing automatic test systems for weapon systems support at DoD field, depot, and manufacturing operations, and to promote joint service automatic test systems interoperability, Program Managers shall use approved DoD ATS Families as the preferred choice to satisfy automatic testing support requirements. Commercial-off-the-Shelf (COTS) solutions that comply with the DoD ATS Technical Architecture should only be used if the Milestone Decision Authority concurs that an approved DoD ATS Family will not satisfy the requirement. Automatic Test System selection shall be based on a cost and benefit analysis over the system life cycle." While this policy was issued via letter, it will be included in the next issuance of DoD 5000.2-R.

The intent of DoD's ATS policy is to define an acquisition environment that makes DoD the smartest, most responsive buyer to meet our warfighters' needs while reducing the total cost of ownership. This will be accomplished through the use of ATS Families as the preferred choice to satisfy automatic testing support requirements. An attachment to reference (a) designates the following DoD ATS Families:

- Consolidated Automated Support System (CASS)
- Integrated Family of Test Equipment (IFTE)
- Marine Corps Automatic Test Equipment Systems (MCATES)
- Joint Service Electronic Combat Systems Tester (JSECST)

There are provisions for introducing a new Family into the DoD inventory. An ATS Family consists of ATSs that are interoperable and have the capability to support a variety of

weapon system test requirements through flexible hardware and software architectures. For a tester to be considered as a new ATS Family the following criteria must be met:

- the tester must be capable of supporting multiple weapon systems
- the tester must have flexible hardware and software architectures that are expandable and tailorable with minimal impact to existing logistic support profiles and TPSs
- the tester must provide a capability that an existing ATS Family does not
- the tester must provide a more cost effective/beneficial ATS solution than either using or modifying an existing ATS Family
- the tester must be reprocurable
- the tester must have a dedicated management office with a process in place to ensure that long term tester viability is maintained and that the tester will evolve to support future requirements.

The objective of the DoD ATS policy is also to minimize unique types of ATS in DoD, thereby reducing redundant ATS non-recurring investments and lessening logistics burdens and long-term costs. By minimizing unique ATS acquisitions through employment of standard Family ATS, DoD seeks to leverage its ATS investment assets across the entire DoD establishment.

3. ATS Management in DoD

ATS Executive Directorate

The Office of the Under Secretary of Defense for Acquisition and Technology (OUSD(A&T)) memorandum of 2 February 2004 directed that Navy (Naval Air Systems Command (NAVAIR) PMA260) serve as the DoD ATS Executive Directorate (ED) and perform the functions previously performed as the DoD ATS Executive Agent Office (EAO) since its establishment in 1994. In accordance with this Office of the Secretary of Defense (OSD) direction, the Deputy Assistant Secretary of the Navy (Logistics) accepted the role of DoD ATS Executive Director and reiterated that NAVAIR PMA260 will continue the supporting and implementing functions previously discharged as the DoD ATS EAO. The functions of the ATS ED include definition and management of DoD ATS standards; guidance of ATS Family product engineering; establishment of ATS Research and Development (R&D) requirements; review of ATS specifications and procurements; and maintenance of a waiver process for OUSD(A&T).

Joint Memorandum of Agreement among Service Acquisition Executives

In a Joint Memorandum of Agreement signed in September 2004, the Army, Navy and Air Force Service Acquisition Executives agreed to:

(1) Ensure compliance with DoD ATS policy and provide Service-specific policy for acquisition of ATS

(2) Provide appropriate Service representatives to serve on the O-6 level ATS Management Board (AMB) and on its various Integrated Product Teams, and

(3) Provide appropriate R&D resources to support Joint Service test and diagnostics technology R&D efforts.

ATS Management Board

The AMB is a joint-Service board comprised of representatives from the Army (PM-TMDE), Air Force (542 ATSG/CC), Marine Corps Systems Command (MARCORSYSCOM) PMM-161, PM TMDE, and Navy (NAVAIR PMA260). Chaired by the Director of the ATS ED, the AMB provides advice and recommendations to the ATS ED and to Weapon System Program Managers and Integrated Product Teams (IPTs). The AMB also reviews policy deviation requests and commercial tester acquisition validation requests, and provides recommendations to the appropriate decision authority.

Each Service has established an ATS Leadership Office (ALO) with oversight of their Service's implementation of the ATS policy and primary responsibility for ATS coordination. These offices are listed in the paragraph above as the Service representatives on the AMB. The ALO has the lead for coordinating Joint Service projects and is represented on ATS IPTs and working groups. These organizations include subject matter experts in the areas of the ATS selection process, preparation of Cost Benefit Analyses (CBAs), Automatic Test Equipment (ATE) and Test Program Set (TPS) acquisition, and ATS capabilities. The office ensures that ATS policy and related procedures are promulgated throughout their Service, provides assistance to weapon system PMs and IPTs in ATS matters, and monitors acquisition and modernization planning for policy compliance.

Navy

Within the Navy, ATS is characterized as either common ATS applicable to multiple weapons systems, or peculiar ATS applicable to a single weapon system. Primary acquisition responsibility for peculiar ATS lies with the appropriate weapon system Program Executive Officer and Program Manager. The primary acquisition manager for common ATS is NAVAIR PMA260. The responsibility for integrating the total Navy ATS program lies with NAVAIR PMA260 in coordination with the Naval Sea Systems Command (NAVSEA) for NAVSEA and Strategic Systems programs, Space and Naval Warfare Command (SPAWAR) for space and warfare programs, and MARCORSYSCOM for Marine Corps non-aviation programs.

