

TEST AND EVALUATION COMMUNITY NETWORK (TECNET)

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ABSTRACT

The Test and Evaluation Community Network (TECNET) has existed as a means of electronically exchanging unclassified information between Test and Evaluation (T&E) practitioners since 1983. The test and evaluation community in the Department of Defense (DoD) is heavily reliant on telemetry products. Thus, it is no surprise that TECNET deals substantively with telemetering matters. TECNET currently provides unclassified electronic mail, bulletin board, file manipulation and information retrieval services to the Test and Evaluation (T&E) community via an unclassified host computer operated and maintained by the Naval Air Warfare Center - Aircraft Division, Patuxent River, Maryland and a classified host computer located at the Aberdeen Proving Ground, Aberdeen, Maryland. National packet switched network capabilities are provided via the MILNET component of the Defense Data Network (DDN), the Defense Research Engineering Network (DREN) and a the Federal Telephone System for 2000 (FTS -2000) data network. The second TECNET computer provides a system high secret secure capability for TECNET via STU -III dial-up and the Defense Secure Network (DSNET) component of DDN. TECNET is a Joint Service network operating under the auspices of a tri-service Steering Committee which reports to a Board of Operating Directors (BoOD). TECNET supports a number of capabilities for the Range Commander's Council (RCC) community, including all scheduling for the RADCAL satellite. Presently TECNET supports a growing population of over 7,000 validated users from service Program Management Offices (PMO) and both the operational and developmental T&E communities in all the services. In the future TECNET envisions support to test planning, execution and reporting through the use of protected Multi -Level Secure (MLS) communication channels. This capability will dispense meaningfully detailed T&E related data bases and tools. The ability to provide needed, accurate, protected, high integrity, value added information at the right time and place and in the right format with the right amount of detail to the right decision makers adds direct value to the T&E process. In essence, the capability enhances the efficiency of the entire T&E process by making timely T&E information and tools more available to both its practitioners and consumers.

KEYWORDS

(1) Test and Evaluation, (2) Internet, (3) Telemetry Information, (4) Information Resource, (5) Network

INTRODUCTION: TECNET DESCRIBED

The Test and Evaluation Community Network (TECNET) exists to support the Department of Defense (DoD) in the conduct of both developmental and operational Test and Evaluation. This support extends to the United States armed services, defense agencies, the Office of the Secretary of Defense (OSD) and qualified defense contractors who provide Test and Evaluation support to the Department of Defense. The test and evaluation community in the Department of Defense (DoD) is heavily reliant on telemetry products. Thus, it is no surprise that TECNET deals substantively with telemetering matters. TECNET offers full featured electronic mail, an extensive bulletin board service, flexible file repository systems for text and binary file exchange, integrated facsimile capabilities, extensive data base support, Internet access and specialized information services. TECNET supports a number of capabilities for the Range Commander's Council (RCC) community, including all scheduling for the RADCAL satellite, a number of RCC group exchanges and a number of telemetry oriented information resources. TECNET currently serves over 7,000 registered users who support defense acquisition from the test and evaluation perspective. TECNET operates under the auspices of a tri-service Steering Committee which reports to the two-star level Board of Operating Directors (BoOD) for Test and Evaluation. Funding is provided by the services for Operation and Maintenance (O&M) and by OSD for Research and Development (R&D).

TECNET operates a security accredited system for unclassified support from the Naval Air Warfare Center - Aircraft Division, Patuxent River, Maryland. This system is accessible via direct dial-up modem lines, the Defense Data Network (DDN), the Defense Research and Engineering Network (DREN) and the Federal Telephone System for the year 2000 (FTS-2000). Another security accredited System High SECRET TECNET capability also operates from the Aberdeen Proving Ground, Aberdeen, Maryland. This system is accessible via the Defense Secure Network One (DSNET1) and via direct dial up lines utilizing STU-III devices.

It has been a TECNET goal since 1989 to integrate its classified and unclassified operations. Such integration was felt necessary to eliminate the costly redundancy of systems and data brought about by the distinctly separate systems serving the same community. Moreover, user acceptance of the classified capability would be better served if all appropriate data were more accessible in context. For these reasons, TECNET launched a focused applied research and development effort in 1991. This initiative was

aimed at better understanding the dynamics and economics of operating a Multi-Level Secure (MLS) TECNET capability in the not too distant future.

