Summer 2003

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"IPv6 will facilitate integration of the Global Information Grid — sensors, weapons, platforms, information and people and ensure that our warfighters are secure and connected in a fast-moving battlespace."

John P. Stenbit Networks and Information Integration/
DoD Chief Information Officer (ASD (NII)/DoD CIO)

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"...transformation is not about technology, but about changing culture, processes and our capabilities. It is not just building new, but finding new ways to work with what we have."

Maj. Gen. Daniel M. Dick
Director for Requirements and Integration (J8)
U.S. Joint Forces Command

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"In 2010, if we should conduct a theater conflict, we are looking at 1.5 trillion words per minute transmitted to, from and across the theater. That is the equivalent of the content of the Library of Congress being transmitted every minute."

Brigadier General Marc E. Rogers, USAF
Director, Standing Joint Force Headquarters
U.S. Joint Forces Command

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"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."

Robert L. Hobart
Deputy Commander C4I Integration
Marine Corps Systems Command

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"The significance of the PEO-C4I & Space stand-up is that now there is an organization that exists for the sole purpose of acquiring C4I and space systems and equipment."

Dennis M. Bauman
PEO-C4I & Space

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"RAPIDS is about software development guidance for our development community to make sure that when we write software code it is portable, scalable, extensible and better supports the warfighters."

Andrew Cox
Technical Director PEO-C4I & Space

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Above: The DON IT Umbrella Program San Diego team. Standing left to right: Margie Smith, Ann Layne, Steve Thompson, Cliff Smart, Sandy Sirbu and Peggy Harpe. Kneeling left to right: Ted Wolken, Linda Greenwade, Carlos Solorzano, Joe Zaizar and Barbara Johnson.

Above: The DON IT Umbrella Program Norfolk team. Back row left to right: Billy Bunton, Rick Paquin, John McLaurin and Calvin Finley. Middle row left to right: Liz Vonasek, Mary Kay Demorest, Julia Jones, Sandy Mieczkowski and Soya Rowland. Front row left to right: Doris Bohenek, Gail Holzsweig, Sharon Anderson, Sherleyann Parks and Tony Virata.

Left: Norfolk team from left to right: Shirley Dunbar, Nancy Reasor and Jakki Rightmeyer.

Left: Cmdr. Jim Clausen, USNR, on active duty at the Business Managers Conference 2001, Fort Belvoir, Va. Mr. Clausen is the OASD (NII)/DoD CIO ESI Working Group Co-Chair.

Editor's Notebook

Welcome home! They are back and we could not be happier for those U.S. Forces returning from Operation Iraqi Freedom. Privileged to work on Naval Station Norfolk, we are especially filled with a sense of excitement, pride and respect as we witness daily the dignity, professionalism and bravery of U.S. Forces — and of their families and friends who have faithfully supported them during their deployment. I have felt as if members of my own family have come home — and they have — my military family. For those military members who are home, still deployed — and those supporting the warfighter — thank you for all you have accomplished. You make us very, very proud.

The covers for this issue are dedicated to the Department of the Navy Information Technology Umbrella Program, a CHIPS sponsor, celebrating 15 years of bringing DON and DoD customers outstanding service and significant savings for IT purchases. In keeping with the celebration, I would like to introduce you to the business warriors of the Umbrella Program, the DoD Enterprise Software Initiative and the Army Small Computer Program (ASCP). These price fighters work very hard to bring you the best prices for IT products and services from leading manufacturers and resellers. And most importantly — these savings can be used for the DoD and DON warfighting mission.

My special thanks to the very kind professionals of the ASCP for the warm welcome CHIPS received at the Army Information Technology Conference — extra special thanks to Tom Leahy and Steve Miller.

Please go to page 48 for a list of Umbrella contracts or visit online at www.it-umbrella.navy.mil.

Happy Birthday DON IT Umbrella Program!

Sharon Anderson

Right and below: The Army Small Computer Program team.

Department of the Navy Chief Information Officer
Dave Wennergren

The Power of Storytelling

As Information Management/Information Technology (IM/IT) professionals, we each have the responsibility to be champions of change, and set the example for our peers. Embracing change is essential to the Navy-Marine Corps transformation to a network-centric force, and central to the theme of achieving Knowledge Dominance. The Navy-Marine Corps team has long been recognized as a Federal leader in Knowledge Management (KM). Throughout the Department there are numerous examples of the power of collaborative tools, information sharing and communities of practice. Commands are recognizing the power of creating an organizational culture that understands its knowledge requirements, effectively leverages its intellectual capital, and values and rewards the flow of knowledge and learning. It's a natural fit for us. While the discipline of KM has evolved to provide processes, tools and practices that can help organizations emulate and formalize knowledge capture and creative problem solving; these virtues have long been evident in the behavior of every successful Sailor, Marine, or civilian member of our team. The Sailor on deployment who finds a way to improvise when a pump breaks and there is no replacement part on the ship; the long tradition of "sea stories" where creative solutions to atypical management or operational problems get shared with interested parties; the long heralded power of Navy Chiefs and Marine Gunnery Sergeants to reach out to an extensive network of professionals to achieve the impossible; are all examples of the kind of creative, self-adaptive learning and collaboration that KM tools and practices can facilitate in organizations.

At Submarine Group TEN in Kings Bay, Ga., teams are applying KM principles in an innovative Warrior Knowledge pilot designed to reengineer the "off-crew," pre-deployment training process for Sailors. The team is looking for new technologies and resources to improve the efficiency and the richness of the training experience. New opportunities are being discovered to share information across communities of practice and embrace innovations like video capture to record just-in-time maintenance training. In addition, the Trident Refit Facility, not previously involved in crew training, may offer use of its facilities to provide Sailors real hands-on maintenance and repair events to greatly enhance training and maintain proficiency levels. The Commander Naval Reserve Force (CNRF) has recently embarked on an effort to transform the Naval Reserve into a high performance, "Knowledge-Centric Reserve Force," where knowledge is readily shared and available to all who need it to support the mission of the organization. This goal was established as part of the CNRF Leading Change initiative to maximize the intellectual capital of the Reserve Force, and it is already yielding positive results. It will include improved technology, strategic planning, and business process reengineering.

A common thread that runs through these and other ongoing KM efforts is the importance of storytelling. Each of us, as IM/IT professionals, must step up and take a leadership role in helping to "tell the story" of our transformational efforts. Whether it is to increase operational effectiveness, improve quality of life, reduce overhead costs, reduce cycle times, or create innovative and learning environments, our ongoing efforts, like knowledge management, eGovernment and the Navy Marine Corps Intranet, are important stories that must be told and understood. In his book, *Leading Minds*, Howard Gardner describes a leader as someone who significantly affects the thoughts, feelings, and/or behaviors of a significant number of individuals. He goes on to point out that one of the key tenets of a good leader is to be a good storyteller — one who can fashion stories of identity, and then embody that story in his or her life. The leader, as a storyteller, must also successfully wrestle with the stories that are already operative in the minds of the audience, or the counter-stories that will resonate in the minds of unconvinced listeners.

As we move forward on this transformational journey, new ideas and technologies will emerge and we will be the beneficiaries of tremendous opportunities to reshape the Department of the Navy. These opportunities will be realized if we can leverage the power of storytelling to do two things: (1) Create an organizational culture that embraces the flow of knowledge and, (2) Communicate the value proposition of our change initiatives, rather than focusing on the "pain of change." Let's face it, transitions are hard. In *Managing Transitions*, William Bridges points out the inherent conundrum of a transition. In essence, before you can begin something new, you have to end what currently exists. So beginnings depend on endings, and the problem is, people often don't like endings. We are working on a lot of "new beginnings" across the Navy and Marine Corps, and I encourage each of you to help be a champion for this journey of transformation.

"Putting Information to Work for Our People."

Moving Power to the Edge

By John P. Stenbit, Assistant Secretary of Defense
Networks and Information Integration/DoD Chief Information Officer (ASD (NII)/DoD CIO)

Introduction

Secretary Rumsfeld came to the Department of Defense two and a half years ago with a vision for transforming DoD to meet the changing, asymmetrical threats of a new and different world. True transformation can only be achieved by transforming the way we communicate, by making the network work for us, and by taking full advantage of Information Age technologies to ensure that our warfighters have immediate and direct access to the information they need. We are making great strides toward that goal.

When I arrived at the Pentagon in August 2001, I talked about the need to move toward net-centric warfare and operations — to create a network that had plenty of bandwidth and that people could trust, to populate that network with new dynamic sources of information, to protect it, and to ensure our adversaries do not have similar advantages. This effort is a driving force in enabling DoD's transformation. Our successes in Afghanistan and Iraq point to the progress we have already made within a relatively short time, and give us reason to be very optimistic about where we are headed.

By exploiting technological advances that continue to shrink the costs of bandwidth, information processing, and information storage, we are moving from the "smart push, smart push" regime of the past to a new "smart pull" paradigm where our warfighters — wherever they may be in the world — will be able, to "pull" from DoD, other U.S. agencies, and allied powers the information they (the warfighters) determine they need to complete their mission. This will move power from the center (headquarters) to the edge (fighters), and it is a transformation we must accomplish if our forces are to be able to operate with the speed and flexibility necessary to overcome the threat posed by small, hidden, dispersed, and fast-moving terrorist groups.

Technology determines how we can communicate and operate. This is illustrated by the differences between the telephone service of the 1970s (i.e., before voice messaging and wireless telephones), direct broadcast television, and the Internet. In the 1970s, when I was doing my first stint at the Pentagon (1973-77), we were in an era when communications bandwidth, information processing and information storage were all expensive. Consequently, we relied upon a telephone system as our fundamental information system because at the time it was the best system for optimizing use of those expensive resources.

Consider the limitations DoD operated under when it had to rely on the telephone system as its fundamental information system. Someone in DoD with valuable information first had to be smart enough to recognize that the information was valuable, and second, had to be smart enough to know to whom the information should be communicated. (How else would he or she know what telephone number or numbers to dial?) In other words, in the 1970s, DoD had to rely upon a smart push, smart push information system that relied, in turn, on the judgment and knowledge of the few to push information to the many, rather than on the exponentially better judgment and knowledge that can be achieved when the brains and experience of the many are harnessed together. That telephone-based information system imposed additional limitations on the Department. Specifically, even if someone with information was smart enough to recognize its value and know to whom it should be communicated, there was nothing he could do if the latter wasn't at his phone when he called. That is, the person called had to be at the right place at the right time —what I have termed being "synchronous in time and place."

The limitations imposed by this system sometimes had serious adverse consequences. For example, there were two separate incidents before my first stint at DoD involving impending danger to two of our ships — the Liberty and the Pueblo. Because of the limits of the communication systems then in use, we were unable to share information that might have saved those ships.

Fortunately, technology has brought us a long way in a very short time. Our communications and information system today is a smart push system that takes advantage of the same broadcasting technology that has created commercial direct broadcast television. That is, someone at DoD just needs to be smart enough to recognize the value of the information they have and the need to push it to others. Having made that determination, they need only put the information on a transmitter and broadcast it to everyone with access to the transmitter. They don't have to determine who needs the information. Moreover, since the information is broadcast — rather than sent down a particular wire circuit to a particular receiver as was the case with our 1970s telephone system — it is available to anyone with a broadcast receiver. Recipients no longer need to be synchronous in place.

