

The Relationship of Enterprise Architecture to Warfighting Capability

By Robert L. Hobart

The Architecture

Within the Office of the Deputy Commander for C4I Integration at the Marine Corps Systems Command (MARCORSYSCOM), efforts are focused on enhancing warfighter capability through the development and employment of an Enterprise IT Architecture (EITA). *The EITA is an information asset, which helps to define the warfighter's mission, and to identify the information necessary to perform the mission, the technologies available to perform the mission, and the transitional processes for implementing new technologies in response to changing mission needs.* The EITA includes "as-is" baseline architecture and a "to-be" target architecture linked through a transition strategy as shown in Figure 1.

There is a compelling need for the EITA. It was discovered that connectivity gaps occurred within our C4I programs, which required an engineering approach to correct our architecture. We began with a database called MAGTF C4I Systems/Technical Architecture Repository (MSTAR), which is a Web accessible repository used for the documentation of C4I connectivity linkages. While this site was somewhat effective, the information gathering process from the programs was lacking. The DoD 5000.2R directed the documenting of all C4I interconnectivity which allowed us to demand system and technical views from each program defined as an Automated Information System. Our Systems Engineering and Integration Division (SE&I) was tasked to produce a repeatable process, which enabled individual programs to supply the required systems and technical views for each stage of the acquisition process. This repeatable process involved the creation of C4I Support Plans (C4ISP). The C4I Support Plans were created to provide the Program Office an easy way to document their linkages by using a template with drop-down menus and easy-to-fill-in boxes. The data contained within the C4ISP are then parsed into MSTAR and used when creating the Marine Corps Integrated Architecture Picture

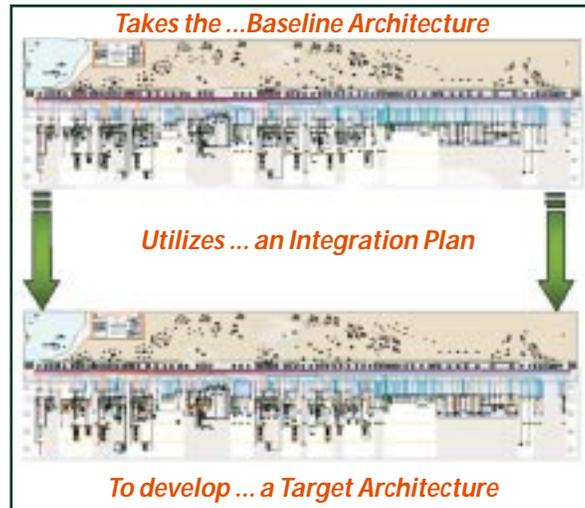


Figure 1.

(MCIAP). The MCIAP is then used as a management tool during all Milestone Reviews and POM (Program Objective Memorandum) initiatives. The development of an Enterprise Architecture provides a disciplined approach for assessing and recommending candidate information technology solutions in an integrated context with business and mission operations. In keeping with this approach, MARCORSYSCOM developed the MCIAP, which shows a notional Marine Expeditionary Force (MEF), deployed in a notional battle space. The MCIAP shows a MEF decomposed into communications links and nodes of operation

The nodes correspond to functional areas: fires, logistics, force protection, maneuver, command and control, and intelligence. The MCIAP is a hybrid "picture" containing components and features found in several formal Architecture Framework "views." The MCIAP depicts a wealth of information. It is a graphic encyclopedia with a high density of information per unit area. The MCIAP shows terminal equipment and automated information systems within the nodes and their communications connectivity and relationship to each other.

The MCIAP contains elements of both the Operational View (OV) and Systems View (SV) products (shown in Figure 2). Since its initial development and release two years ago, the MCIAP has been continually improved. In addition to a notional MEF slice tactical lay-down, it now also depicts a Naval amphibious force and the shore-based Supporting Establishment. MARCORSYSCOM and other Service System Commands have found the MCIAP

extremely useful for quickly answering questions about which systems and capabilities are found at various units.

MARCORSYSCOM engineers then use a systems engineering approach to develop potential solutions for gaps, overlaps and bottlenecks within our architecture.

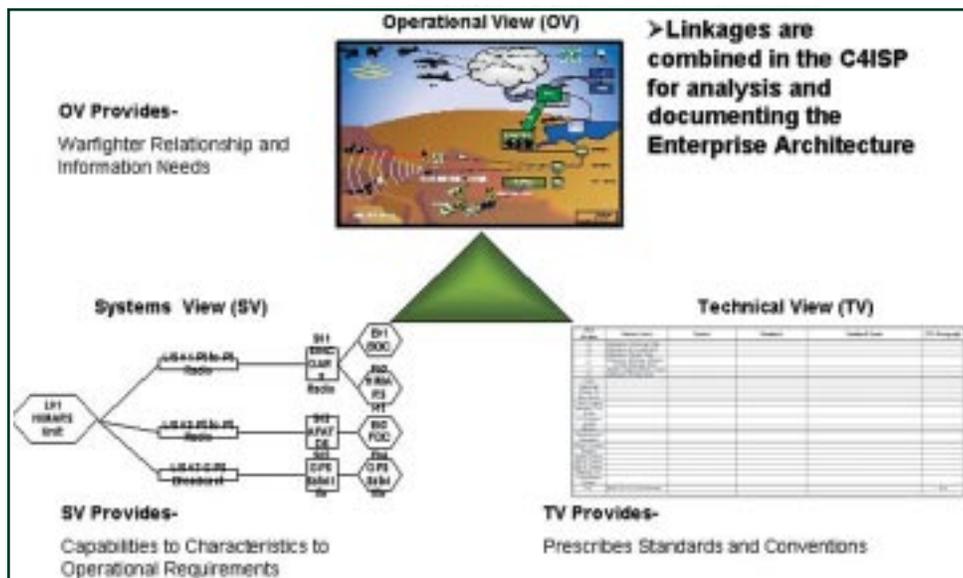


Figure 2.