THE TECNET TECHNICAL ENVIRONMENT

TECNET made a purposeful decision to provide an increasing access to information as may be available on the Internet. This added service is in keeping with TECNET's belief that information is an important tool for the effective pursuit of test and evaluation. Open Internet access supports this contention by increasing TECNET's information reach without encumbering TECNET resources with redundant data. In this manner, TECNET users may gain focused access to data of interest from the various telemetry product vendors who have established World Wide Web (WWW) Home Pages. As evidence of the utility of this extended reach, TECNET regularly appears as one of the top ten systems accessing the Defense Technical Information Center's (DTIC) DEFENSELINK and other home pages. TECNET is unique on this DTIC list as it is the one frequently accessing systems with a .mil address.

While TECNET continues to perfect its X-Interface in anticipation of abundant X-clients at the user PC level in the future, TECNET has also acknowledged the growing popularity of the MOSAIC and Netscape Graphical User Interface (GUI) using WWW techniques. In May 1995, TECNET introduced these capabilities to the TECNET software beta test community. Upon successful initial trials, TECNET took direct action to elevate the number of simultaneous users accessing TECNET under license to The Internet Adapter (TIA). TECNET has now gone to full production TIA support. TIA allows users to access TECNET via Serial Link Internet Protocol (SLIP) using popular shareware packages from a local PC, such as TRUMPET. Once connected via dial-up access, such as FTS-2000, one may invoke TIA and go to MOSAIC, Netscape, File Transfer Protocol, GOPHER or Eudora via TECNET's POP-3 server to gain TECNET and Internet services. The speed of the interface is rather impressive. The TECNET Home Page, while unavailable outside of the JCTE.JCS.MIL domain, has become the primary TECNET GUI. The existing TECNET home page will continue to expand to support all TECNET functionality.

With the growing popularity of the Serial Link Internet Protocol (SLIP) Graphical User Interface (GUI) tools, TECNET created a repository to provide the various downloadable shareware components for this GUI. This new MOSAIC file repository contains subrepositories for the PC and the Mac. These subrepositories contain programs that support SLIP based GUIs. These programs include Mosaic, Netscape, Gopher, FTP, Ping, Telnet, POP_3 mail client, SLIP access and other utilities, such as the MOSAIC.INI file. TECNET will continue to maintain a downloadable mosaic.ini file to permit direct launch to the growing list of home pages now directly accessible from within TECNET. One large PC based file entitled "pc-apps.exe" provides a preformatted TECNET access kit

complete with instructions in an embedded text file. This self extracting file permits full TECNET SLIP access. It includes the MOSAIC.INI file.

TECNET is also proud to support POP-3 mail service. Using shareware POP-3 packages, such as Eudora, one may now access TECNET and remotely obtain the contents of the "In" box. This "single transfer" process permits a direct download of all text files. These files may then be manipulated locally on a local PC using the same POP-3 mail package that permitted the download. Message replies and new messages may then be transmitted back to TECNET as outgoing mail, again using a single POP-3 transmission session. This overall procedure lowers connect time (and costs) to TECNET, allows one to process mail locally with convenience and permits efficient mail transmission. The POP-3 may be invoked via a Serial Link Internet Protocol (SLIP) session from any Internet dial-up service provider. It is also available via direct SLIP dial-up access to TECNET. This direct POP-3 SLIP access to TECNET is immediately available to any TECNET dial-up user (FTS-2000 or Senior Executive Line direct dial) with a commercial equivalent of a POP-3 client, such as Eudora, which supports direct dial-up POP-3 access. (In other words, SLIP access is not necessary in this case - just a direct dial-in is required). TECNET has also perfected POP-3 transfer of binary attachments and binary files and now permit expansion to support access to other available TECNET mailboxes and bulletin boards other than just the "In" box. These advanced features, however, require a commercial version or equivalent of Eudora.

Recognizing the effect that added growth has had on TECNET performance in recent months, TECNET has taken positive steps to assure improved performance. In late 1995, TECNET plans to transition to a larger, more state of the art computer system. TECNET has also taken steps to transition to faster and greatly expanded RAID storage technology. Moreover, at this writing, TECNET has ordered a second FTS-2000 line to accommodate observed growth in FTS-2000 access lately. TECNET is growing to accommodate needs as expressed by its user's continued use and support of the capability in support of Test and Evaluation.

