Developing a Command and Control System For the Theater Army Commanders in Europe A Study in Controlled Mayhem

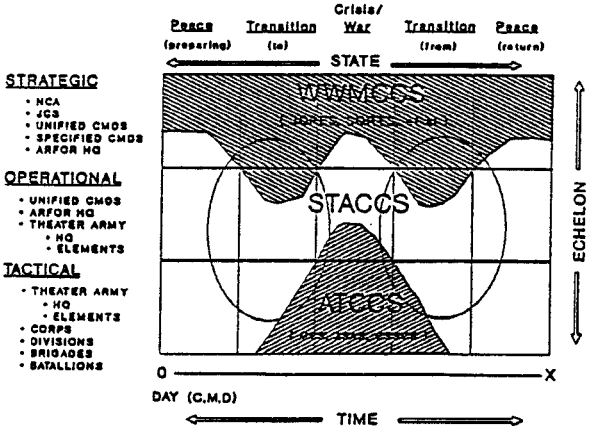
Submitted by Neil Marple
Florida Institute of Technology
TAI Associate

Summary

A new system is being developed to support the United States Army in Europe. This Standard Theater Army Command and Control System (STACCS) is chartered augment the TOP SECRET strategic World Wide Military System (WWMCCS) and utilize data from the Army Tactical Command and Control Systems (ATCCS) to provide commanders echelons above Corp with an integrated SECRET level command and control environment. Although still in its infancy, this system has been used operationally in Europe, in Saudi Arabia during Desert Storm and is today still being used to support operation Provide Comfort in Turkey. Most of the development of STACCS has yet to be done, but already it is being used on a day to day basis and is being supported as an operational system. This paper presents the challenges involved in managing this project and explores the evolutionary implementation model which has been successfully used in the development and fielding STACCS.

Background

In 1986, General Otis, Commander-in-Chief (CINC) for USAREUR directed that a study be conducted to determine the needs of theater level commanders for automated command and control support. This study [1] identified two major command and control systems available to theater WWMCCS and the Army Tactical Command and Control System (ATCCS), but concluded that they did not adequately address the operational needs of theater commanders echelons above Corp. WWMCCS provides strategic level information about the flow of forces from the continental United States into the European theater but was not responsive to USAREUR commanders during crisis situations. WWMCCS also imposes severe limitations due to its architecture and TOP SECRET classification.



The other system, the Army Tactical Command and Control System (ATCCS) provides low level tactical control of artillery, air defense, combat support, intelligence and maneuver control. Both WWMCCS and ATCCS address problem spaces to which the

defense, combat support, intelligence and maneuver control. Both WWMCCS and ATCCS address problem spaces to which the theater level commander requires access, but they do not provide integrated support for the theater- level commanders. To fill this void, the CINCUSAREUR directed that a new effort be initiated to support the European theater. This effort targeted at the needs of the USAREUR commanders was chartered to utilize strategic deployment data from WWMCCS in support of force reception and onward movement of forces as they arrive into the European theater. Complementary with this prime mission are the sustainment operations necessary to provide food, cargo, and personnel to support the forces once in theater and rear area operations involved transporting the forces in theater and supporting the support infrastructure.

A mission need statement [2] was developed further delineating the force reception and onward movement, sustainment and rear area operations needs. These needs were validated by the user community, and a functional description [3] was written. Under the Army WWMCCS Information System program, a series of high level requirement specifications [4] were developed, validated with the user communities, and approved by the department of the Army. From the onset, this project was considered complex and of high risk. Management of the complexity and risk mitigation were of prime concern in determining the management structure and techniques to be employed.

Management Challenges

As the complexity and associated risks involved with the project became apparent, the need for a flexible and responsive management approach became of significant concern. An evolutionary implementation plan [5] was developed to address project management and budgetary issues. Significant within this plan was the strategy to establish a set of requirements for each area, attempt to normalize the requirements across the various applications, prioritize the requirements, and a time phasing for capability realization. Several users were involved, each with a separate and often conflicting agenda, and each wanting their areas given top priority. Rather than treating the software as a monolithic system, each user community was treated as a separate project with needs identified and implementation schedules developed. User requirements were grouped according to the user community it supported.

Foundation products needed to support the applications were identified including data distribution, map graphics, communications, message handling and soldier machine interface (SMI).