The price of processing and storage has gone down so much that we now can afford to have many people listen to all of the broadcast channels, store what they receive, and then put the information together to meet their own specifications. That's why Operation Iraqi Freedom worked as well as it did. That's also why in our post-September 11 action in Afghanistan, for example, a guy on a horse with a wooden saddle could broadcast, "*I need a bomb over there*," and another guy in a B-2 who had flown all night from Missouri could drop a Joint Direct Attack Munition (JDAM) right on "there."

Certainly, the smart push broadcast system represents a big improvement over the old smart push telephone system. However, it still relies upon the few to decide for the many what information is valuable and needs to be pushed to the many. It is in conflict with two basic truths: (1) Information consumers are the best judge of the information they need and; (2) Many brains working together are exponentially smarter than a single brain working in isolation.

That is why we are moving aggressively to put in place the satel-

lite laser and fiber optic bandwidth as well as the information processing and storage capacity that will enable us to complete the quantum leap to a network-centric smart pull information system linking all DoD's personnel, systems, and assets (including, as appropriate, other U.S. agencies as well as agencies and forces of other nations) so they may communicate, think, and act together.

The Internet is the closest we have to a commonly recognized model for the network-centric system we are building. Those with information need not be smart enough to ascertain the information's value or to whom it might be valuable. They can just post the information on the network and leave it to everyone else who is browsing the net (information consumers) to pull that information from the net, use it, assess its value, and offer (post) additional information. Information can be quickly exchanged by a nearly limitless number of participants dispersed all across the globe but connected to the network, i.e., many brains can be "networked" together to greatly accelerate learning and problem-solving just as we link computers together to crunch enormous amounts of data. The network of lasers, fiber optic lines, and information processing and information storing computers will be at the center of this network-centric model.

DoD's National Imaging and Mapping Agency (NIMA) illustrates the huge potential value to DoD of building a robust network-centric information, communication and warfighting system. NIMA has a Web site where the user can specify a particular geographic site or area and download (pull) all the latest satellite photos. That's the good news. The bad news is that the downloading is slow because there is insufficient bandwidth. And, of course, that underscores how critical it is that we rapidly put in place the bandwidth that is essential if we are, in fact, to achieve a robust, network-centric system that will link all our brains and other resources together to multiply our capabilities and make those capabilities available to be pulled (used) by those "at the edge" — most particularly America's fighting men and women — wherever they may be in the world.

Marketplaces of Information

Net-Centric Warfare allows users the ability to create and share a high level of awareness and to leverage this shared awareness. But achieving shared awareness alone will not guarantee success. We need to think about information differently as we move from a set of monopoly suppliers of information to an information marketplace. In essence, we want to create an environment where these five critical architectural tenets prevail:

♦ *"Only handle information once."* Collecting information and entering data multiple times is costly and adversely affects efficiency in both combat and business operations. The concept of only handling information once requires that processes be reengineered, and that technology and processes are integrated to minimize the time and effort dedicated to data collection and entry.

♦ *"Post before processing"* means that access to data for disparate needs is not delayed by unnecessary processing. Everyone is a provider and consumer of information. A provider has the responsibility to post data before using or manipulating it; consumers will have the technical capability to securely access the data they are cleared to access when they want it and in the format they need.

♦ *"Users will pull data"* as needed instead of having massive amounts of information pushed to them regularly — regardless of whether it is needed. TPPU (Task, Post in parallel, Process in parallel, Use in parallel) means that information moves us away from the stovepiped information that characterizes the old TPED (Task, Process, Exploit and Disseminate). A key tenet of net-centric warfare is that the consumers of information are smarter than their sources about what is needed operationally right now and that they should be able to pull those data when they need it. Smart pull promotes speed instead of drawn out analysis. Further, the network will provide the access to information at multiple security levels (MSL), avoiding the technical challenges and high cost of Multi-Level Security (MLS) systems, which required users to have a trusted operating system to process information at multiple levels simultaneously.

♦ *"Collaboration technologies"* will be employed to assist users in making sense of the data that is pulled. For example, subject matter experts from diverse units or organizations are frequently called upon to come together to make sense out of special situations. The ability to pull expertise from within a unit as well as from across the Department is a value-added feature of a net-centric environment.

♦ *"A reliable network is key."* Diverse information pathways must be in place to ensure reliability. Security must be designed into networks and systems. Information assurance and interoperability — critical elements of "net-readiness," — must be the rule rather than the exception.

Interoperability

The approach to interoperability needs to change. The pace of advancing technology requires us to move from an approach that is based upon application standards to one based on data standards. The key is to give data users an opportunity to use the applications that make sense to them while maintaining the ability to exchange data. We also need to give more support to peer-to-peer relationships and information exchanges that transcend individual systems and organizations. Net-Centric Warfare involves a historic shift from platforms to the network. In effect, the single greatest contributor to combat power is the network itself. However, moving power to the edge will multiply the power that can be generated from a given set of assets and available information.

DoD's Net-Centric Transformation

The Department has undertaken key initiatives that provide a solid foundation for DoD's net-centric transformation. Just recently, I signed a policy memorandum that will institute the next generation Internet protocol, IPv6, throughout the Department by 2008, and bring DoD closer to the goal of net-centric warfare and operations. IPv6 will facilitate integration of the Global Information Grid — sensors, weapons, platforms, information and people and ensure that our warfighters are secure and connected in a fast-moving battlespace.

Communications or the Transformational Communications Architecture, consists of the Global Information Grid Bandwidth Expansion (GIG-BE), the Joint Tactical Radio System (JTRS) and the Advanced Wideband System and Transformational Communica-

tion Satellite Efforts. This defines the transport element of the GIG and will be composed of three fully integrated segments. The terrestrial segment will be based on fiber optics and includes the GIG-BE. The wireless or radio segment will be based on the software programmable JTRS and its wideband network waveform. The space-based segment will be based on the Transformational Communications Satellite capability using lasers in space.

GIG-BE. Current telecommunications lines are not robust enough to handle the volume of information needed for optimum strategic decision-making. The GIG-BE is designed to be robust enough to address current bandwidth constraints. It will use advanced fiber optic backbone and switching technology to upgrade telecommunications lines at DoD critical installations, and provide networked services with unprecedented bandwidth to operating forces and operational support activities. The GIG-BE will provide approximately 1,000 times the current capacity to critical DoD sites worldwide. New security technologies are being developed to keep pace with expanding capacities and enhance performance.

Installation Bandwidth Modernization. Service-specific efforts to upgrade base or installation level communications capabilities will guarantee successful connectivity and ensure maximum benefits are obtained from the GIG-BE initiative. DoD components are developing installation bandwidth expansion strategies that will provide a bridge from the installation or base level telecommunications infrastructure to the expanded GIG.

Joint Tactical Radio System (JTRS). The radio-based or wireless segment will migrate to the software radio-based JTRS technology. Software radios are essentially computers that can be programmed to imitate any other type of radio and thus, can be readily configured to operate in different networks based on different standards. JTRS will also serve as a gateway between users with different hardware radios — a capability that speeds the transition to universal interoperability.

Transformational Communications Satellite (TSAT). The space-based segment of the transformational communications architecture is critical because many users are deployed in areas where optical fiber is unavailable, and many of our information sources — particularly intelligence, surveillance and reconnaissance capabilities — are airborne, making them especially difficult to link into a wideband network. TSAT, in essence, will extend the network's full capabilities to mobile and tactical users and will incorporate Internet protocol and laser communications capabilities into the Department's satellite communications constellation.

Net-Centric Enterprise Services (NCES). NCES provides a common set of information capabilities for the Global Information Grid to access, collect, process, store, disseminate and manage information on demand to warfighters, policy makers, and support personnel. These capabilities will enable shorter decision cycles by providing near real-time connectivity and computing power for warfighters and other users to get the right information at the right time and in the right format to meet operational, tactical, and mission support needs.

Horizontal Fusion. Networks are essential to a net-centric environment, but they have limited value without quality data that are reliable, accessible, and usable in an integrated manner. The Horizontal Fusion Initiative will provide the tools and means to integrate the smart pull of data with expert interpretations of the information. It will also provide tools to allow users to identify what data is available, access it, smartly pull and fuse it, and make sense of the data gathered. These tools require investing in data content and management, and the acquisition of commercial applications. While the initial focus is on intelligence RDT&E (research, development, test and evaluation), lessons-learned from the intelligence community will be exported and employed by the DoD business communities of finance, logistics and personnel.

Data/Information Management. Computers and communications networks process, transport and deliver data. Horizontal fusion tools provide the means to search for, pull and fuse data from a myriad of sources, and allow users to make sense of data. Clearly, the crux of it all is "the data" — its visibility, accessibility, trustworthiness and understandability. Accordingly, the DoD Data Management Strategy has evolved with several features. For example, it emphasizes the use of catalogs, registries and other "search" services so that users can discover the existence of data with or without prior knowledge of its existence. It addresses means by which data is posted, tagged, advertised, retrieved and governed, as well as methods that facilitate trust in the data.

Joint Strike Fighter (JSF). Although the F-35's super cruiser capability, reduced radar signature, and vertical take off and landing capability are impressive, it is the aircraft's advanced avionics, sensor/radar and communications systems that truly stand out. They are designed to facilitate interoperability — enabling the JSF to exchange information with over 100 U.S. and allied platforms or systems including AWACS, JSTARS, sensors, aircraft, UAV ground stations, etc., — and also to be usable with new technology as it becomes available. Consequently, these avionics, sensor/radar and communications systems make the JSF particularly well suited for net-centric warfare where unhindered communication is an essential element, while helping to ensure that JSF will not be rendered obsolete anytime soon by the rapid evolution of technology. JSF, in essence, will plug into the net to satisfy its needs for information while also providing information to other platforms on the net.

Business Modernization. The business community supports the warfighter and must be incorporated in business functions. The Under Secretary of Defense (Comptroller)/Chief Financial Officer is leading an effort to transform business processes. The CIO community's involvement includes assessment of architecture products for compliance with the Global Information Grid architecture; promoting business process improvements and ensuring that net-centric architectural tenets are reflected in these improvements; system acquisition oversight; and providing for the IT infrastructure and ensuring that its capabilities are in sync with the business functions' requirements for these capabilities.

Information Assurance. The vision, *"People throughout the trusted, dependable and ubiquitous network are empowered by their ability to access information and recognized for the inputs they provide,"* holds profound implications for the Department's information assurance program. Because trust and confidence in our information is a primary concern when developing and deploying the information network and providing needed services, none of our critical systems, networks, platforms, and sensors can be deployed without the necessary security and interoperability capabilities

to make them net-ready. As such, our information assurance program has developed a strategy that supports this concept and has focused on providing the Department with robust protections, agile network defenses, integrated situational awareness, transformational assurance capabilities, and a professional, highly aware and trained workforce. Each of these elements works together to provide the necessary dynamic and agile information assurance capabilities for a net-centric force. I view these capabilities as integral to our efforts to transform the communications capabilities of the Department and see information assurance as critical to successful business and warfighter operations.

We are working hard to put all these pieces in place, and to institute a seamless, common network linking the Department and the Services. This new, integrated network will discourage anti-collaborative behaviors and allow us to exploit Information Age technology to our fullest advantage and turn the network into the single greatest contributor to combat power.