THE TECNET MANAGEMENT ENVIRONMENT

The Test and Evaluation Community Network (TECNET) was approved in April 1995 by the Test and Evaluation Corporate Information Management (CIM) three star equivalent Steering Council as a CIM migration system. This move formally nominates TECNET, along with four other test and evaluation information automated systems, as a nominee for Defense Information System Agency (DISA) acceptance as a formal CIM migration system.

The significant factor in 1994 and 1995 was that TECNET held the line on its Test and Evaluation operating budget at 1993 levels. TECNET accomplished this despite highly significant growth in the number of registered users, active users, sessions and connect time. This was accomplished by a serious realignment of the TECNET staff under a team based matrix management concept. Ms. Rose Benjes, the TECNET deputy Executive Secretariat, was instrumental in bringing the team together under new mutually agreed upon functional alignments. This functional consolidation helped streamline TECNET operations and helped relieve previously pressing workload concerns. The TECNET teams have taken hold and the team continue to develop and learn new procedures together. In 1994, TECNET spun off a second out source operation. The two existing TECNET based out source operations provided support for extended matrix support at a sponsor rate far lower than that of a "new start" operation. In 1994, TECNET obtained its own support contract which greatly aided TECNET's continuity of operations. This eliminated the "piggy back" effect of riding on an existing contract vehicle. The TECNET management challenge has really been to create an environment where the TECNET team, the real powerhouse of the TECNET operation, can excel. The TECNET team, including the outstanding development arm at Clemson University, is truly achieving new heights and the results are obvious in continuing growth without added expense.

Once again, TECNET aims to hold the line on its operating budget in FY95 while continuing to grow. To do so, however, TECNET had to undertake a conscious effort to conserve resources. This initiative started during Fiscal Year 1995 (FY95). The Federal Telephone Service for the Year 2000 (FTS-2000) dedicated dial-up access to TECNET was limited to support internal TECNET business only. Access beyond TECNET to other Internet resources outside of direct WWW access described previously via FTS-2000 was seriously curtailed for TECNET users in early FY95. The objective is to maintain FTS-2000 operations at the same fiscal level as FY94. So far in FY95, the FTS-2000 curve is showing signs of flattening as desired. While spiked in nature, the faired curve, however, could still stand to sustain a bit more of a drop. In the meantime, Defense Research and Engineering Network (DREN). Internet and Defense Data Network (DDN) accesses continue to climb steadily in keeping with the extraordinary growth seen in TECNET use. These access methods retain the full spectrum of Internet access. It was just this kind of open access capability that caused us to issue a reminder that TECNET existed to do the professional business of Test and Evaluation in support of weapon system acquisition and not the business of individuals. TECNET indicated that it would not violate the long standing practice of totally respecting user privacy by not reading the content of user mail or storage areas, but would be compelled to report events that show up in daily status monitoring and system diagnostics. If TECNET saw activity trends that smacked of inappropriate use of the Government resource, the staff has no choice but to initiate necessary dialogues.

In December 1994, TECNET announced an initiative to maintain a reasonable amount of storage space per user. TECNET cut a bit too deeply with the policy, and based on user response, rescinded the portion concerning IN-Box purging for inactivity. The objective is to continue to improve service while maintaining a reasonable and economical operating envelope for each user.

THE TECNET SECURE SYSTEM ENVIRONMENT

The classified TECNET, operating from the Aberdeen Proving Ground, Aberdeen, Maryland, continued to grow in capability. This system now supports the Navy's Tactical Intelligence Data Extraction System (TIDES) which supports data on threats and threat simulations from various intelligence oriented data bases. The Air Force's Electronic-CounterMeasures (ECM) Vulnerability Assessment Data Encyclopedia (EVADE) provides ECM data by platform by run, sortie and test. The secure TECNET is also handling a portion of the Army's T&E secure business and message processing. The working relationship between Aberdeen and Patuxent River is excellent as all involved continue to learn how to manage like systems with separated geographic and cultural sites. The Aberdeen team continues to fold into the larger TECNET team.

TECNET MULTI-LEVEL SECURE DEVELOPMENT PROGRESS

The secure TECNET system is a forerunner for things to come. In 1993, TECNET became a full partner with the National Security Agency (NSA) in a Concurrent Systems Security Engineering (CSSE) project. This project is aimed at fielding a truly Multi-Level Secure (MLS) TECNET system by 1996. Expending one week each month, the joint TECNET/NSA team has already hammered out the MLS systems security concept, the MLS system architecture, the underlying sub-system architectures and has begun to negotiate through the systems integration issues. All required MLS documentation is underway and nearly completed.