Each user area would be treated as a module with clear and defined interfaces to the foundation products and to other user applications. For each user area, a point of contact was identified who would be responsible for representing that user area, however, during user validation of requirements and screens, many users from each area would review and provide comment. Fundamental to this approach is a close interaction between the developers and the users.

A functional applications branch was created to interact with the users, refine requirement

theater level commander requires access, but they do not provide integrated support for the theater- level commanders. To fill this void, the CINCUSAREUR directed that a new effort be initiated to support the European theater. This effort targeted at the needs of the USAREUR commanders was chartered to utilize strategic deployment data from WWMCCS in support of force reception and onward movement of forces as they arrive into the European theater. Complementary with this prime mission are the sustainment operations necessary to provide food, cargo, and personnel to support the forces once in theater and rear area operations involved transporting the forces in theater and supporting the support infrastructure.

A mission need statement [2] was developed further delineating the force reception and onward movement, sustainment and rear area operations needs. These needs were validated by the user community, and a functional description [3] was written. Under the Army WWMCCS Information System program, a series of high level requirement specifications [4] were developed, validated with the user communities, and approved by the department of the Army. From the onset, this project was considered complex and of high risk. Management of the complexity and risk mitigation were of prime concern in determining the management structure and techniques to be employed.

Management Challenges

As the complexity and associated risks involved with the project became apparent, the need for a flexible and responsive management approach became of significant concern. An evolutionary implementation plan [5] was developed to address project management and budgetary issues. Significant within this plan was the strategy to establish a set of requirements for each area, attempt to normalize the requirements across the various applications, prioritize the requirements, and a time phasing for capability realization. Several users were involved, each with a separate and often conflicting agenda, and each wanting their areas given top priority. Rather than treating the software as a monolithic system, each user community was treated as a separate project with needs identified and implementation schedules developed. User requirements were grouped according to the user community it supported.

Foundation products needed to support the applications were identified including data distribution, map graphics, communications, message handling and soldier machine interface (SMI).

Each user area would be treated as a module with clear and defined interfaces to the foundation products and to other user applications. For each user area, a point of contact was identified who would be responsible for representing that user area, however, during user validation of requirements and screens, many users from each area would review and provide comment. Fundamental to this approach is a close interaction between the developers and the users.

A functional applications branch was created to interact with the users, refine requirement definitions into requirement specifications, and to insure consistency within and between the user areas. A fielding and

training branch was created to support the user communities and to maintain the equipment that would be used during exercises.

An overall software architecture was defined and the hardware requirements identified. The hardware configuration was selected from the Common Hardware Suite (CHS) used in the ATCCS Maneuver Control System of ATCCS. The platform, Hewlett Packard 9000/350 workstations, could also function as Local Area Network (LAN) servers. Each LAN could support up to eight user terminals, either Personal computers or CHS workstations equipped with ethernet cards. Users on these LANs would be communicate through Packet Switches (PS) across an X.25 protocol Wide Area Network (WAN) to other users.

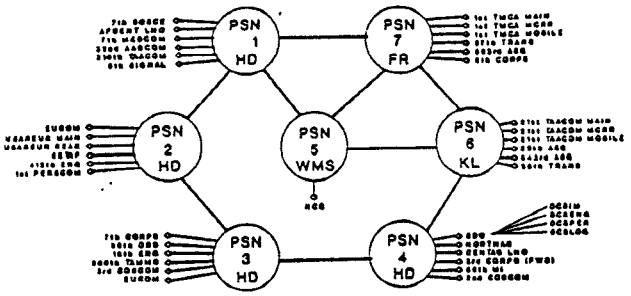
Funding would be by fiscal year. Mid-way through each year, the progress of the efforts in each user area would be assessed and new requirements reviewed. The requirements list for each area would be modified, revalidated and reprioritized. A general priority list would be built and, based upon project budgets, a new set of functionality for the next fiscal year would be defined. The European command has two major exercises a year, Reforger in the Fall and WINTEX in winter. The deliver schedules were oriented towards providing releases such that they could be used in the exercises, after action reports would be written and used for refinement and scoping. Prototypes would be developed and demonstrated to the user during exercises. The prototypes based upon the after action reports would be refined, made more robust and expanded in scope, or if too far from the mark, thrown away and rebuilt. Flexibility and the orderly incorporation of change are paramount in this approach.