Mr. Stenbit became Assistant Secretary of Defense for Command, Control, Communications, and Intelligence (C3I) on August 7, 2001, and now serves as Assistant Secretary of Defense of the C3I successor organization, Networks and Information Integration/Department of Defense Chief Information Officer. His career spans over 30 years of public and private sector service in the telecommunications and the command and control fields. His public service includes four years at the Department of Defense from 1973 to 1977, serving for two years as principal deputy director of telecommunications and command and control systems, and two years as staff specialist for Worldwide Command and Control Systems in the Office of the Secretary of Defense.

Mr. Stenbit previously was an executive vice president of TRW, retiring in May 2001. He joined TRW in 1968, and was responsible for the planning and analysis of advanced satellite surveillance systems. Prior to joining TRW, he held a position with the Aerospace Corporation involving command and control systems for missiles and satellites, and satellite data compression and pattern recognition. During this time, he was a Fulbright Fellow and Aerospace Corporation Fellow at the Technische Hogeschool, Einhoven, Netherlands, concentrating on coding theory and data compression.

He has chaired the Science and Technology Advisory Panel to the Director of Central Intelligence, and served as member of the Science Advisory Group to the directors of Naval Intelligence and the Defense Communications Agency. He also chaired the Research, Engineering and Development Advisory Committee for the Administrator of the Federal Aviation Administration. He has served on the Defense Science Advisory Board, the Navy Studies Board, and the National Research Council Manufacturing Board.

In 1999, Mr. Stenbit was inducted into the National Academy of Engineering.

Mr. Stenbit holds bachelor's and master's degrees in electrical engineering from the California Institute of Technology. He is a member of Tau Beta Pi, the engineering honor society.

"The Umbrella Program has been and continues to be a cornerstone of the ESI project ..."

Talking with Jim Clausen OASD (NII)/DoD CIO ESI Working Group Co-Chair

The Enterprise Software Initiative (ESI) is a joint project designed to implement a software enterprise management process within the Department of Defense (DoD). The main problem identified with procuring software for DoD is that the software (including price, acquisition cost, distribution, training, maintenance, and support) costs too much. ESI objectives are to save money and improve information sharing. By pooling commercial software requirements and presenting a single negotiating position to leading software vendors, ESI provides pricing advantages not otherwise available to individual Services and Agencies. ESI's initial focus is on DoD common-use, standards-compliant software COTS software products.

CHIPS: How does ITEC-Direct and the DON IT Umbrella Program (www.it-umbrella.navy.mil) fit into the ESI program?

Mr. Clausen: The Umbrella Program fulfills the Navy's duties as ESI Executive Agent for Office Automation Tools and Enterprise Resource Planning software. The Program Manager, Barbara Johnson and her whole team, Linda Greenwade, Peggy Harpe and the ITEC-Direct group have been very supportive and proactive in pushing the ESI project. The ITEC-Direct (www.itec-direct.navy.mil) Web site is great and the team is customer-focused. I am amazed at what they have accomplished and at what they continue to do.

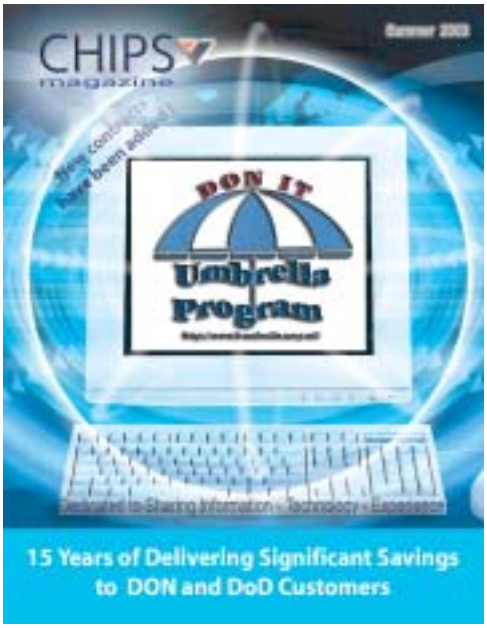
CHIPS: How do you gather requirements for the IT products and services offered to DoD customers?

Mr. Clausen: We follow the money and leverage the marketplace. We continually monitor customer interest levels by collecting data to see who is purchasing, and what they are purchasing. As Service or Agency buyers purchase, or plan to acquire significant amounts of particular software products, we look into the feasibility of expanding the scope of their contracts for the benefit of all DoD buyers. Then we assign an Executive Agent, who develops an acquisition strategy and a business plan. We discuss this strategy and reach consensus within the group. The Executive Agent, through their Software Product Manager (SPM) then begins negotiations with the software publisher. What usually results is a BPA off the GSA Schedule; with substantial pricing discounts. For example, as he observed that there was substantial interest in the Navy for Merant software, Floyd Groce (Department of the Navy representative and co-chair of the ESI Working Group) brought the information to one of the bi-weekly ESI Working Group meetings. The group eventually approved the Navy's plan to move forward with an agreement, which included some up-front funding, resulting in a pre-purchased inventory for Navy customers, and a BPA for DoD-wide use priced at 21 percent off GSA Federal Supply Service (FSS).

"It has been 15 great years for the Umbrella Program and their Navy and DoD customers."

CHIPS: Who are the ESI Working Group members?

Mr. Clausen: Our ESI Working Group includes members from: the Office of the Secretary of Defense (NII)/DoD CIO; Department of the Navy; Defense Finance and Accounting Service; Defense Logistics Agency; Office of the Secretary of Defense (CIO); Missile Defense Agency; Defense Intelligence Agency; National Imagery and Mapping Agency; Defense Information Systems Agency; Department of the Army; and the Department of the Air Force. They are truly just the "tip of the iceberg" though, because the really heavy lifting gets done by all the wonderful people in our Software Product Manager organizations, which include the Navy's IT Umbrella Program, the Army's Small Computer Program and the Air Force's Standard Systems Group. Our SPMs, in turn, are supported by a variety of superb contracting offices, including NAVICP, DITCO, and ITEC4. It's important to realize that all these folks have full-time "day jobs"; they perform their ESI functional roles in conjunction with their billeted duties.



CHIPS: Do you require IT products to be interoperable or to conform to a standard?

Mr. Clausen: We only require that products meet the JTA, the Joint Technical Architecture. By following the money, we allow the functional experts in the field to determine "best of breed." DoD PEOs (Program Executive Officers), Program Managers and field offices know their functional requirements quite well, and are also cognizant of the various interoperability and information assurance requirements. We have to assume that their purchasing decisions take all those requirements into account. It is a formula that has worked well for the past five years.

CHIPS: Do you work with the Service CIOs and other groups?

Mr. Clausen: Absolutely — DoD CIOs own this project! Priscilla Guthrie, the DoD Deputy Chief Information Officer is our champion and sponsor. The ESI Steering Group includes many of the department's CIOs and senior CIO staff within DoD, and meets as required to update our way ahead, and resolve issues. We also provide quarterly briefings to the full DoD CIO Executive Board.

Also, ESI is endorsed by the DoD Business Initiative Council (BIC), which authorized development of a DoD-wide Software Asset Management (SAM) Framework. We are beginning a process to populate the SAM Framework through the efforts of a CIO-led joint IPT (Integrated Product Team). Our current plan is to finish by 2005. Accomplishment of this task will help us track the majority of COTS software licenses in DoD. This will give us the visibility we need to create more and better ESI software agreements, and enable software transferability throughout the DoD. So, for example, if an Air Force base is closed down we could transfer their 1,000 MS 2000 Professional licenses to other DoD users. The BIC also approved extension of the project to establish a Virtual Information Technology Marketplace (VITM) for online purchasing of Information Technology. Effective working relationships with the DoD Comptroller have enabled ESI use of the Defense Working Capital Fund to provide "up-front money" for initial, wholesale software buys. This funding process assures maximum leverage of DoD's combined buying power, and results in large software discounts.

CHIPS: Can you talk about current savings to DoD?

Mr. Clausen: In the last five years the ESI has accumulated over $1 billion in cost avoidance. For the most part, this is measured as the difference between our ESI software pricing, and GSA Schedule price. We also attempt to capture the delta between our ESI software price, and a buyer's large volume spot bid quoted price, which is always lower than GSA Schedule.

CHIPS: What about potential customers who may not be aware of the ESI or Service programs like the DON IT Umbrella Program and use their local contracting agency instead?

Mr. Clausen: No problem with buyers using a local contracting agency — as long as they purchase off our ESI agreements (through our SPMs) whenever possible. If they are buying ESI software products via other means, we call that "leakage" and it is very difficult to measure. But there should not be anyone buying COTS software that is available under ESI, through means other than an ESI agreement. Contracting Officers, and other requiring officials should be aware of the DFARS change (subpart 208.74) and the Defense Acquisition System guidance (issued May 12 , 2003) regarding COTS software purchasing. The ESI vision is "Point and Click IT Shopping at the Lowest Cost," so ask your readers to take a look at our Web site: www.don-imit.navy.mil/esi. There really is no reason not to use ESI; it's a classic "win-win" for everyone involved!

CHIPS: Did you know that it is the Umbrella Program's 15th birthday?

Mr. Clausen: It has been 15 great years for the Umbrella Program and their Navy and DoD customers. Keep up the good work!

www.it-umbrella.navy.mil
www.itec-direct.navy.mil

Transformation - a journey not a destination

By Maj. Gen. Daniel M. Dick, USAF

Ask any 12 people to define transformation and depending on what they have read, you will likely get 12 very different answers. So to start, let us define transformation and lay some groundwork about how we may view it within the Department of Defense. In the Transformation Planning Guidance (April 2003) Secretary Rumsfeld defined transformation as, *"a process that shapes the changing nature of military competition and cooperation through new combinations of concepts, capabilities, people, and organizations that exploit our nation's advantages and protect against our asymmetric vulnerabilities to sustain our strategic position, which helps underpin peace and stability in the world."*

I think the important message to take from Secretary Rumsfeld's statement is that transformation is not about technology, but about changing culture, processes and our capabilities. It is not just building new, but finding new ways to work with what we have. It is easy to be dazzled by new toys and equipment. But when we do things like we have recently done with the Predator unmanned aerial vehicle, where we put Hellfire missiles on a surveillance platform, we have to rethink how we identify targets, assess risk and collateral damage, and determine release authority, because, we just reduced the time from sensor to shooter by an order of magnitude. So, are our decision systems ready for that kind of immediacy? Are our leaders prepared for those types of decisions? These are areas that we will have to look at as part of our transformation.

The Air Force's transformation theme states, "A journey, not a destination." As the premier military in the world today, it is easy to ask why we must transform. These quotes allude to the reality that the world does not stand still.

"The threats and enemies we must confront have changed, and so must our forces." - 2002 National Security Strategy

"Over the past decade, potential adversaries sought to compensate for U.S. conventional military superiority by developing asymmetric approaches and capabilities across the full range of military operations." -Transformation Planning Guidance

Therefore, our military cannot stand still. We must adapt to our current, and anticipate our future threats so that we have the right force mix, the right doctrine, the right skill sets, the right materials, along with our people trained to a razor's edge with latitude for creativity. In this way, we will meet our adversaries and be ready, able, and willing to defeat them anytime, anyplace.