As this paper is written, TECNET has acquired the necessary equipment and is in the process of establishing a baseline complete with requirements traceability and configuration management practices. The trusted software and functionality is beginning to conform to functional and security requirements. TECNET has also taken delivery of a modem based system that both encrypts a session between any host PC (via direct dial-up) and TECNET. These devices, already in use by TECNET personnel on travel status, permits full identification and authentication capabilities. This way, truly secure dial-up connections to the eventual unclassified but sensitive portion of TECNET can be assured. TECNET has also initiated a Cooperative Research and Development Agreement (CRADA) to permit similar access capabilities via the Internet. In both cases, TECNET anticipates eventual compliance with the Defense Messaging System (DMS) standards,

including the Multilevel Information systems Security Initiative (MISSI). When MLS TECNET service is initiated, the existing System High SECRET TECNET host capabilities will transfer to the MLS TECNET. This will fulfill the long standing TECNET vision to permit accessibility to both classified and unclassified Test and Evaluation related material within an appropriately authorized session. The TECNET trusted code will also permit non-hierarchical markings and DoD recognized distribution marking caveats. The TECNET MLS capability further satisfies a requirement to truly protect unclassified but sensitive materials which may have a proprietary or privacy act flavor.

THE CONCURRENT SYSTEM SECURITY ENGINEERING (CSSE) PROCESS

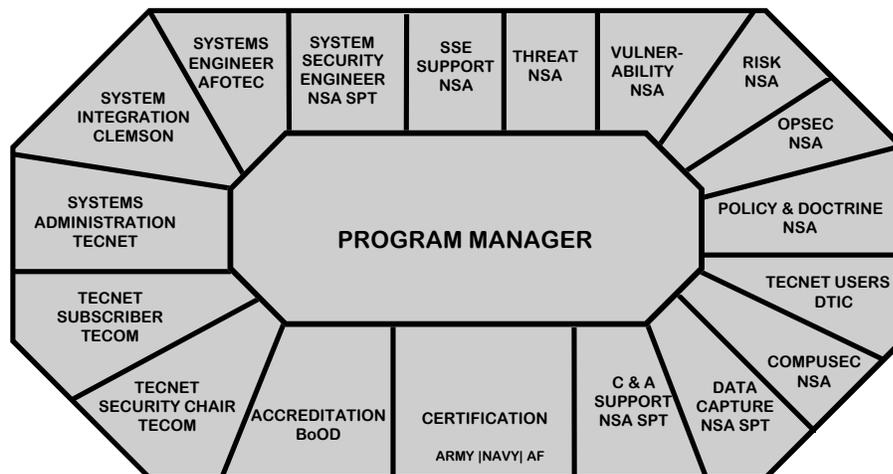
The TECNET/NSA CSSE principles are at the core of modern systems engineering. The CSSE effort is founded on concurrent engineering, requirements traceability, evolutionary development, an open systems approach and rigorous configuration management. The TECNET/NSA effort has built a functional model of the iterative CSSE process. This process takes policy, threat, procedures, human resources, hardware and software into simultaneous consideration. The overall MLS TECNET profile serves as a design model for subsequent efforts. The TECNET MLS system is significant from a number of standpoints. It represents a serious concurrent systems engineering effort where all affected parties are formally represented. In the age of Corporate Information Management (CIM), it represents a way to better understand how to manage the flow of sensitive defense information in an open systems environment. It also highlights the importance of good configuration management practice.

This initial TECNET research, funded by the services through the Defense Acquisition Security Protection (ASP) program, brought TECNET in close proximity to the National Security Agency (NSA). A natural union formed as TECNET and NSA slowly learned that many key objectives were mutual and intertwined. Using a teamed multi-service Steering Committee approach to its management, already engaged in a MLS oriented research program and increasingly aware that multiple disciplines would be necessary for its continued development, TECNET was well aware that a MLS capability would have to be built based on these principles. At the same time, NSA was experimenting with the engineering and documentation concepts underlying an up-front concurrent engineering approach. By 1993 the affinity between TECNET's needs and the rapidly maturing NSA System Security Engineering (SSE) approach to MLS certification and accreditation was a natural fit. TECNET clearly needed a multi disciplinary accelerated approach to MLS development at the same time that NSA was constructing a sound concurrent engineering framework for such a methodology in the CSSE arena. The linkage was evident and formal meetings began in earnest by the end of 1993.