The ATS acquisition strategy for the Navy (including Marine Air) is to build around CASS as the Navy's standard Family of ATE. This policy is published in OPNAVINST 3960.16A and NAVAIRINST 13630.2D. NAVAIR (PMA260) is the Navy's designated ATE Lead Systems Command. ATS acquisitions are managed centrally by NAVAIR PMA260 who is responsible for ensuring that all Navy acquisition programs follow Navy policy.

NAVAIR PMA260 manages all Marine Corps aviation ATS requirements.

USMC Ground

The MARCORSYSCOM is responsible for the acquisition of weapon systems used by non-aviation Fleet Marine Forces. MARCORSYSCOM Program Managers are assigned the primary responsibility for weapon system acquisition, including any special purpose test equipment. MARCORSYSCOM PMM-161 (PM TMDE) is responsible for the procurement and life cycle management of General Purpose Electronic Test Equipment, to include Automatic, Electronic, Electro-Optical and Mechanical test equipment. TMDE provides Logistic Element Manager (LEM) functions and test equipment support recommendations for every system that MARCORSYSCOM procures. This office manages the Marine Corps Automatic Test System (MCATES), which includes the Third Echelon Test Set (TETS), recently more accurately renamed the Virtual Instrument Portable Equipment Repair/Tester (VIPER/T). TMDE has recently been given the responsibility for developing TPSs for fielded systems where the implemented support concept needs to be upgraded with ATE support. The TMDE LEM function also provides technical assistance in the validation of requirements for Special Purpose Test Equipment. Classic examples are dedicated test sets, special tools and TPSs.

Army

The Commanding General (CG), United States Army Material Command (USAMC) leads the Army Test, Measurement and Diagnostics Equipment (TMDE) program. The CG, USAMC and the Army Acquisition Executive (AAE) are the principle agents for executing Army TMDE policies and programs. The TMDE Product Manager, under the direction of AAE, manages the Army's ATS acquisition program. This includes (1) managing the Integrated Family of Test Equipment (IFTE) program, the Army standard ATE Family which includes both at-platform and off-platform diagnostic test systems, (2) developing and maintaining a standard at-platform tester to support field level maintenance activities and support Army Integrated Electronic Technical Manuals (IETMs) requirements, (3) developing and maintaining a standard off-platform tester to support sustainment level diagnostic and maintenance activities and reduce the logistics burden associated with weapons systems support, and (4) maintaining an active R&D program to promote a standard ATE system architecture and incorporate advanced diagnostic test capabilities that incorporate the best commercial standards into Army ATE systems with the goal of improving readiness, supportability and, affordability.

USAF

All Air Force program authority, including that for acquisition of ATS, lies with the Designated Acquisition Commanders (DACs)/Program Executive Officers (PEOs), and the individual weapon system System Program Directors (SPDs). Under the Integrated Weapon System Management concept, SPDs are totally responsible and accountable for their weapon systems from cradle to grave. Accordingly, the SPDs are empowered to exercise total control over their weapon system funding, including that for ATS in support of their weapon systems.

The ATS Product Group Manager (PGM) at 742 CBSG/CC is the Air Force Single Manager for ATS. The ATS PGM's role is to manage all common as well as some weapon system unique Air Force ATS, and to provide ATS requirements definition, acquisition, and

sustainment support to SPDs with ATS requirements. The ATS PGM is accountable to the Designated Acquisition Commander at Warner-Robins Air Logistics Center for program execution and the Air Force Senior Acquisition Executive (SAE) at SAF/AQ for policy implementation.

4. Framework

Critical Interfaces Working Group

The 1995 DoD 5000.2-R ATS Policy stated: "ATS capabilities shall be defined through critical hardware and software elements". The Critical Interfaces Project was initiated to define these ATS hardware and software elements.

Beginning in 1994, OSD provided funding for the Factory-to-Field Integration of Defense Test Systems Project (commonly referred to as the Critical Interfaces Project) which was started in the latter part of 1995. In October 1995, the AMB's Joint-Service ATS Research and Development Integrated Product Team (ARI) chartered the joint industry-government Critical Interfaces Working Group (CIWG) to determine the key ATS elements and interfaces that affect the costs of TPS re-hosts and transportability. The ATS EA Office provided project management and coordination among the Air Force, Army, Marine Corps, and Navy participants. In addition, many industry representatives participated. The objective of the Critical Interfaces Project was to demonstrate the feasibility of reducing the cost to re-host TPSs and to increase the interoperability of TPS software among the military services by using standardized interfaces. Interfaces that offer the potential to achieve this objective were deemed critical. Potential savings were to be quantified through demonstration. The CIWG developed a list of CIs based upon open commercial standards, de facto standards, and DoD tester architectures including the CASS, IFTE, and MCATES.

Priority was given to formal or de facto commercial standards in selecting candidates for CIs. The effectiveness of these candidate standards were to be evaluated during demonstrations. If the demonstration concluded that the candidate standards were effective at reducing the cost of a TPS re-host and increasing the interoperability of TPSs among the military services, they would be recommended by the ARI for inclusion into DoD acquisition guidelines.