And our transformation cannot be limited to just the military. We need to look across the government so that we can tap into the many methodologies, systems, and tools necessary to resolve our conflicts. Some of those tools, expertise, and systems may reside in other government departments such as State, Treasury, Justice, Labor or Interior. We have to be able to bring all the tools of government together in a holistic way to achieve the nation's goals while maintaining our security.

The question then before us, is how do we conduct our transformation? Well, first, we need to scope the areas we want to transform. Secretary Rumsfeld wants the Department to focus on three areas as we transform.

The first area is transforming how we fight. As I will discuss later, Joint Forces Command is responsible for developing warfighting concepts and integrated architectures that will influence the capabilities that we will need in the near through far future. These capabilities will lead our discussions in how we change our Doctrine, Organizations, Training, Material, Leaders, Education, Personnel, and Facilities to insure we take maximum advantage of the assets we have now and invest in those capabilities we will need tomorrow.

The second area is transforming how we do business. As Secretary Rumsfeld has said on several occasions, we must find ways to speed up the acquisition processes so that we get capabilities to the field sooner. The days of allowing aircraft development to linger for years and years must come to an end. I was a major on the Tactical Air Command staff 20 years ago when the first studies for the replacement aircraft for the F-15 were initiated. Now here we are, more than 20 years later and we only have a handful of F-22s on the ramp. We must do better than that. It is not just a function of the warfighter need, but also the fiscal reality of the costs for such systems. As an engineer, I am reminded of the engineer's philosophy of whether the solution needs to be good or perfect. We have to get a product that is good enough and then invest in product improvement over time. We need a way to implement a rapid acquisition system with spiral development. We need to build a little, test a little and build a little bit more. We need to better integrate our operators and engineers so they understand each other and give us the product we need.

To go with these changes in acquisition processes, we must develop better business practices that provide planning and resource allocation processes. The Secretary envisions a more entrepreneurial, future oriented, capabilities-based process that supports our future warfighting concepts. He wants a way to measure our success in providing those capabilities and allow for spiral development to improve those capabilities over time. This is not an easy task. We have a very regulatory based, statutory mandated system to insure we spend our tax dollars as Congress directs. So, we are looking at some very real challenges here.

Our third and final scope is transforming how we work with others. The reality is every organization has friction. The United States government is no different. For proof, all you need to do is read a newspaper at anytime in our history. The key is we must overcome our parochialism. We must find ways to integrate our governmental efforts. As I mentioned above, every department has tools in their area of expertise that we need to tap so that we can exercise a holistic solution to each crisis and conflict. Today, we see tremendous efforts across many departments trying to rebuild Iraq. Recently, Joint Forces Command experimented and validated the concept of a Joint Interagency Coordination Group that we are in the process of briefing through the Joint Requirements Oversight Council process. Do we have the perfect solu-

tion? No. But we are well on the road to a good start. With our problem scoped, we must focus on the strategy directing our transformation under the Transformation Planning Guidance. Our strategy will conduct a three-prong advance: 1) Transformed culture through innovative leadership; 2) Transformed processes for risk adjudication using future operating concepts; and 3) Transformed capabilities through force transformation.

By encouraging innovative leadership, we will achieve our most difficult challenge — cultural change. Almost all management theory shows that cultural change does not tend to move from within the corporate structure, but is driven by the leadership. The keys are to find ways to promote innovation and promote those that implement change and eliminate barriers. While we find our innovative leaders, we must improve our processes and find the right balance between risk and reward. In this case, reward is the future capability and the risk is today's capability. The keys include a reformed capabilities identification process that helps us define our requirements to support our joint operating concepts and a transformed strategic analysis that looks over time to compare many disparate threats across the multiple levels of war or conflicts while taking into consideration the level of uncertainty. Again, it is about finding the balance of what we have today versus what we want tomorrow.

Certainly the most talked about part of our transformation strategy is force transformation. All the Services are already working on their own road maps for force transformation. Some of the keys include strengthening joint operations, exploiting our intelligence advantages, experimenting with new warfighting concepts, and developing new transformational capabilities. This area has gained new focus as we realize a paradigm shift in our doctrine. Under the Goldwater-Nichols Act, we moved closer to joint operations, but defined them at the Air Wing, Naval Battle Group, Marine Amphibious Group, and Army Corps level. Today, we are seeing joint warfighting at the team, aircraft, ship and tank level. This change has some tremendous consequences in our doctrine, training, leadership, education, material and programs. Now we must adapt our forces to integrate at a wholly new level.

In answer to some of these challenges, Joint Forces Command assumed responsibility for the Joint Battle Management Command and Control (JBMC2) mission area to oversee and bring to the warfighter from the operational through tactical level of war, systems that are integrated and interoperable with the appropriate doctrine, training, leader development, and support systems to insure we have capabilities to meet our joint warfighter concepts. I'll go deeper into our JBMC2 responsibilities later.

As we work through our transformation strategy, we must use some pillars to build a foundation for that strategy — the four pillars envisioned in the Transformation Planning Guidance are shown in Figure 1. The key area I want to focus on is Strengthening Joint Operations. We have made a paradigm shift in doctrine. Today, we can no longer afford to think in Service-centric terms of warfare, but must look from a joint warfare perspective to maximize our capabilities. We have over 200 years of fighting the nation's wars as loosely joint integrated operations. In truth, we did not really fight our first joint actions below the strategic level of war until World War II. However, Operation Iraqi Freedom showed us that we are now going to fight wars as a jointly integrated team at the tactical level with squad leaders requesting

The Four Pillars of DoD Transformation

•Strengthening Joint Operations
- Near-term (2-3 years) Joint Operations
- Mid-term (4-7 years) Joint Concepts
- Linked Integrated Architectures to a Reformed Capabilities Identification Process
- Far-term (15-20 years) Joint Vision

•Exploiting U.S. Intelligence Advantages

•Concept Development and Experimentation
- Wargaming
- Modeling and Simulation
- Joint National Training Capability
- Operational Lessons Learned

•Developing Transformational Capabilities
- Actionable Transformation Roadmaps
- Transformational Research, Development, Test & Evaluation
- Transformation of Training
- Transformation of Joint Education

Figure 1.

and coordinating fires that may come from any of the Services. We are not too far away from Army Apache-Longbows under Marine control protecting Navy ships in coastal waters with Air Force Combat Air Patrol. In fact, we could do that today. Not as well as we would like to conduct those operations, but we have the means and capabilities to execute those kinds of missions.

The next area, Exploiting our Intelligence Advantages is also key to future joint warfighting capability. We have the best intelligence platforms and systems in the world. But there is still much that goes on during a crisis or war that we don't know or understand. We saw that during Operation Iraqi Freedom. Future transformation in this area is about netting our systems together in a system of systems environment for shared and better situational awareness. We need to get the right information to the right person — at the right time. Just as important is getting better intelligence and getting better at understanding what we do know. JFCOM's operational net assessment prototype that we experimented with during Millennium Challenge 2002 will allow us to do just that. It brings together all the knowledge of the diplomatic, information, military and economic areas to get a true understanding of the enemy.

Next, we see Concept Development and Experimentation and Developing Transformational Capabilities. JFCOM's J9 and J7 are heavily involved in transformational experimentation and improving joint training for all our forces. That includes working JSIMS [Joint SIMulation System], developing the Joint National Training Capability, running the DoD center for lessons learned, as well as influencing the curriculum for the joint education our folks receive throughout their careers. As far as the Actionable Transformation Roadmaps, each Service already has some form of a Transformation Roadmap, but now we are charged to take their Service centric roadmaps and bring them together into a Joint Transformation Roadmap to eliminate duplication and synergize our efforts.

Upfront I said that JFCOM is charged with Transforming the Department of Defense. As you can see from these pillars from the DoD Transformation Planning Guidance, JFCOM is leading that

Ten Top Priorities

- Successfully Pursue the Global War on Terrorism
- Strengthen Joint Warfighting Capabilities
- Transform the Joint Force
- Optimize Intelligence Capabilities
- Improve Force Manning
- New Concepts of Global Engagement
- Counter Proliferation of WMD
- Homeland Security
- Streamline DoD Processes
- Improve Interagency Focus, Process and Integration

Figure 2.

charge in almost all the critical areas. Our mission has four essential tasks. USJFCOM will:

- Discover promising alternatives through joint concept development and experimentation
- Define enhancements to joint warfighting requirements
- Develop joint warfighting capabilities through joint training and solutions
- Deliver joint forces and capabilities to warfighting commanders

Joint Forces Command is already aligned from a mission perspective with where the Secretary of Defense wants to go. We are the Joint Force trainer. Figure 2 shows where Joint Forces Command plays in the DoD's Top Ten priorities. Our primary focus areas fall within the two highlighted priorities. We also provide forces to the Secretary's number one priority, but for this article, I want to remain fixed on bullets two and three.

When we talk about the Transformation Planning Guidance, here is a list of Joint Forces Command's areas of responsibilities.

- Develop Joint Concepts
- Develop Integrated Architectures for Supporting Operations
- JBMC2 integrated architecture
- Joint Experimentation Assessment
- Joint Experimentation Plan
- Develop the Integrated Interoperability Plan
- Develop the Joint Transformation Roadmap
- Joint Rapid Acquisition Programs
- Joint National Training Capability

When we talk about Joint Concept Development and Joint Experimentation, whether assessment or plan, at JFCOM, we are talking about Maj. Gen. Jim Dubik who leads our experimentation efforts. He is a gifted leader and will bring some great insights to this area. The Integrated Architectures for JBMC2 come under my auspices. Mr. Steve Derganc is thoroughly engaged in working those issues and, I must tell you, every day is a challenge. I am also responsible for the Integrated Interoperability Plan.

The Joint Transformation Road Map comes under Brig. Gen. Jim Warner. Trying to kludge the Services' Road Maps with an overarching Joint Road Map is a big challenge. The Transformation Planning Guidance also gives me oversight of the Joint Rapid Acquisition Program. This program is funded to help accelerate the implementation and fielding of projects employing newly matured technologies to meet the immediate needs of the warfighter. These projects will be the results of our experimentation, ACTDs [Advanced Concept Technology Demonstration] or other exercises.

Figure 3.

Our J7, Maj. Gen. Gordon Nash is leading Joint Forces Command's Joint National Training Capability effort. Gordon got a little bit of a jump on the rest of us with that mission, but he has numerous challenges ahead to make that into a reality. When you talk to our allies, they cite our training regime as one of the finest in history and the leading reason for our current military supremacy.

Of course, the real key to all these transformation goals is resources — money and people. As Alan Shephard once said, "No bucks, no Buck Rogers." Although we have some very daunting tasks before us, they are not insurmountable, but we must find the right talent to help us work through these tasks to find new ways of looking at our concepts, designing our capabilities, refining our requirements, and speeding the processes to bring them to the warfighter and that is where you all can help.

As the Department headed toward publishing the Transformation Planning Guidance, JFCOM experienced some real growth in missions. The list below came about prior to the signing of the TPG and, in many cases, without the resources necessary to oversee and implement changes in these critical areas. We are committed to making a difference for the joint warfighter, but you cannot produce results without resources. That is why we are very determined to match the Secretary's desire for transformation particularly in the resource allocation to joint warfighter requirements.