These meetings have grown in intensity and significance since their inception. The TECNET team brings several necessary perspectives to the table. The system administration function, system security management role, system engineering activities, network security and planning responsibilities and the program management functions are fully represented within the TECNET team. By extension, TECNET has recruited and funded a tri-service certification team drawn from the three services to carry out this important independent task. These individuals have also been integrated into the full CSSE process as full team partners as appropriate. In this and other cases, functional sub-groups are identified for separate deliberations in specialty areas as required. TECNET is also seeking full accreditation authority through its management structure via the two star Board of Operating Directors (BoOD) for Test and Evaluation. This group, which oversees the TECNET Steering Committee, has already agreed to the MLS TECNET certification and accreditation plan. Likewise, NSA brings great and complementary expertise to the table. The natural dynamic between the actual operational capability of TECNET and the NSA security perspective has produced a meaningful outcome at each stage of the CSSE process. It is this process, which all parties have pledged to follow, that focuses the mutual activities of all concerned. At each stage of this well defined CSSE process the level of specificity grows as the options clearly narrow through strong consensus. While discussion is frequently animated and vivid, the process places clear focus on the ultimate team dynamic. To date, the process has served as the glue that makes the otherwise highly diversified team cohesive. Figure (1) depicts the CSSE team arrangement.

TECNET/NSA CSSE TEAM PARTICIPANTS

(figure 1)



The benefits of this experience to TECNET have been invaluable. Left to its own devices, TECNET may have reached similar conclusions, but it is doubtful that many of the desirable attributes of the CSSE process would have ever been fulfilled. No successive and topical documentation would exist demonstrating the distinct steps in the highly deductive process. The process oriented discipline places meetings above day to day operations, so action items cannot be put off. Deadlines have not slipped. Thus, the speed of execution has been greatly enhanced. The mutual teaming between agencies has made the acquisition of support funding and skill such as the certification team far more credible and easily accomplished. The mutual respect among the team members has fostered a professional atmosphere that is highly charged with enthusiasm. Such respect could not have emerged without the natural association of TECNET and NSA players. Without this teaming, the dismal chemistry of day to day operations in the same benign TECNET environment would have diminished the impact of the CSSE process, no matter how well conceived. Moreover, all parties brought skills not easily replicated or even available on the complementary side. Finally, joint recognition of the soundness of the CSSE process has helped forge the vital links between the various team players.

CONFIGURATION MANAGEMENT

The MLS requirement also led TECNET to launch on a very serious pursuit of good configuration management (CM) practices. In reality, good CM is the effective key to unlocking the kind of MLS flexibility required for the 1990's. While CM is typically not related to flexibility, it is the only way to effectively manage change in an environment fraught with opportunity. Having successfully grown through its initial "hobby shop" phases over the years into a fully capable system, TECNET has had to learn many important lessons. As a system, it has had to mature at each step along the way. The latest step takes TECNET into the world of Multi-Level Secure (MLS). Before taking this important and long sought step, however, the TECNET staff must do far better at managing an increasingly complex configuration. While knowing that configuration management entailed a steep learning curve, TECNET "bit the bullet" in late 1994. TECNET is now engaged in systematically instituting configuration management practices. While CM increases communications, rigor and discipline in terms of daily operations, TECNET is also actively seeking ways to eliminate unnecessary management overhead. TECNET hopes to achieve the optimum balance such that the TECNET team can better focus its attention on meeting user needs and less so on meeting managerial goals.

CONCLUSION

The TECNET capability, once MLS, will truly be on the threshold to move smartly into the world of visual representation of data. Already engaged in a windowing interface under 1994 initiated beta testing, TECNET stands poised to aim at a full multi-media approach to providing high integrity information in a secure and meaningful fashion. In order to do so, TECNET must come to grips with refining data for object based visual and text representation as appropriate based on knowledge driven search techniques reaching throughout the Internet. The capability, combined with TECNET's native ability in a MLS environment will dispense focused and meaningfully detailed T&E related data bases and tools. The ability to provide needed, accurate, protected, high integrity, value added information at the right time and place and in the right format with the right amount of detail to the right decision makers adds direct value to the T&E process. In essence, the capability enhances the efficiency of the entire T&E process by making timely T&E information and tools more available to both its practitioners and consumers. Please stay tuned, as TECNET has much more work to accomplish on behalf of its users in the coming years.