Contracts were let to various vendors and development began. Based upon the priority list, attention was given to the foundation products specifically data distribution, map graphics, communications and network management briefing systems and message handling. These products were considered not only the best understood but also the most important in terms of demonstrating functionality. With various user applications and foundation products being various stages of maturity, being developed by multiple vendors and at locations from California, to Virginia, to Germany, inter-operability was important. Clear and concise standards, were established. All new development efforts would be in Ada. Upgrades to existing products would be done in the most practical language. Where practical Common off the shelf (COTS) software would be purchased rather than built even if the long term implementation plan had to be adjusted to accommodate COTS product availability.

On Schedule ...

The first fielding was for WINTEX 87. The hardware performed well but the software, less than six months in development, did not. Changes were made, priorities adjusted, and development continued. With each new exercise, the most current version of the software was taken and demonstrated. A fielding team provided the operators to support the system and recorded victories and defeats. With each new exercise, more requirements were identified, adjustments were made to the packages, and the system matured.

STACCS-E NETWORK



By the Winter of 1989, the UTACCS effort was becoming a reliable system and users were begining to operate the machines without operator support. Emphasis was placed on the foundation products while requirements analysis continued on the user applications. An automated briefing system, a situation map (SITMAP) and a Movement Control/ Readiness Reporting (MCRR) had been built. Users within the European Army were gaining experience with the system and new capabilities for the upcoming fiscal year were being analyzed. The model for force reception and onward movement was well developed with the first piece, MCRR,was gaining popularity. The project seemed well under control. Users were gaining trust in the system and were able to use the briefing system, situation map, MCRR, electronic mail, word processing, and file transfer without operator support from the fielding teams. UTACCS had been used to support the WINTEX 89 exercise in Europe. Users were able to successfully dial into UTACCS using secure encryption devices, modems, and lap top computers. Data was successfully shared between users across the European theater. Not everything was perfect, but users were gaining confidence in the system and the system was becoming reliable. Deficiencies were noted and get well plans were put in place. New requirements were identified, the development list was reprioritized, and projects for the next year were identified.

The evolutionary plan seemed to be working. In general the user community was accepting UTACCS and several successes had been noted. MCRR and the other UTACCS applications has been successfully used by theater commanders and their staffs to monitor and control the flow of forces into theater.

Then Came the War ...

UTACCS, as well as the other command and control systems were oriented to support a mission of deploying forces from the continental United States to theaters of conflict, specifically Europe. Our major scenarios were deployments to Europe to combat hostilities through the Fulda gap. Our units had trained, and our command and control systems were oriented toward flowing troops into Europe. Operation plans were in place to deal with aggression. With the main scenario being against a force invading through the Fulda gap on what was the border between East and West Germany.

When Saddam Hussein and the Iraqi army choose to attack Kuwait rather than attacking through the Fulda gap our plans and schedules went out the window. The European commander was tasked to send troops out of Europe. The Army Central command was given the task of combating Iraqi intervention into Kuwait. Troops began to move. The 22nd Support command was deployed to Dhahran in Eastern Saudi Arabia. The Army headquarters was moved to Riyadh, three hundred and fifty miles away. Support facilities were set up in the port of Dammam, and a

facility to house and feed troops was established 370 miles away call King Khalid Military City (KKMC). Communications between these points were through secure voice and fax transmissions. Communications rapidly became a problem. Utilization jumped to over 90% and reports were being faxed over the digital networks then typed into other systems. Mistakes were made in the reentry of spreadsheet information and situation reports and significant delays were also noted in the largely manual transfer of reports.