- Joint National Training Capability (JNTC)
- Joint Battle Management Command & Control (JBMC2)
- Joint Interoperability and Integration (JI&I)
- Standing Joint Force Headquarters (SJFHQ)
- Joint Urban Operations (JUO)
- Joint Deployment Process Improvement (JDPI)
- Interoperability Technology Demonstration Center (ITDC)

To illustrate the complexity of some of our challenges, I want to walk you through the JBMC2 area. Figure 3 shows the programs that we currently envision being a part of JBMC2. By no means is this an all-inclusive list, but it gives us a starting point on what we are trying to integrate. Some of these acronyms may be very familiar such as the Global Command and Control System or GCCS or the Standing Joint Force Headquarters. Others may not be as familiar such as the Joint Fires Network, Deployable Joint Command and Control or Single Integrated Maritime Picture.

Management Initiative Decision 912 Provides:

Figure 4.

All of these systems will play a part in the command and control of joint forces in the operational through tactical levels of war. Each program is big in its own right, but the netting together of these programs in a system of systems; network-centric environment is where true transformation will take place. This past January, the Deputy Secretary released a document known as Management Initiative Decision 912 giving Joint Forces Command primary responsibility for the Joint Battle Management Command and Control mission area. As Secretary Rumsfeld has asked, who organizes, trains, and equips the Joint Warfighter? This document is a first step in answering that question and gives JFCOM an ambitious mandate to try and find solutions to that issue in the area of joint command and control. The items listed under the second bullet, "Expands USJFCOM role," give you an idea of the areas that we are working to integrate, coordinate, and facilitate in bringing JBMC2 into focus and making it into a process that quickly meets the Joint Warfighter's requirements.

♦Strengthens Department's fielding of JBMC2 capabilities by improving the Department's ability to organize, train, and equip joint forces

♦Expands USJFCOM role in establishing JBMC2 mission/capability area requirements and system-of-systems capability requirements

♦Joint influence (USJFCOM-led, in conjunction with Combatant Commanders, Services and Agencies)

♦System-of-systems engineering

♦Service/Agency implementation (sustain current acquisition life-cycle responsibilities)

♦Funding stability for JBMC2 capabilities

If we implement this right and with proper resources, MID 912 allows Joint Forces Command to fill our previous question mark with capabilities listed in Figure 4. Key to these capabilities is meeting the Combatant Commander needs by establishing Joint Forces Command as the Combatant Commander with the single focus to harmonize priorities and requirements.

Although the MID 912 gives Joint Forces Command a wide range of authorities and responsibilities, we need to keep our tasking in line with our resources. In our effort to gain insight, skills, and command capabilities, we are taking charge of the following programs in the near term.

♦The Deployable Joint Command and Control, also called DJC2, is a Navy-led joint program that will bring a deployable command suite to the Joint Force Commander and provide the material piece to the Standing Joint Force Headquarters.

♦The Single Integrated Air Picture, or SIAP, is another joint program that gives us a common air picture to assist the Joint Task Force Commander to control air assets and coordinate fires in his air space to achieve tactical and operational objectives.

♦The Joint Fires Network is a task given to Joint Forces Command to look at all the Service ISR management systems to determine the way ahead for a joint integrated system that will eliminate redundancy while integrating across the Services and incorporating in a more joint fashion ISR and fires to support the Joint Task Force Commander's objectives.

Next year, Joint Forces Command will assume responsibility for the Family of Interoperable Operational Pictures or FIOP. An Air Force led Program, FIOP will bring all the common operating pictures together allowing the Joint Task Force Commander to gain a consistent picture of operations with access to all the data sources that will allow him to have information dominance in a format that allows him to see the battlefield and direct actions to achieve his objectives.

Looking at the JBMC2 beyond next year, Figure 4 shows some of the systems we are studying to add to our portfolio of programs that we will share oversight and directive authority over to insure we continue to build systems that are born joint. Only then can we achieve a level of joint interoperability that will support the paradigm shift I mentioned at the beginning where we have truly joint integration at the individual and system level.

Before closing, I want to put some challenges before you. I truly think it is imperative that we, the government, must be better at articulating to industry what we are doing and where we are going. We cannot afford proprietary systems that are stovepiped and expensive to integrate with other systems. We need to put industry engineers and our operators together earlier in the acquisition and development cycle. We need to spiral our development where we build a little, test a little and build a little more.

We need capabilities compliant with DoD standards supporting joint interoperability rather than pursuit of individual proprietary products resulting in battlespace stovepipes. Lastly we need your help to give us systems that are born joint and fit in a network-centric environment. Transformation is all about better, truly seamless interdependent joint warfighting.

Maj. Gen. Daniel M. Dick is the Director for Requirements and Integration (J8), U.S. Joint Forces Command. The general received his Air Force commission through the Reserve Officer Training Corps program at Virginia Polytechnic Institute and State University in 1970. A distinguished graduate of undergraduate pilot training, he has served as an F-14 and F-16 instructor pilot and as an aide and special assistant to commanders at Tactical Air Command and Air Combat Command, respectively. He is a command pilot with more the 3,600 flying hours including 155 combat hours and 51 missions over Iraq.

Talking with Brigadier General Marc E. Rogers, USAF Director, Standing Joint Force Headquarters U.S. Joint Forces Command

The Standing Joint Force Headquarters (SJFHQ) is a team of operational planners and information command and control specialists. This team of planning, operations, information management, and information superiority experts form the backbone of the JTF command structure. During day-to-day operations, the SJFHQ element is assigned to a theater commander and is embedded in the commander's staff. The team uses collaborative tools to build an extensive knowledge base of focus areas that can be used in the planning process. It also coordinates with academic, industry and government centers of excellence to pull specialized knowledge into the planning process. When a crisis develops in a theater, the SJFHQ can be assigned to a JTF headquarters where it brings the knowledge base, collaborative tools and contacts from the centers of excellence to the JTF. This enables more proactive and coherent advanced planning and quicker use of capabilities than can be accomplished by ad hoc stand-up of a JTF headquarters.

CHIPS: Is the SJFHQ a new concept? How was SJFHQ developed?

Brig. Gen. Rogers: Actually, no. We in the American Armed Forces have tried for decades to have a better capability to rapidly stand up a Joint Task Force to deal with a crisis. The problem was we never really codified how we were going to do it with the organizations and there were various attempts in all the Services where they had their own capabilities for command and control to set up a Standing Joint Task Force or Standing Joint Task Force Headquarters. Most of the time these were made up of "part-time people." As a result they really were not as ready or quick as we would have liked.

Senior government leaders concluded long ago that we needed to be faster and there were suggestions in the mid-1990s that we establish Standing Joint Task Forces. There were discussions in Congressional staffs and inside the Pentagon and the end result was that we could not afford to do it. To stand-up Standing Joint Task Forces would have taken thousands of people and we could not resource that, not budget-wise or people-wise. The second phase was that if we can't afford Standing Joint Task Forces — full combat-ready Task Forces, then maybe we could resource Standing Joint Task Force Headquarters. But that is a problem too because a normal Task Force headquarters would involve hundreds and in some cases over a 1,000 people due to the complexities of what they have to manage, coordinate, plan and execute for a crisis. So to resource and fully support an established Standing Joint Task Force Headquarters was not doable either.

So we decided if we couldn't do that, at least we could have a core element of true professionals who have the pockets of requisite skills, trained and proficient in these skills to stand-up a Joint Task Force Headquarters much more rapidly. When a crisis comes up, the question is where are the people who have been paying attention to this crisis and already have a game plan? Normally, the way we form a Joint Task Force Headquarters, since it doesn't exist on a day-to-day basis in peacetime, is we go to all of the Services and ask for people who form up as a headquarters. They have to learn first what the situation is, what is the background, they have to organize themselves, and you can see the problems with that. They have to play a pickup ball game.

But if you have a core element of people, who already understand the situation and are skilled at organizing a headquarters to meet a mission then this core element can raise the situational awareness and help organize all of those augmenting in a headquarters very rapidly. And that is what was demonstrated in Millennium Challenge 2002, when the Joint Task Force Headquarters was composed of many augmentees, but the core element, the SJFHQ people who went into that headquarters, were able to rapidly provide information, situational awareness and understanding, and a game plan for the mission approved by the regional commander and the JTF commander. It accelerated the clock tremendously, in terms of what that headquarters was able to do in organizing for that mission. And that is the value that SJFHQ brings. So this is an idea we have been working on a long time, but finally we came to the conclusion that we can gain most of the benefit by using a core of true professionals. It is really not a true headquarters; rather it is a core element of a headquarters.

CHIPS: What sort of IT tools does the SJFHQ team bring to the commander's staff? Wouldn't the commander already have these skills and tools already on his staff?

Brig. Gen. Rogers: Many of these tools and these types of individuals do exist, but the difference is they also have other responsibilities or they would not be in that headquarters. For example, they may have policy or resource allocation or training duties, etc., in addition to the mission at hand. They also don't have the time to practice every day using the equipment or the processes that a joint warfighting headquarters must use. They are not brought together to function as a core team. As a result they would be playing a pickup game. They would perform better than a staff brought from the field to plug into a headquarters, but they would not have the capability that a SJFHQ core element would bring. The software and hardware tools we use are not unique; many do exist on the commander's staff. The difference is how we use and organize them.

One of the most important things that SJFHQ is going to bring to the headquarters and joint operations is skill at employing a "Collaborative Information Environment" (CIE)... Skill at exploiting what a collaborative information environment can do. We do not have people today who are adept at this. What we have realized is that with a collaborative environment you can very rapidly build plans and make decisions compared to having to do things the old way with telephones and asynchronous e-mail, etc. The tremendous value of the CIE is realized when you actually view it as a new dimension of your operational environment and you realize you should organize yourself within the CIE.

Just as you do in normal operations — you must have rules for

operating, everything down to brevity codes for how you talk, i.e., certain words mean certain things, just as pilots talk to each other or ships talk to each other or as people talk in a tactical situation in ground combat on a radio. You need these procedures in a CIE as well.

Additionally, in a CIE you need to pay attention to organizational principles and protocol, for example, who speaks with what authority, when would they speak or transmit, etc. This CIE, when properly exploited, gives us the capability to take advantage of the knowledge enrichment phenomenon. The idea that the more you propagate a piece of information, the more knowledge participants will be able to add to it — and all this knowledge will be known by the community of participants. Imagine its use in a military command and control situation with all of its complexities and you can see how much more efficient the operation can become. You can conduct several planning discussions simultaneously and much more rapidly produce something that allows a commander to make a decision. But *only* if you are properly organized and operate with a set of business rules to ensure efficiency.

CHIPS: Does the SJFHQ team assist the commander's staff in making sense out of the overwhelming amount of data that comes in?

Brig. Gen. Rogers: There is a group of people in the SJFHQ called knowledge management. Knowledge management is a new arena for us and one reason is that we have realized the impact of the Information Age. If you look at the history of information exchanged in conflicts, you find the ability to pass information has grown exponentially. Warfare is a very, very complex operation. There is nothing in the commercial world that matches it — no company, no process on a daily basis has to deal with the complexities that commanders, forces and government have to deal with in wartime.