The CIWG utilized a systems engineering approach to identify and characterize ATS hardware and software interfaces. First the CIWG developed requirements and formulated the overall approach. Then the CIWG divided into subgroups to address specific issues. The results are documented in the CIWG report (available at http://www.acq.osd.mil/ats).

Each subgroup used the following process to identify and characterize interfaces and candidates.

- Develop a reference architecture diagram to allow identification and description of interfaces
- Identify interfaces
- Develop criteria for evaluating the criticality of identified interfaces

- Apply criteria to interfaces and identify the CIs
- Select candidates for the CIs
- Provide the results for review by the full CIWG

In September 1996, the CIWG submitted its report entitled Automatic Test System Critical Interfaces - Release 1 (available at http://www.acq.osd.mil/ats). The interfaces and recommendations stated in that document serve as the basis for defining an ATS open systems architecture.

NxTest IPT

The Next Generation Test (NxTest) IPT was formed in 1999 and serves as the Joint Services ATS Technology Team. Its purpose is to define, develop, demonstrate and plan implementation of emerging test technologies into the DoD maintenance test environment. Membership is from all Services.

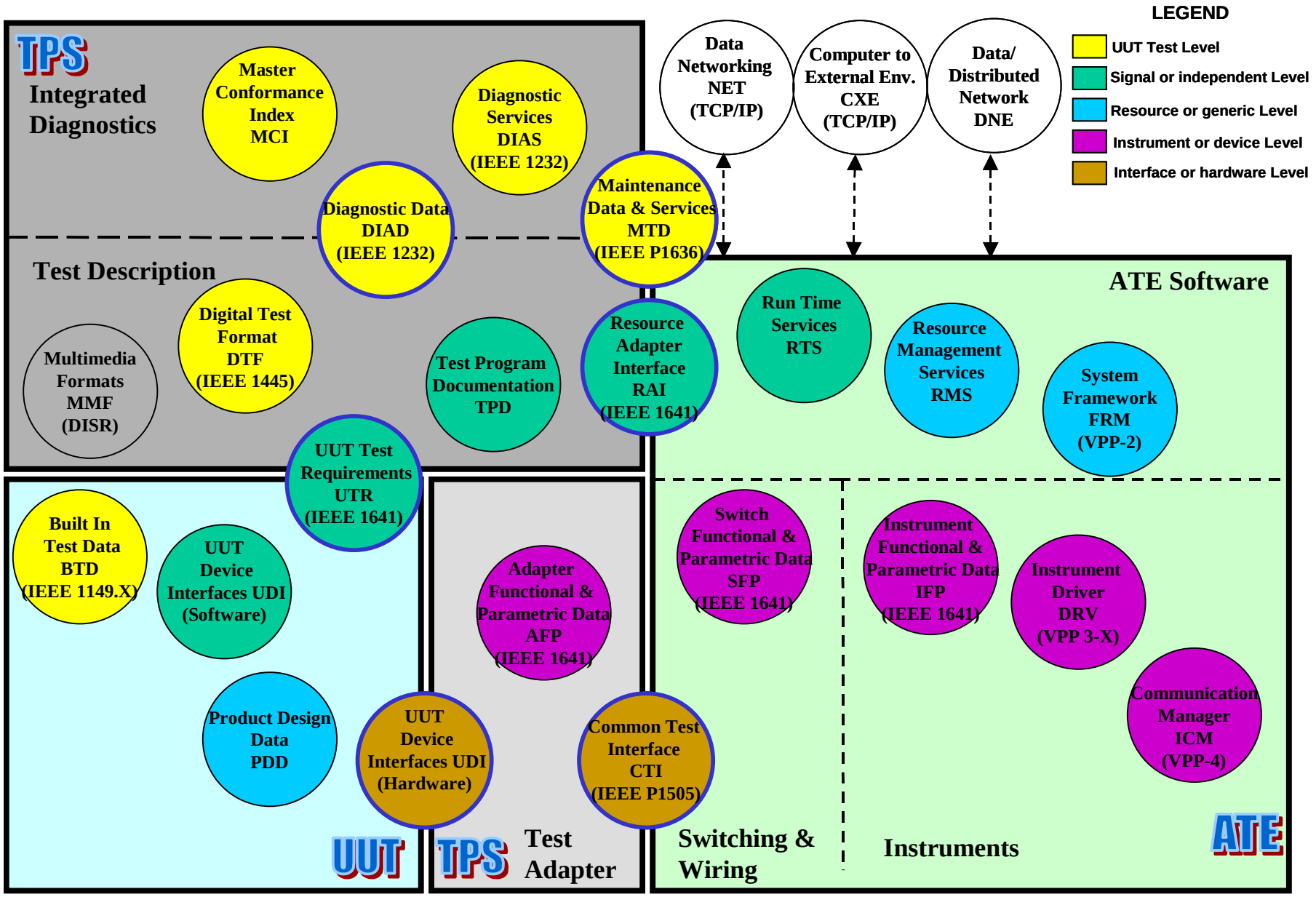
ATS Framework Working Group

The ATS R&D IPT (ARI), which developed the ATS Framework from the initial CIWG ATS architecture work, was merged into the NxTest IPT in 2002, and was renamed the Framework Working Group (FWG). The ARI, via the CIWG, had defined elements of the framework as hardware and software components; interfaces between components; information models for required data entities and data relationships; and rules and processes for describing how components, interfaces and information models must interact. As a working group under the NxTest IPT, the FWG focuses on continuing development of the ATS Framework to support ATS convergence, TPS transportability, and elimination of Service-unique ATS. The ATS Framework must support new test needs and permit flexible insertion of updates and new technology with minimum impact on existing ATS components.