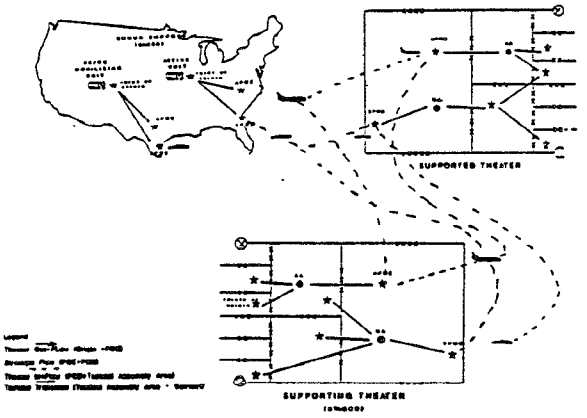
The CINCUSAREUR offered to have the then named USAREUR Tactical Army Command and Control System (UTACCS) sent to support ARCENT. The ARCENT commander accepted and a fielding team was assigned. In November 1990, Capt Rich johns was sent to perform a site survey and determine the applicability of using UTACCS. Three additional members of the UTACCS fielding team brought equipment and expertise to Dhahran and by the end of January 1991, had installed two UTACCS workstations and utilizing a borrowed circuit connected the 22nd support command in Dhahran to the support command detachment in KKMC. Training sessions were conducted and users were training in using electronic mail and file transfer. Users could now transfer spreadsheet and word processing files rapidly. Due to the rapid turnover in the user community and inability to train the large number of users, the fielding teams operated the work stations an all functionality other than electronic mail and file transfers were disabled. This reduced functionality version of UTACCS called AC2IS was used. During February 1991, this team installed workstations in Riyadh and Damman, and additional workstations in Dhahran and KKMC.

By the Beginning of March 1991, connectivity had been established between these four nodes in Saudi Arabia, UTACCS support facilities in Germany, and rear army headquarters in the United States. AC2IS utilization had significantly increased but circuit utilization had dropped to 60%. The UTACCS support team turnover operation to a 22nd support command team and returned to Europe.

Almost immediately, UTACCS was called upon to support the relief effort for Kurdish refugees in Turkey, operation Provide Comfort. Equipment and personnel were deployed to Turkey and communications were quickly established between support activities in Incirlik and Silopi in Turkey and locations in Germany. UTACCS is still operating in Turkey and providing critical secure communications.

Mission Changes

From the experience gained in Desert Storm and Provide Comfort, the mission of UTACCS has changed.



The system can no longer function to support only the reception of forces. Although traditionally Europe has been a supported theater concentrating on receiving forces, its theater level command system must now accommodate the

command in a supporting role of preparing units and transporting them to air and sea ports in support of missions in other theaters. A additional scenario has also become evident, that of being both supporting and supported. Theaters have certain roles and missions. As we learned in Desert Storm, while deploying forces to Saudi Arabia, forces also arrived into the theater to replace departing units and provide additional support. In addition, with the diminished threat from the East, the number of military units and personnel in Europe are being reduced. UTACCS has been tasked to provide support moving units out of Europe and back to the United States. For several reasons, UTACCS is in the process of becoming a standard Army system and has been renamed to the Standard Theater Army Command and Control System. STACCS is now being considered for possible implementation in other theaters.

Over the past eighteen months, the system has gone from a small and sometimes fragile prototype system supporting the European theater commanders to being a robust system supporting command and control activities across three continents. Requirements have been adjusted. The receiving and sending forces mission has been analyzed and has resulted in a concept called End-to-End Force Tracking (EEFT) which has replaced force reception as a primary mission of STACCS. STACCS has also leapt from preliminary implementation to maintenance. The STACCS support office is now supporting operational STACCS sites in Turkey and in Germany while development continues on the East and West coasts of the United States and in Germany. The products of STACCS are in various stages of maturity but now must pass rigid integration criteria before becoming available to the user.

Conclusions

Substantial capabilities are continuing to added to STACCS, at the same time three versions are being used operationally, two of which are being maintained out of the European support center, the other out of California. Configuration Management has become a very non-trivial issue. Through all of this, the management approach has weathered the storm. The evolutionary implementation approach has worked and continued to work. Mistakes have been made and hopefully lessons learned. The evolutionary implementation model has proven itself to be flexible yet strong enough to support the development of a system that has proven itself successful in accomplishing its mission as a command and control system.

References

Project related documents:

[1] Battlefield Automation architecture, basic structure, and needed actions, February 1986.

[2] UTACCS Mission Need Statement, (updated draft) March 1990.

[3] UTACCS Functional Description, (updated draft) April 1988.

[4] UTACCS System Specification, Phase A, (updated draft) June 1989.

[5] UTACCS Evolutionary Implementation Plan, (updated draft) November 1987

Disclaimer

The views expressed herein are solely those of the author and do not claim to reflect the position of the European command, Department of the Army, nor the Department of the Army.