Here are some of the examples of the amount of information that was passed in previous wars. In World War I the standard communication rate was about 30 words per minute on a field phone. In World War II it was about 60 words per minute on a radio, but you had to talk clearly. In Vietnam it was probably 100 words per minute using satellite communications, etc. In the Gulf War it was roughly 192,000 words per minute using networked computers. I don't have any idea what it was in our recent conflict, but I bet it was far above 192,000. In 2010, if we should conduct a theater conflict, we are looking at 1.5 trillion words per minute transmitted to, from and across the theater. That is the equivalent of the content of the Library of Congress being transmitted every minute. Somewhere in those 1.5 trillion words is the precise information that a commander, planner, tactical squad leader, flight lead or ship's crew needs. *Where is their information*? Knowledge management is the field that will be able to fuse, collate and funnel that information to the right people at the right time.

It is a very complex challenge and we don't know quite the best way to do it. But in the SJFHQ we have some capability at a beginning level. Right now there is no schoolhouse, no training ground for knowledge managers. Some think they are network managers or administrators, but it is much more than that. When you filter and prioritize information and make sure that the right people have free access to that information that is relevant to them — it is a very challenging task.

Above: SJFHQ Prototype personnel using collaboration information tools to conduct meetings with participants worldwide.

CHIPS: What types of emerging technologies are you working?

Brig. Gen. Rogers: In the sense that knowledge management is a technology we are working to bring that to the Combatant Commander to whatever degree we can — but also multilevel security. The SJFHQ prototype is not going to develop it, but we will use it. We are participating in certain experiments and Information Assurance studies to help bring that capability. Our Joint Experimentation Directorate in Joint Forces Command is working on multilevel security and industry is also working hard. That will be one of the prime technologies — if we can achieve reusable, multilevel security that will bring tremendous capability to commanders and this nation because of what we will be able to do with our coalition and multinational partners. What you need to do is work with your partners while protecting the appropriate information at the appropriate level. The other nations of any coalition have the same problem protecting critical information just as we do. We would like to operate in the same collaborative environment and not have to worry about sensitive information being compromised. Multilevel security is one of the prime challenges to true multinational interoperability in the information domain.

CHIPS: I have heard you say that your goal is to build capabilities using COTS technology because it is less expensive for DoD and our allies. How closely are you working with our allies on operability issues? How difficult is it using COTS in a coalition environment when a country's national interests might lead them to choose a domestic product rather than a U.S. developed technology?

Brig. Gen. Rogers: One good thing about the computer industry and the Internet is that even though you may have computers manufactured in another country, all manufacturers, in trying to meet their customer demand, want their products to be able to connect to the global Internet. As long as users can connect, the issue will be reduced to culture, language, policy and law barriers.

In multinational terms we are working with the United Kingdom at understanding how they employ their equivalent of the SJFHQ because they have had great success and eight years of experience with it. We want to learn what they know about training for a SJFHQ — training cycles and proficiencies, etc. Then how they manage personnel, assign and track them. Obviously these people come out of these assignments with superb joint warfighting skills and the British track them in the personnel system for possible recall during crises. What we would like is to operate with their Joint Forces Headquarters within the same CIE. I'm not too concerned if our partners buy domestic products be-

cause as long as we exploit global computing and Internet industry standards and capabilities we will enhance interoperability, aside from the usual policy, law and language hindrances.

CHIPS: How does the SJFHQ compare to its British equivalent?

Brig. Gen. Rogers: I have seen examples of the performance of the British standing headquarters. It was outstanding and enabled the British to perform very well. In recent months we have been unable to work with them because they have their standing headquarters element deployed to the Gulf and it formed the core of their national command element. Right now they are probably returning to the UK and need some time off, but as soon as they are able we would like to resume working closely with them. We have had exchange visits with their headquarters, we have been in the UK and a few of them have been here. Now that the hostilities of Operation Iraqi Freedom are essentially over perhaps we can work with them more often over the next several months.

CHIPS: Can you talk about the reach-back links to U.S. strategic planning and intelligence organizations, and other non-DoD agencies?

Brig. Gen. Rogers: One of the things we are going to ensure we provide is the ability to reach-back to certain agencies and organizations that provide special services, for example, the Joint Warfighting Analysis Center, certain intelligence agencies, etc. By using a Web-based capability with the proper security the SJFHQ can reach to other organizations to acquire information and to conduct collaborative planning. There are other entities you will want to reach as a SJFHQ in instances where you might not execute a particular planning function but another agency does and once you contact them with your needs they will forward the results to you.

One of the things we need to keep in mind is the level that the SJFHQ should operate. You are familiar with the terms tactical level, strategic level, operational level, national level planning or operations ... there is strategy and tactics at all levels. The SJFHQ should normally function at the regional command level at the strategic and high operational end of planning and execution. It should reach down to the different components — air, land, maritime and Special Operations and rely on them for the planning and execution of those skills and core capabilities that they bring to the fight. It is too difficult to do all of the planning at one level, but if you collaborate with other organizations you will be more effective in a shorter time period.

CHIPS: How many people would actually deploy in a SJFHQ mission?

Brig. Gen. Rogers: It depends on the situation. Our model for the SJFHQ core element right now has 58 individuals. Those 58 individuals are all handpicked for certain skills and capabilities to make sure we cover the range of things that a headquarters needs to be able to do. If it is a small simple operation maybe only a few of them need to deploy, maybe it is humanitarian aid or disaster relief ...something not as complex — just urgent. But if you have a large-scale military combat operation it is much more complex. Perhaps you need to send the major portion of the SJFHQ element to the Joint Task Force. In Millennium Challenge 2002 almost everyone was sent to work in the Joint Task Force Headquarters ...certain "plugs" of capabilities. Plugs or teams went into operations, plans, information superiority, knowledge management ... it is situation dependent. It depends on the scale or scope and the expected duration of the operation.

CHIPS: So the SJFHQ would assist the commander in instances of humanitarian aid, disaster relief or assistance to civil authorities, as in the massive humanitarian effort for the people of East Timor?

Brig. Gen. Rogers: That's a possible scenario. We view the SJFHQ core element as a command and control weapons system. So for a given situation the Combatant Commander will determine how he wants to employ this weapon system just as he determines how he is going to employ a carrier battle group or squadron of airplanes, air and space task force, etc. You can compare it in the same way ... *how do I want to deploy this force and how much of it do I need?* For something like East Timor or another humanitarian operation, he may want to deploy a few of these people to the JTF Headquarters to assist the commander. Or perhaps they will not even need to leave headquarters to be a part of that operation. I think in many cases the commander is going to want them to deploy to wherever his headquarters is in the theater, but it is possible to use reach-back for many of these capabilities and again it would be determined by the complexity, scale, scope and expected duration of the operation. But we must plan for the worst case where most or the entire SJFHQ core element would deploy. These people will have mobility requirements and be able to deploy forward at a moment's notice to help establish a Joint Task Force Headquarters.

CHIPS: How soon will you be able to deploy a fielded SJFHQ?

Brig. Gen. Rogers: We are working with three different Unified Commands right now to establish their SJFHQ within a year. Precisely when they will be fully established and able to deploy I couldn't tell you. It is very difficult to just turn a switch and insert a 58-person core element into a headquarters with complete functional capabilities. It will be a building block approach. For example, some commands are going to do this incrementally and be ready by the end of 2004; others are going to do it more rapidly and probably have it available by the beginning of 2004.

CHIPS: How is the core element of SJFHQ being fielded?

Brig. Gen. Rogers: What we have done at Joint Forces Command is establish what we call the Standing Joint Force Headquarters prototype. We view this as a weapons system so what we have here at JFCOM is a prototype consisting of the equipment, the software, hardware and the 58 people. The prototype serves as a model to perfect the standard operating procedures, tactics and techniques the SJFHQ will need in the field. Here at JFCOM we are building an addition to one of the buildings to house our prototype and its laboratory. We will use the prototype to assist all the regional commanders in establishing their SJFHQ. But we will also use it to conduct further experiments and develop new capabilities and improvements to the SJFHQ — just as we have made improvements to other weapons systems that we have fielded in the past. For example, effects-based operations and the building and exploiting of an operational net assessment will improve over time, especially as information technology continues to advance. Before we bring a new capability into a headquarters we would like to first try it out and integrate it into the functions of the prototype before we produce modifications to the fielded capabilities in the years ahead.

We are truly trying to manage the SJFHQ as a weapons system. This is an exciting challenge and a needed addition to our com-

mand and control capabilities for our forces, especially given where we are in the Information Age. It is here and it is here to stay and we must learn how to operate in it better than anyone else and exploit the capabilities and possibilities it offers. The SJFHQ, I think, is probably the first command and control weapons system to view it that way and to accept upfront that its core capabilities will rely to a great extent on information technologies and new constructs such as the CIE.

Brigadier General Rogers enlisted in the Air Force in 1974 and earned his commission in 1978 through the Reserve Officer Training Corps. He has held numerous staff and command positions, including combat tours in Iraq and Bosnia and as commander of the 49th Fighter Wing at Holloman Air Force Base from 2000-2002. A command pilot with more than 2,300 hours in numerous types of aircraft, Rogers holds a bachelor's degree in physics from the University of Missouri. He holds master's degrees from Embry-Riddle Aeronautical University and the National War College. He also attended the Joint Forces Staff College. His awards include the Legion of Merit, the Defense Meritorious Service Medal, the Meritorious Service Medal, the Air Medal, the Aerial Achievement Medal and the Air Force Commendation Medal.

Choose the Best O/S

By Patrick Koehler

In today's world of computing, you can select from a smorgasbord of operating systems such as IBM OS/2, Linux, Macintosh, Microsoft Software (MS), and Unix flavors. What *tastes* best to your PC will depend upon how much it can easily swallow. We will take a look at some of the essentials to determine what is best for you, such as how much memory is required, hard drive (HD) space needed and how long vendor support will continue. *How do we even get started?*

First let's take a look at one of the largest software vendors:

Microsoft's Lifecycle Policy for a business-oriented product defines three phases of support:

•*Mainstream* includes a pay-per-incident and free hot fix support for a minimum of five years.
•*Extended* includes an hourly rate and a fee for hot fix support for two years following the end of the mainstream phase. This support is offered only for Business and Development Software.
•*Online Self-Help* includes a searchable Knowledge Base, FAQs, etc., for a minimum of 8 years.

Windows 2000 exits the mainstream phase March 31, 2005. Extended support will continue to March 31, 2007 and self-help support will continue for at least another year.

Typically you would not use an operating system that is no longer supported by the manufacturer, so we will not consider Windows 95, 98/98SE because these operating systems are no longer supported by Microsoft. Support ended for Windows 95 and NT 3.5x on December 31, 2001; and Windows NT 4.xx extended support will stop on June 30, 2003. For a complete listing of product lifecycles, visit Microsoft's site at: http://support.microsoft.com.

The Navy Marine Corps Intranet (NMCI) identifies Windows 2000 as their O/S. There are four different flavors of 2000: Professional, Server, Advanced Server and Datacenter Server.

Windows Millennium (ME) will be supported until December 31, 2004. Windows ME requires a Pentium 150MHz or better, 32MB of RAM and a HD with 320MB of available space. ME is a good choice for multimedia computing.

Windows XP is designed for the novice user, but can be used by the expert. XP's strength lies in multimedia. Windows XP was designed to run on the latest PC equipment. Windows XP Home and Professional both require the same minimum hardware: Pentium 300MHz or faster system with 64MB of RAM, 1.5GB of free HD space, an SVGA or higher resolution video adapter, CD-ROM or DVD, and a keyboard and mouse. Since XP supports graphics, the more RAM, hard drive space and video memory you can afford the better. I think XP should be run on a 400MHz or faster system with 256MB of RAM. There are several significant differences between XP Home and Professional. XP Home cannot be a domain member, but can access domain resources. XP Home does not install a backup program by default, but one can be extracted from the O/S install CD. XP Home does not support group or local policies, while XP Pro provides full support for groups. XP Pro has better security than XP Home supporting Kerberos V5 authentication protocol and IP Security.