ATS Framework

Portions of the ATS Framework have been approved for use and are published in the DoD Information Technology Standards Registry (DISR) https://disronline.disa.mil/a/DISR/index.jsp), Engineering Support – Automatic Testing Service Area. Approved elements are listed as “mandated” and elements still in the development or approval process are listed as “emerging”.

The following graphic shows the current ATS Framework. Additional information about the ATS Framework can be found on the ATS ED web site at http://www.acq.osd.mil/ats.


TPS
Integrated Diagnostics
Master Conformance Index MCI
Diagnostic Services DIAS (IEEE 1232)
Diagnostic Data DIAD (IEEE 1232)
Maintenance Data & Services MTD (IEEE P1636)
Test Description
Digital Test Format DTF (IEEE 1445)
Multimedia Formats MMF (DISR)
Test Program Documentation TPD
Resource Adapter Interface RAI (IEEE 1641)
UUT Test Requirements UTR (IEEE 1641)
Data Networking NET (TCP/IP)
Computer to External Env. CXE (TCP/IP)
Data/ Distributed Network DNE
LEGEND
UUT Test Level
Signal or independent Level
Resource or generic Level
Instrument or device Level
Interface or hardware Level
ATE Software
Run Time Services RTS
Resource Management Services RMS
System Framework FRM (VPP-2)
Built In Test Data BTD (IEEE 1149.X)
UUT Device Interfaces UDI (Software)
Product Design Data PDD
UUT Device Interfaces UDI (Hardware)
UUT
Adapter Functional & Parametric Data AFP (IEEE 1641)
Common Test Interface CTI (IEEE P1505)
TPS
Test Adapter
Switch Functional & Parametric Data SFP (IEEE 1641)
Instrument Functional & Parametric Data IFP (IEEE 1641)
Instrument Driver DRV (VPP 3-X)
Communication Manager ICM (VPP-4)
Switching & Wiring
Instruments
ATE

5. Test Technology Advancement

The Services have worked closely with industry to advance test technology. In addition to helping steer industry's discretionary Internal R&D (IRAD) projects, the Services have made use of several opportunities to obtain funds for test technology development and demonstrations as discussed in subsequent paragraphs.

Commercial Operations and Support Savings Initiative (COSSI) Projects

The purpose of the COSSI program is to reduce DoD operations and support costs by developing, testing, and inserting commercial technologies into fielded military systems. COSSI establishes Government and industry partnerships. Projects are cost-shared between the Government and industry thereby, reducing the expense of developing and qualifying a commercial product for use in a military system. It also signifies the contractor's commitment to the long term success of the project.

Since 1999, COSSI projects have played a key role in the advancement of test technology. Three of the most recent test technology advancements have been developed and acquired via the COSSI program. The CASS Upgrade COSSI program implemented two COTS instruments (the Teradyne Ai-7 Analog Test Instrument and the Bi-4 Bus Test Instrument) which allowed CASS to perform parallel testing functions. Subsequent COSSI projects have included Synthetic Instruments, which provides a common suite of analog measurement capabilities to insert into legacy test equipment currently in use by all the Services in order to reduce footprint and cost while enhancing capability. The classic analog measurements of a DMM, Frequency Counter, Digitizer, Spectrum Analyzer, Power Meter, and RF Signal Analyzer are synthesized from the building blocks of modern instrumentation. The products of these COSSI projects are expected to be in wide use across all future DoD ATSs.

Small Business Innovative Research (SBIR) Projects

The Services have used the SBIR program to develop and advance test technologies. Selected SBIR topics in recent years include the following:

- Automatic Test Equipment COTS Replacement for Obsolete Instruments
- Intelligent Embedded Diagnostics System for Future Avionics Systems
- Process for Gathering and Processing Parametric Data Required to make an ATS Selection Decision
- Develop Advanced System Tools to Automate Test Program Set Development and Re-Host
- Embedded Diagnostics/Integrated Diagnostics
- Resource Adapter Interface
- Automatic Test Markup Language
- Reusable Measurement Components
- Software Architecture for Virtual Instrumentation
- Artificial Intelligence and Expert System Tie to Automatic Test Equipment

- Down Converter Hardware Development in a PCI Extensions for Instrumentation (PXI) Form Factor
- Concurrency, Visualization, and Execution

Advance Concept Technology Demonstration (ACTD) Project

The Services joined to obtain OSD approval and support of a test technology demonstration program with the potential to help define the next generation DoD ATS. The Agile Rapid Global Combat Support (ARGCS) ACTD integrates a number of on-going Joint Services test technology initiatives, including the COSSI projects mentioned above in addition to several other projects in work by government/industry working groups. The objective is to evaluate the feasibility of integrating the complete set of new test technologies (both hardware and software) into a scaleable ATS that can be used at each level of maintenance. Key features expected from ARGCS include interoperability among weapon systems and the Services, scaleability to need, rapid fielding of test capability, reduced impact from instrument obsolescence, smaller footprint, reduced logistics burden, and reduced Total Ownership Costs. When the ARGCS ACTD completes in 2008, the Services will individually leverage the demonstration results into their own ATS modernization programs.