POM Capability Planning and Investment Control

By using architecture products and a visual tool like the MCIAP we now have a much better understanding of where we are now, where we are planning to go, and what is required for the transition. The Marine Corps is now able to make better informed decisions regarding the application of resources, fulfilling one of the principal purposes for Enterprise Architecture development, that is, to aid in capital planning and investment control. Additionally, architecture development efforts have helped identify and refine system integration and interoperability requirements both internally and jointly. It has allowed our project officers to see the bigger picture of how their programs directly influence the rest of the architecture.

Network-Centric Warfare

Our effort to create a network-centric warfare capability is riddled with obstacles. Some of our more significant challenges are acquisition, and research and development, which are historically based on a stovepiped system. Additionally, IT initiatives are often justified on their own merits including the autonomous program budgets. Our challenge is to provide the basis for which we create operational capabilities. To do this we must translate the linkages, which turn legacy systems and to-be fielded systems into operational capabilities.

C4I Support Plans

We start with systems, which are not yet fielded and legacy programs by requiring them to develop C4ISPs. The C4ISPs document the Information Exchange Requirements (IERs) for the individual system and is one of the milestone support documents. The C4ISP meshes operational views with the systems and technical views to create the database from which our MCIAP is developed. We have found the C4ISP to be an exceptionally powerful document, and one which inherently provides the necessary depth to identify when programs are in jeopardy of producing a system which, when fielded, may not be interoperable to the levels deemed necessary in current plans and policy.

Organizational Responsibilities

The Marine Corps is unique in that three different Marine Corps organizations have a direct impact on the Marine Corps Architecture. The three organizations work together very closely, and have documented their roles and responsibilities in a Memorandum of Agreement (MOA), which is nearly a year old. HQMC C4 is responsible for defining IT standards to be used throughout the Marine Corps and participates in the development of the roadmap to enhance EITA and address architectures in Automated Information System (AIS) IT requirements. The second stakeholder in our architecture development efforts is the Marine Corps Combat Development Command (MCCDC), which develops and maintains the operational architectures and concepts. MARCORSYSCOM develops and maintains the systems and technical architecture of the Enterprise and is responsible for leading efforts to resolve conflicts between operational, systems and technical views. This triad's most difficult challenge is to continue to work closely to refine the combination of views. MARCORSYSCOM, under its responsibility for conflict resolution regarding architecture views, has developed initiatives to address the issue of conflict resolution.

MCTSSA and the SIE

We continue our integration efforts in the sustainment of our Systems Integration Environment (SIE), located within the Marine Corps Tactical Systems Support Activity (MCTSSA), Camp Pendleton, Calif. The SIE provides the Marine Corps with the capability to test and assess new and existing C4I systems in a controlled, repeatable and re-configurable environment. Additionally, MCTSSA plays an ever-increasing role in the development of the following products:

- Enterprise Integrated Product Configuration Management Plan is a strategy for identifying, planning and verifying configurations, interfaces and interoperability of the Family of Systems defined as the full suite of C4ISR Systems fielded to the Operating Forces and Supporting Establishments.
- Enterprise Integrated Product assessments use the SIE to assess and validate interfaces contained in Systems Views Sixes (SV-6) for MEU to MEF level units. SV-6 is a "System Data Exchange Matrix" included in the C4ISP, encompassing Nature of Transactions (i.e., content, size, format, other protocols, and LISI Levels or Levels of Information Systems Interoperability), Data Sources, and Data Destinations supporting Operational Views derived from operational requirements documents.
- MCTSSA hosts the only Marine Corps node on the Joint Distributed Engineering Plant (JDEP) Network. JDEP is designed as a toolbox to evaluate individual and Family of System interoperability for the developer, tester and warfighter. JDEP uses systems Hardware in the Loop (HWIL), simulators, stimulators, data exchange specifications, and data collection and analysis tools to create a controlled environment on pieces of the Enterprise Architecture both internally and jointly.

Conclusion

To date, MARCORSYSCOM and the Marine Corps have made significant gains by employing Enterprise Architecture based products. We have defined our architecture, developed plans, and instituted policies to identify, and improve the architecture. Developing and refining our architecture has had a direct impact on our POM process, leading, we believe, to easier, and better understood resource allocation and timely decisions. These, in turn, will translate into greater, timely, integrated and interoperable capabilities being delivered to the warfighters.



Mr. Hobart is the Deputy Commander C4I Integration for the Marine Corps Systems Command. He earned his bachelor's degree of Electrical Engineering from the Georgia Institute of Technology. Mr. Hobart earned a master's degree in Engineering from Virginia Polytechnic Institute and State University. He is a graduate of the Federal Executive Institute (FEI) for the "Leadership in a Democratic Society" course, the Defense Systems Management College for the Program Manager's Course and the DoD Senior Executive Leadership Course. Mr. Hobart is a certified level III member of the Navy's Acquisition Professional Community. He is a recipient of the Navy's Superior Civilian Service Award. Mr. Hobart is also a member the Institute of Electrical and Electronics Engineers (IEEE) and the International Council of System Engineering (INCOSE). □