Below is a summary of MS operating systems, and minimum and suggested requirements.

Win 2000 Professional - 133MHz or higher Pentium, 64MB of RAM, 2GB HD with 650MB available space, CD-ROM or DVD drive, VGA or higher and keyboard. More RAM and hard drive space improves performance. Supports up to 2 CPUs and 4GB of memory. I suggest 400MHz or higher Pentium, 128MB of RAM, 8GB HD with 2GB available space, CD-R/RW, CD-ROM or DVD, SVGA or higher, mouse and keyboard.

Win 2000 Server - Same as Windows 2000 Pro, 128MB of RAM, 2GB HD with 1GB of available space. Same as 2000 Pro except it supports up to 4 CPUs. I suggest 400MHz or higher Pentium, 256MB of RAM, 10GB HD with 4GB available space.

Win 2000 Adv Server - Same as 2000 Server except it supports up to 8 CPUs and 8GB of memory. Has server failover and load balancing capabilities.

Win 2000 Datacenter Server - 8-way CPU capable using a Pentium III Xeon or higher, 256MB of RAM, 2GB HD with 1GB of available space. Same as 2000 Advanced Server except supports 8 to 32 CPUs and 32GB of memory so I recommend 512MB of RAM and a120GB HD with 20 percent available space.

The next step to consider is the level of your expertise. MS Windows provides a graphical user interface (GUI) that is easy to use and offers three different server versions and a client with multiple processor support. XP has an easy interface and keeps some things initially hidden from view that might confuse the novice user. For example, XP does not show everything in the Control Panel that is available. This is nice for the novice user because it doesn't present options that may cause confusion.

Security is another important factor to consider. Windows 2000 and XP can be made more secure by using New Technology File System (NTFS). NTFS extends security down to the file level. Windows 98/98SE's security consisted of a log on or password screen savers that could easily be circumvented by simply pressing the Escape key. Windows NT 4, 2000

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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.

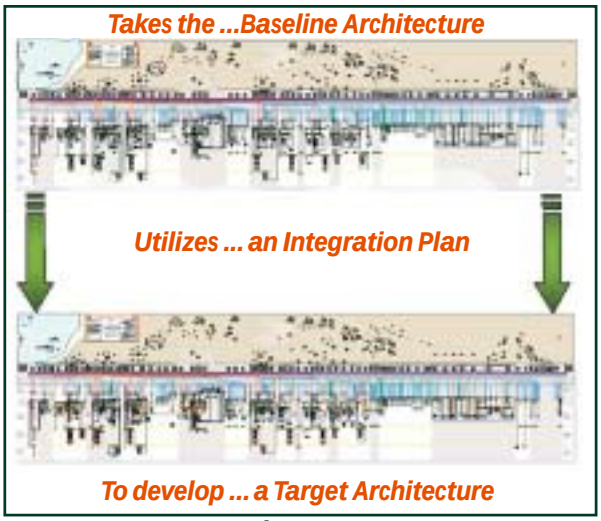


Figure 1.

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 (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.

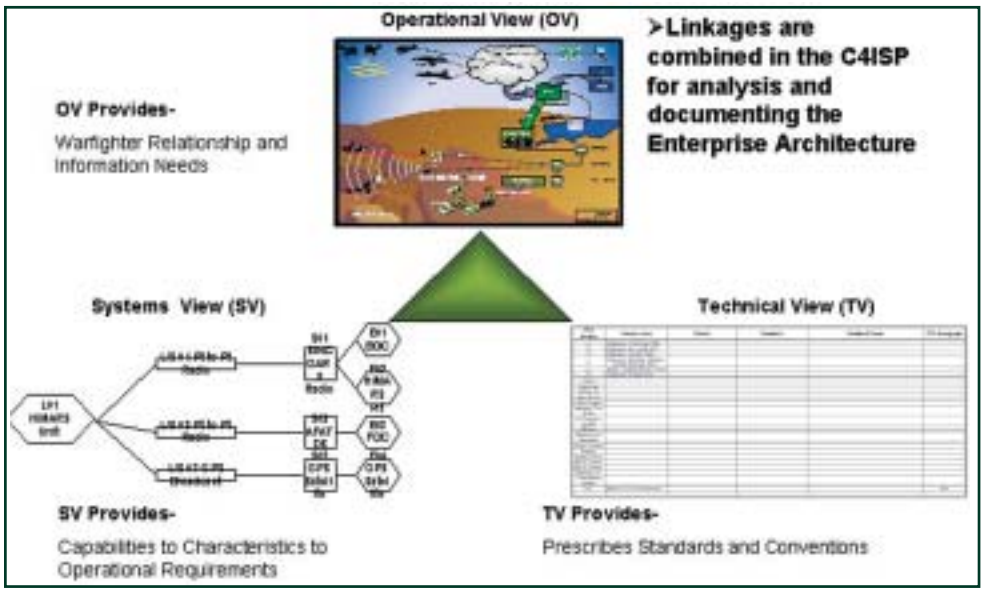


Figure 2.

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).

Interview with Dennis M. Bauman PEO-C4I & Space

Mr. Bauman received a Bachelor of Science Degree from Pennsylvania State University in 1971. He served as a Lieutenant (j.g.) in the U.S. Navy until 1975, as a Weapons Officer and Qualified Surface Warfare Officer aboard an amphibious warship. Mr. Bauman earned a Master of Science Degree in Computer Science in June 1977 from the University of California at San Diego. From 1997 to 2000, he was the SPAWAR Program Director for Information Warfare, responsible for acquisition of Navy capabilities for IW defense, exploit and attack. In October 2000, he became SPAWAR Program Director for Command, Control and Intelligence (C2I) and Combat Support Applications. He assumed his current position as PEO-C4I & Space in November 2002. He is a member of the Senior Executive Service and the Navy's Acquisitions Professional Community for Program Management. He was a faculty member of the University of California at San Diego, Computer Science and Engineering Department from 1980 through 2000.

CHIPS: Please explain the background and significance of the stand-up of the PEO-C4I & Space.

Mr. Bauman: There continues to be a great deal of discussion within the Navy acquisition community about how to improve the efficiency and effectiveness of acquisition. To put it into historical perspective, prior to November 1, 2002, the majority of the acquisition community, with the exception of SPAWAR, aligned acquisition with PEOs. Traditionally, Program Executive Officers, aligned to acquisition commands such as the Naval Sea Systems Command and Naval Air Systems Command, do most of the acquisition in the Navy. SPAWAR, however was organized differently. Instead of PEO positions, there were sixteen program offices who reported to five program directors. These program directors, in turn, reported to the Commander of SPAWAR.

The Honorable John J. Young, Jr., Assistant Secretary of the Navy, Research, Development and Acquisition (ASN (RD&A)) felt that there were benefits to be gained by establishing a PEO-C4I aligning the acquisition of C4I systems and products under this office. There are three very good reasons for this alignment. First, it focuses part of the organization specifically on acquisition, which improves efficiency and effectiveness. Secondly, it increases the interchange among the acquisition professionals at SPAWAR and other acquisition organizations within the Navy and other Services. This is significant because it facilitates a more cohesive joint acquisition community. Lastly, the change clarifies the authorities and reporting structure required by the Goldwater-Nichols Act of 1986 as well as some of the decisions made as a result of the Packard Commission Report of the late 1980s. Goldwater-Nichols and studies like the Packard Commission were part of the genesis and rationale for establishing the PEOs.

The significance of the PEO-C4I & Space stand-up is that now there is an organization that exists for the sole purpose of acquiring C4I and space systems and equipment. Again, this realignment provides a unique focus for providing effectiveness and efficiencies in the business of C4I acquisition.

CHIPS: What is the chain of command for the PEO-C4I & Space and, if you could, elaborate a little on the organization's responsibilities?

Mr. Bauman: PEO-C4I & Space reports to the ASN (RD&A) for acquisition, and is responsible for assigned programs from "cradle to grave." Specifically, the PEO takes full responsibility for the systems and programs that are assigned to it — from conception of the program, through the retirement of the system and eventually, to the removal of the system from the fleet, this includes both acquisition and full life-cycle support for the system. Additionally, the PEO reports through SPAWAR to the Chief of Naval Operations (CNO) and the Commandant of the Marine Corps for execution-year support of fielded equipment.

CHIPS: Which organizations will you be working with as PEO?

Mr. Bauman: I've mentioned ASN (RD&A), who is my reporting senior in the chain of command. However, there are a number of organizations and agencies, both internally in the DON as well as externally in support of the joint community with which we will partner and work. I want to first emphasize the close relationship PEO-C4I & Space will continue to have with SPAWAR. Furthermore, our collective success will hinge on our ability to work together as a C4I team. As the C4I systems engineer for the Navy, SPAWAR establishes the architecture and technical standards that allow the PEO to acquire, integrate and field products for the warfighter, including those that will make ForceNet a reality. SPAWAR also functionally supports the PEO in areas such as contracting, infrastructure and security — all the functions that the PEO is not staffed nor equipped to handle.

I intend to work very closely with all my PEO counterparts in the DON. Most of them are platform PEOs: PEO Carriers, PEO Submarines, PEO Ships, PEO TACAIR, etc. Additionally, there are a couple PEOs who overlap rather closely with the C4I role that we have. For example, PEO Integrated Warfare Systems (IWS) oversees the acquisition and integration of many of the fleet's combat systems, which are closely related to and interface with C4I. Our close relationships with DON PEOs and organizations will also benefit our ability to support the joint warfighter. In terms of a joint focus, PEO-C4I & Space is probably more joint-oriented than other product lines within the Navy's inventory. As a result, I place special emphasis on establishing close working relationships with U.S. Joint Forces Command and the other Services' PEOs in support of DoD's Transformation goals and objectives.

The PEO also works very closely with the OPNAV Resource Sponsors. Our primary sponsor is OPNAV N61, Rear Adm. Thomas Zelibor, Director of Space Information Warfare, Command and Control Division. We also have close interaction with OPNAV N7 platform sponsors, such as N76. It is a PEO priority to maintain constant communication with the warfighters in the fleet and

the Marine Corps. Commander, Fleet Forces Command (CFFC), COMLANTFLT and COMPACFLT are the primary users of our systems, and they generate the requirements for the future capabilities that the PEO will need to build.

In July 2002, the CNO created a new operational command, the Naval Network Warfare Command (NETWARCOM) led by Vice Adm. Richard W. Mayo. NETWARCOM acts as the Type Commander for networks and C4I equipment for the warfighters. We work very closely with NETWARCOM to develop requirements and provide solutions that, if we were a platform PEO, would be coordinated with the TYCOM.

I also see a very special and significant role with the Marine Corps. During the last All Flag Officers Conference, the CNO outlined two initiatives underway in support of increased Navy-Marine Corps integration. The first is the integration of Navy and Marine tactical air. This means there will be Marine Corps squadrons onboard aircraft carriers and attack aircraft onboard large deck amphibious ships as standard operating routine. There will be close coordination between the Marine Corps and Navy on this, and in particular, I see a great deal of the C4I world coming into play, where we must interface and interoperate, and perhaps even share common equipment with the Marine Corps in the C4I & Space arena.