Some of the test technologies being further developed and demonstrated by ARGCS include the Synthetic Instrument RF Subsystem, the Switching Subsystem, the Power Subsystem, the Digital Subsystem, Analog Instrument Subsystems, and the Common Test Interface.

6. Tying It All Together

This section of the DoD ATS Program Plan will tie together the preceding discussion and present the Services' ATS modernization plans.

Framework vs Demonstrations

In order to clarify the distinction between implementation of the ATS Framework and the architecture being demonstrated in the ARGCS ACTD, a brief discussion of the difference between the two projects is necessary.

The DoD ATS Framework is an evolving set of standards required for an ATS Open System approach and, when adopted by the DoD ATS Families, will reduce the cost of ownership of ATS, improve Joint Service interoperable ATS, reduce logistic footprint, and improve quality of test.

The ARGCS Architecture is helping to mature and validate some of the emerging DoD ATS Framework standards before they are mandated via the DISR.

The mature standards contained in the DoD ATS Framework and documented in the DISR as "mandated" will be specified as requirements in Service acquisition contracts. The remaining "emerging" standards, other architecture elements, and the various test technologies will be elements of the competitive marketplace. It is expected that companies will respond to Service Requests for Proposal with proposed solutions that draw from all of these elements as appropriate for a given weapon system support requirement.

Service ATS Modernization Plans

Navy

Mainframe CASS, AN/USM-636(V), is fielded in five versions that are designed for specific testing requirements. The Hybrid version is the basic core five-rack station that provides analog and digital test capability. Other CASS configurations add capability to the basic Hybrid station to test radio-frequency components (CASS RF), high power radar systems (CASS HP), electro-optics (CASS E-O), and communications/navigation/Identification Friend or Foe systems (CASS CNI).

CASS was initially designed in 1986. The first CASS stations were ordered in 1990 and CASS entered the Fleet in 1994. The last of the 613 production Mainframe CASS stations was delivered in December 2003. The Navy and Marine Corps use 553 of these stations for afloat and shore-based intermediate level maintenance support. The remaining stations are used at various Navy depots, a National Oceanic and Atmospheric Administration depot, and around the world by more than 10 different countries.

Mainframe CASS was acquired in three major blocks:

- Block I includes the Low Rate Initial Production (LRIP) stations acquired in four production lots from 1990 – 1994. Block I includes 103 Hybrid CASS stations, 95 CASS RF stations, 39 CASS CNI stations, and 5 CASS E-O stations.
- Block II implemented a Value Engineering Change Proposal (VECP) upgrade and includes 110 CASS Hybrid, 108 CASS RF, and 11 CASS E-O stations. The VECP brought upgrades to the computer, the Digital Test Unit, the display, and several test assets, in addition to timing changes and asset relocation. Block II stations were acquired from 1995 – 1999.
- Block III includes 36 Hybrid and 63 RF stations and brought another upgrade to the computer, made changes to improve reliability, and addressed a few production obsolescence issues. Block III stations were acquired from 2000 – 2002.

Several factors have led to the requirement for modernizing mainframe CASS.

Obsolescence: CASS is 85 % COTS, semi-COTS or Non-Developmental Items. This made CASS considerably less expensive to develop and procure than any alternative, but it has made CASS more susceptible to individual instrument or component support problems.

Technical Capability: Weapon systems are continually being upgraded to incorporate the latest in warfighting and net centric technologies. CASS must evolve to remain abreast or, ideally, ahead of changes being incorporated into weapon systems. Test capability must be

added where needed. Emerging weapon system testing requirements will drive the replacement or the upgrade of test instruments to meet higher performance requirements.

Differences Between Blocks: The three blocks of CASS stations are increasingly more capable. However, it has been necessary to develop TPSs to the Block I station configuration, which is the lowest common denominator. Since CASS stations of any block may be assigned to a given Intermediate Maintenance Activity, TPSs must be transportable among all blocks of CASS. This results in TPSs generally being written to play on Block I stations, which means that TPS engineers sometimes cannot take advantage of increased processing speeds, instrument capabilities, or software algorithms available in the Block II and Block III stations. On the other hand, if TPSs were to be written to exploit the capabilities of the Block II and III stations, maintenance management would be more difficult and flexibility in utilizing all available CASS stations would be decreased. By modernizing the Block I stations to match or exceed the speed and instrument capabilities of the Block II and III stations, TPSs could be made more efficient, Unit-Under-Test (UUT) turn-around times will decrease, and maintenance management can be optimized. Moreover, modernizing Block I stations will also reduce requirements and costs for logistics and training by optimizing parts and management commonality between Blocks II, III, and the modernized Block I stations.

Deterioration of the CASS Station Infrastructure: A majority of CASS Block I stations have seen more than 100,000 hours of use and, as a result, are beginning to physically deteriorate. The physical infrastructure of the CASS stations includes components such as wiring, rails, slides, power supplies, and card connectors, all of which are subject to corrosion, metal fatigue, and normal wear and tear. While obsolescence has typically been limited to instrumentation, as the CASS stations age, replacement of these physical components incurs greater costs and increases station down-time.

Architecture: Since CASS was developed in the mid-1980s, its electrical and software design is based on a closed architecture, which is inflexible and does not permit easy modification or upgrade. Incorporation of an open architecture will better address situations such as this and will facilitate future changes to reduce the cost of ownership.

CASS Station System Software: Mainframe CASS has millions of lines of system software code which is becoming archaic, and while technically supportable, it is likely to become so cumbersome that it is no longer cost effective to maintain. Therefore, modernizing CASS will allow the Navy to take advantage of the latest state-of-the-art in system software, programming languages, operating systems, bus architectures, and TPS programming environments.

PMA260's ultimate goal is to have all CASS stations in equivalent configuration based on the open ATS architecture; for current and future TPSs to be transportable among all configurations; for CASS to be capable of interoperability with other Services; for new test technologies to be easily inserted; and for stations to be easily reconfigurable (scalable) to meet specific UUT testing requirements with only the minimum required test assets in the stations. Specific objectives of the CASS Modernization Program which support these goals, are:

- Update current test capability
- Add test capability to support emerging weapon system requirements
- Reduce the impact of obsolescence
- Address the ageing station infrastructure

- Reduce logistics footprint – both in the shops and inside Mobile Maintenance Facilities, and for ancillaries/spares
- Implement an open system via the DoD ATS Framework
- Reduce the number of configurations of CASS
- Facilitate interoperability with other Services
- Decrease station mean time to repair
- Reduce Total Ownership Costs
- Add user-friendly enhancements

Working with the DoD ATS ED, the Navy has begun its CASS modernization planning. An Independent Cost Estimate and Cost Benefit Analysis showed that the best course of action is to develop a new tester (as opposed to modifying existing CASS stations) to satisfy the above requirements. "eCASS" is the name for the modernized version of CASS. Plans call for a full and open competition (best value basis) for the development of eCASS. The contract process will be initiated by release of a Request for Proposals in Spring, 2007. Award of a three-year development contract is planned for early FY 2008. Production of eCASS will begin in FY 2011.

Aviation Marines

Marine Corps aviation ATE requirements are satisfied by the CASS Family. The Operational Requirements Document (ORD) for the V-22 aircraft, which will be used by both USMC and US Special Operations Command, requires a man-transportable, reconfigurable tester. Reconfigurable Transportable CASS (RTCASS), which was developed as an Engineering Change Proposal to mainframe CASS and is a sixth configuration of CASS, was initially developed to support the V-22 ORD's mobility requirements. The Marine Corps has since expanded the requirements for RTCASS to support all USMC fixed wing aircraft (F/A-18, AV-8B, and EA-6B). RT CASS will eventually replace Mainframe CASS at all USMC maintenance units, with the exception of the E-O and CNI CASS configurations.

Ground Marines

MCATES is the Ground Marines' approved DoD ATS Family with the Third Echelon Test Set (TETS), AN/USM-657, being the basic Family member within MCATES. TETS (now named the VIPER/T) was designed in the early 1990s to provide a capability to test, diagnose, and screen a wide variety of electronic and electro-mechanical units at the ground forces third echelon maintenance level. TETS also functions as stand-alone General Purpose Electronic Test Equipment (GPETE), allowing the operator maximum usage of all TETS test assets. TETS supports testing of analog, hybrid, and digital technologies and includes both a basic and RF configuration. TETS has been designed to function at the intermediate maintenance level from the tailgate of a High Mobility Multipurpose Wheeled Vehicle (HMMWV). The four TETS configurations are:

1. AN/USM-657 (V)1, Core System
2. AN/USM-657 (V)2, RF
3. AN/USM-657 (V)3, E-O

4. AN/USM-657 (V)4, HMV

In 2004, a contract was competitively awarded to acquire 100 new TETS stations and upgrade 200 existing TETS testers. The changes to the previous version of TETS include:

- "3-box" base system (including RF and added capabilities)
- Single Assembly Power Distribution Unit
- Upgraded Instrument Controller
- Synthetic Instrumentation RF Measurement Suite (to 18GHz)
- Added Synchro/Resolver Simulator
- Added generic and peculiar busses
- Redesigned/repackaged "one-box" E-O subsystem
- Option to support expanded radio systems testing

Despite this technology insertion project, due to the age of the tester's architecture and much of the hardware, a technology refresh project is planned to begin in 2010. This effort will bring the VIPER/T architecture into full compliance with the DISR-mandated ATS Framework, and will include the test technologies successfully demonstrated by ARGCS that are determined to be necessary to satisfy USMC test requirements.

Army

The Army's IFTE Family is comprised of at-platform and off-platform test equipment. At-platform systems test units physically installed on the weapon system or major item. Off-platform systems test units removed from the weapon system or major item. Army IFTE off-platform test equipment include:

- Base Shop Test Facility (BSTF (V)3)
- Electro-Optic Test Facility (BSTF (V)5)
- Next Generation Automatic Test System (BSTF (V)6)
- Electronic Repair Shelter (ERS)
- Commercial Equivalent Equipment (CEE)

Army IFTE at-platform test equipment include:

- Contact Test Set (CTS)
- Soldier Portable On-System Repair Tool (SPORT)
- Maintenance Support Device (MSD V1 &V2)

All Army automatic testing requirements have been consolidated on IFTE except the Direct Support Electrical System Test Set (DSESTS), which supports tracked vehicles, and the Electronic Equipment Test Facility (EETF), which supports the APACHE system. Both the DSESTS and the EETF have been in use for more than 20 years. These systems were designed in the 1970s and fielded in the 1980s as "stovepipe" testers for specific weapons platforms. They are both experiencing very similar sustainment, reliability and other performance issues associated with obsolescence including diminished sources for replacement/repair parts, as well as component level and COTS end-item obsolescence. The APACHE support is currently being moved to the Electro Optics Test Facility (EOTF), also known as the BSTF (V)5, the latest version of the IFTE off-platform tester.

The IFTE modernization program is based on fielding an updated IFTE system named the Next Generation Automatic Test System (NGATS) BSTF (V)6, which will focus on satisfying DoD's policy of establishing a single ATS (IFTE) within each component service by replacing the DSESTS, BSTF (V)3 and the BSTF (V)5 with a single piece of ATE. An incremental fielding plan will begin with the replacement of the DSESTS in FY09. The second increment will replace the BSTF (V)3, and the third increment will replace the BSTF (V)5.

NGATS is a reconfigurable ATS housed, sheltered and transported by a standard Army vehicle suited for mission needs. It will perform the following missions:

a. Diagnose and fault isolate Line Replaceable Units (LRUs) to the Shop Replaceable Unit (SRU) level.

b. Screen for no-evidence-of-failure (NEOF) to reduce the rate of LRUs sent back to the depots that are NEOF.

c. Ensure user-friendly reconfiguration to provide support for multiple weapons systems.

The NGATS will be 100% compatible with all TPSs currently in use by current Army standard ATE and will have full sustainment level diagnostic maintenance capability on the full spectrum of Army weapons systems including Avenger, Kiowa Warrior, MLRS, Abrams, Bradley, TOW, Apache, Stryker and Paladin . In addition, NGATS will be capable of supporting the Future Combat Systems (FCS) platforms and additional systems being developed such as the Common Remotely Operated Weapsons Station (CROWS) and Towed Artillery Digitized (TAD). NGATS will have a modular design that will facilitate continuous incremental modernization through preplanned product improvements as test technology improves or as ATS test capability requirements expand. Transportability will be improved over some of the currently fielded ATS platforms because NGATS allows utilization of the intra-theater lift capability provided by USAF C-130 aircraft. NGATS will implement an internal self-diagnostic capability using self-tests and self-alignment for onboard system maintenance. A key feature of NGATS is that it will utilize joint service-developed test technologies and move DoD closer to its stated goal of a common ATS architecture capable of cross-service weapons system testing..

USAF

Despite Air Force Policy Directive 63-2 and Air Force Instruction 63-201, USAF policy directives which require the use of standard ATE, the USAF has traditionally placed responsibility for ATS acquisition with the SPDs who optimize solutions for the weapon system vice the USAF as a whole. The result is that there is no standard ATS Family in the USAF. The USAF is working to gather requirements to move closer to ATS standardization. The ATS Council has been formed to enforce ATS policy and curb ATS proliferation.

Acquisition Documentation

JCIDS Process Overview

Chairman of the Joint Chiefs of Staff Instruction 3170.01E establishes the policies and procedures of the Joint Capabilities Integration and Development System (JCIDS). The purpose of the JCIDS is to identify capability gaps and redundancies, determine the attributes of a capability or combination of capabilities that would resolve the gaps, identify materiel and/or non-materiel approaches for implementation, and roughly assess the cost and operational effectiveness of the Joint force for each of the identified approaches.

JCIDS implements a top down capabilities identification methodology to identify gaps in warfighting capabilities and assess associated risk(s). It better leverages the expertise of all government agencies to identify improvements to existing capabilities and to develop new warfighting capabilities.

The documentation developed during the JCIDS process provides the formal communication of capability needs between the operator and the acquisition, test and evaluation and resource management communities. There are three major documents that result from the JCIDS process: the Initial Capabilities Document (ICD), the Capabilities Development Document (CDD) and the Capabilities Production Document (CPD). These relate to acquisition milestones A, B, and C respectively. There may be predecessor documents such as a Functional Area Analysis, a Functional Needs Analysis, a Cost Benefit Analysis, and a Joint Capabilities Document (JCD), which is the predecessor document for the ICD.

An ICD is generated to define the capability in a joint context, review the options to provide the capability and ensure that all doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) and policy alternatives, impacts and constraints have been adequately considered. The ICD documents the need to resolve a specific capability gap, or set of capability gaps, identified through the JCIDS analysis process. The ICD supports the concept decision, Analysis of Alternatives, technology development strategy, Milestone A acquisition decision, further refinement and/or development of integrated architectures and subsequent technology development phase activities. ICDs are non-system specific and non-Service, agency, or activity specific to ensure capabilities are being developed in consideration of the joint context.

The CDD captures the information necessary to develop a proposed program(s), normally using an evolutionary acquisition strategy. The CDD outlines an affordable increment of capability. It provides operational performance attributes, including supportability and allied and coalition interoperability, necessary for the acquisition community to design the proposed system. The validated and approved CDD supports the System Design and Development (SDD) Phase and the subsequent Milestone B acquisition decision.

The CPD addresses the production attributes and quantities specific to a single increment of an acquisition program. The validated and approved CPD supports the Milestone C decision review.

DoD ATS JCIDS Documentation

Under a typical ACTD development where the technology is planned for acquisition following the demonstration project, after the Joint Military Use Assessment is completed the

ACTD documentation itself serves as the ICD. However, the ARGCS ACTD will not be completed in time to satisfy Army and Navy ATS modernization program requirements. Therefore, as the DoD's functional experts on ATS matters, the AMB and the Services have agreed that the best and only course of action open is for Army and Navy to develop CDDs to document the System Design and Development Phase of NGATS and eCASS. These CDDs are currently in the approval process. The basis of the CDDs are the existing IFTE and CASS ORDs.

Following the SDD Phase, CPDs will be developed for each of these programs independently.

The USMC will develop a CDD for the TETS (VIPER/T) refresh program in the 2010 timeframe.

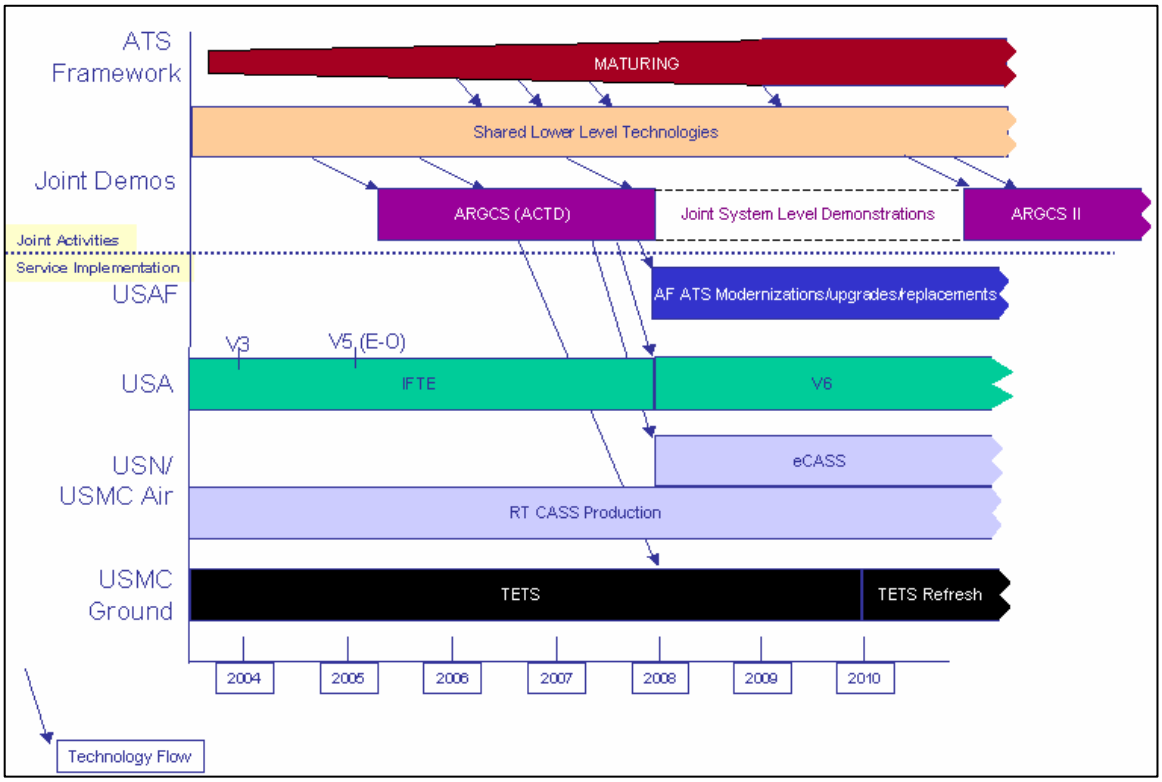
When the USAF resolves funding and other issues and begins the acquisition process for a USAF ATS Family, the necessary JCIDS documents will be developed.

To address future ATS interoperability goals in the 2013+ timeframe, a new JCD will be developed under AMB leadership after the ARGCS JMUA is completed. It is expected that this JCD will serve as the basis for subsequent ATS CDDs and CPDs across the Services.

7. Summary

The Services are working closely together to implement DoD policy and standardize ATS requirements on approved ATS Families. The DoD ATS Framework is being implemented via the DISR to provide an open architecture, and test technologies continue to be developed and demonstrated. ATS modernization plans for the Army's IFTE and the Navy's CASS are well documented and underway; USMC ground ATS modernization will begin in 2010; and the USAF is in process of defining ATS requirements on a USAF-wide basis.

The graphic below shows how the ATS Framework and the test technologies flow into the Services' ATS modernization planning.


ATS Framework
MATURING
Shared Lower Level Technologies
Joint Demos
ARGCS (ACTD)
Joint System Level Demonstrations
ARGCS II
Joint Activities
Service Implementation
USAF
AF ATS Modernizations/upgrades/replacements
V3
V5 (E-O)
USA
IFTE
V6
USN/ USMC Air
eCASS
RT CASS Production
USMC Ground
TETS
TETS Refresh
2004
2005
2006
2007
2008
2009
2010
Technology Flow