"The stand-up of the PEO is truly a good news story since an increased focus on C4I and space is absolutely critical in realizing the benefits of network-centric warfare . . ."

The CNO also talked about the formation of Expeditionary Strike Groups (ESG), which expands the current composition of our Amphibious Readiness Groups, providing them with increased striking and forcible entry capabilities. Again, this change to our battle force structure is going to require increased emphasis on interoperability between the C4I & Space systems of the Navy and Marine Corps.

CHIPS: How does the stand-up of the PEO-C4I & Space help the Navy's warfighting mission?

Mr. Bauman: PEO-C4I & Space technology is becoming increasingly important to the joint warfighters as the Services move away from platform-oriented warfare and toward the more robust and coordinated network-centric warfare. For instance, in Operation Iraqi Freedom, our forces went into battle as a very network-centric force rather than a platform-centric force. This demonstrated our transformation from a deliberative strike focus to a "time-critical" strike focus. The enabler for this new focus of joint forces is C4I and networking, enhancing the capabilities of traditional platform warfare areas. In essence, C4I is the lubricant that makes the machinery of warfare work in the modern era.

CHIPS: There has been a lot of talk about the need for acquisition reform to more rapidly field warfighting capabilities. Have there been any changes to the Federal Acquisition Regulations (FAR) that will provide more flexibility for the Navy to field C4I capabilities more quickly?

Mr. Bauman: This Administration is committed to removing the bureaucratic obstacles that slow down and hinder the acquisition process. Historically speaking, PEOs were stood up to make the acquisition process more efficient and effective. The primary reason to stand-up PEOs is to reduce the length of the chain of command from the program manager to the milestone authority in the program, and thus allow freer rein to get the job done in a more efficient and effective manner.

In the recent past, DoD cancelled the governing instruction for acquisition, which is the DoD Directive 5000 Series. In light of the cancellation, the Department has issued temporary guidance on how to proceed. Clearly, there is more latitude to do what is smart and efficient while maintaining reasonable oversight and stewardship of taxpayer dollars. This is a very important priority and focus for us.

It is also very apparent that new ideas, and new ways of doing things more efficiently, are very much welcomed by top leadership, both by Mr. Young, the Service Acquisition Executive, and by the chain of command through OSD to Secretary Rumsfeld. The opportunities are here and we still need to maintain appropriate oversight for stewardship of taxpayer dollars, but I think that the system is now open to new innovative ideas. That is going to be a focus for us — to try to generate, advance and test new and innovative ideas on how we can do acquisition more efficiently and effectively. In essence, getting increased capabilities in the hands of our warfighters faster.

CHIPS: I know that your office just stood up November 2002, but can you report any successes since stand-up?

Mr. Bauman: We have made significant progress in determining and organizing the scope and size of our organization. As a result, we have implemented a very flat organizational structure. We have limited layers of management and a limited staff — we are very lean and mean. This is an important accomplishment. Also, the PEO has achieved increased alignment within the goals of the acquisition community and the needs of the warfighter. We can point to some tangible results from this realignment, even in the short period since stand-up. Additionally, our program managers are exercising latitude in proposing new initiatives as a result of the new organization and new focus on acquisition.

CHIPS: Is there anything you would like to add in closing?

Mr. Bauman: Much has happened in a little over a year when discussions began regarding how we can effectively align the acquisition community to support the 21st century joint warfighter. Considering where we are now, we could not have imagined being in such an enviable position from the standpoint of acquiring and fielding the latest C4I capabilities. The stand-up of the PEO is truly a good news story since an increased focus on C4I and space is absolutely critical in realizing the benefits of network-centric warfare.

While PEO-C4I & Space has a different reporting chain than SPAWAR, we are intrinsically linked. We are completely linked with SPAWAR for architecture, technical direction, and the augmentation of the PEO staff with acquisition and engineering talent. We can't do our job without SPAWAR. Likewise, in its role of defining the system engineering C4I architecture and the technical standards, SPAWAR relies on the PEO to provide product focus, expertise, and help in executing the architecture. This bodes well for future successes. You will hear more about the SPAWAR and PEO C4I & Space team in the future.

Integrated Battle Force Training Centers: A new training resource for the Navy

By Dee Quashnock

The opening of the newest Integrated Battle Force Training Center (IBFTC) at Afloat Training Group, Western Pacific, June 17, 2003 marks the completion of fleet-wide IBFTC installs planned by the Chief of Naval Operations. All eight planned locations are now up and running. The IBFTC program was designed to help meet the unique challenge for training associated with the Command, Control, Communications, Computers, and Intelligence (C4I) systems in the fleet — keeping up with the rapid advances in technology that drive new installations in our battle forces. These training labs and classrooms change as the fleet-identified training needs change, through planned upgrades and technical refreshes. The classrooms are designed, maintained, managed and operated in a cross-claimant environment of multiple resource sponsors, across the wide spectrum required to target the C4I needs of the fleet deployer. This investment represents a collaborative use of scarce training resources to provide an extremely agile training environment.

GCCS-M Watch Officer Training at IBFTC MIDPAC

What is the IBFTC?

The IBFTC classrooms are reconfigurable and multipurpose, designed to support delivery of various levels of C4I training from Fleet Introductory Training (FIT) delivered by the Systems Commands (SYSCOMS) to support new systems training, to Functional and Formal Training delivered in Naval Education and Training Command (NETC) schoolhouses operated by the Naval Personnel Development Command (NPDC), to fleet training offered by Afloat Training Groups (ATGs). The purpose is to maximize use of limited resources and address training shortfalls and requirements in Fleet Concentration Areas (FCA), improving both fleet readiness and reducing travel costs.

The IBFTC classrooms were designed by reviewing common technical training equipment (TTE) used in the delivery of C4I training and by developing a classroom architecture that would allow the same rooms to be configured to support numerous diverse courses. Training in the areas of Integrated Shipboard Network Systems (ISNS) and Global Command and Control System - Maritime (GCCS-M) provides the greatest opportunity to maximize the IBFTC resources.

Built to reflect the Navy shipboard networks, these classrooms function as a laboratory environment and are capable of delivering both operational and administrative training objectives. One is a Unix-based GCCS-M classroom. The second is an NT-based ISNS classroom. These rooms can be connected together to further simulate shipboard systems. In San Diego and Norfolk, IBFTC also includes classrooms with Advanced Digital Network Systems (ADNS) and ADNS Sensitive Compartmented Information (SCI) Network TTE. Using removable hard drives, patch panels and programmable switches, the IBFTC can be configured to meet the objectives of a specific course as shown in Figure 1.

Figure 1.

Courses currently offered in IBFTC include: GCCS-M FIT training, ISNS Systems Management, C4I Systems Engineering, Over the Horizon Targeting/C4I, GCCS-M Watch Officer, GCCS-M System Administrator, GCCS-S Afloat Operator, Information Systems Administrator, Network Security Vulnerability Technician, Advanced Network Analyst and Force Over the Horizon Track Coordinator (FOTC) Team Training. Additionally, in Norfolk and San Diego, IBFTC also delivers ADNS Afloat Networks, SCI Networks, and End-to-End Team Training.

Another feature that makes IBFTCs unique is the program investment beyond classroom design and install. Host commands are identified to oversee the daily operation of the classrooms. In most locations, the host command is the local ATG, except in San Diego where Fleet Combat Training Center is the host, and in Bremerton, Wash., where Trident Training Facility is the host. To help with execution of this responsibility, IBFTC training specialists were hired at each location to maintain site configuration, coordinate the classroom scheduling, and deliver training to Sailors and other instructors. IBFTC training specialists are considered a valuable IBFTC investment in maintaining requisite on-site subject matter expertise in organizations structured with a rotational workforce. Additionally, the IBFTC program provides life-cycle support, managing the design for technical refreshes to upgrade, expand and sustain the classrooms. To ensure the TTE will support new and upcoming training objectives, all upgrades and technical refreshes are identified by working closely with both the SYSCOMs and NETC via the appropriate Centers.

Why was IBFTC established?

In October 1998, the three-star admirals in OPNAV N1/N6/N7 recognized that rapid technology insertion, force reductions, and fiscal constraints required the most efficient use of C4I training and technical resources. They signed a formal Memorandum establishing the Navy Communications Information Systems and Networks (CISN) Training Strategy on October 14, 1998. As directed by CISN, delivery efforts are integrated and improved through the implementation of the IBFTC located in each FCA. Historically, C4I training and technical organizations acted independently, without an overarching strategy. This resulted in exces-

sive fiscal burdens, redundancy and uneven quality of technology refresh. The IBFTC Integrated Product Team (IPT) was chartered to manage the operation of the IBFTC program, to improve the Navy's operational and tactical C4I training effectiveness. The IPT is responsible to the CISN Training Working Group (TWG) under the leadership of the Naval Network Warfare Command (NETWARCOM).

IBFTC was funded by CNO in FY01 to install classrooms at major fleet concentration areas. Initially piloted in 2000 in Norfolk and Mayport, Fla., IBFTC classrooms now exist at San Diego, Bremerton and Everett, Wash., Ingleside, Texas, Pearl Harbor, Hawaii, and Yokosuka, Japan.

In FY03 and beyond, NETC is responsible for IBFTC funding. They will play an important part in ensuring that this agile, cost-effective solution continues to meet the C4I training needs of fleet deployers by working closely with the IBFTC IPT, NETWARCOM, CISN TWG, NPDC and the appropriate centers. Space and Naval Warfare Systems Command (SPAWAR) will continue to execute the program design and operational management.

How is IBFTC used?

Fleet C4I training requirements are documented in the Integrated Battle Force Training Web site, which is the fleet's primary management tool for C4I training. Here, ships assign individuals jobs related to C4I operations. These jobs, which are customized by the specific configuration of each ship, have all C4I training requirements listed, including Formal, Functional, Fleet, and FIT training. Thus, the IBFT drives the scheduling of each IBFTC. The schedule in each region is built to meet the maximum IBFT shortfalls resulting from new systems installations, unexpected personnel transfers, and qualifications that could not be resolved in the detailing process. In this respect, IBFTC is a resource for the ships' training officers and IBFT coordinators to accomplish training after they have exhausted options with traditional Navy resources.

Regional training commands (local NETC, fleet, and SPAWAR activities) collaboratively develop each IBFTC schedule to reduce the identified shortfalls in IBFT requirements for local commands. While NETC schoolhouses remain the primary location for NETC Functional and Formal training, the IBFTC provides a capability available to deliver any required training, as long as it is supported by the TTE installed in each classroom. In the last year of operations, the vast majority (60 percent) of training delivered in the IBFTC was fleet training. The SYSCOM-delivered training made up 26 percent and NETC training made up the remaining 14 percent.

By reviewing the regional training resources, the host command determines whether training will be delivered by local military instructors, local contracted instructors, or Mobile Training Teams (MTT). The IBFTC provides the capability to deliver these courses, while the cognizant training agent is responsible for providing the instructors and curriculum. NETC uses Local Training Authorities (LTA) to coordinate the delivery and funding of functional, formal, and nontraditional training delivery in fleet concentration areas. SPAWAR Institute (SI) coordinates FIT for SPAWAR systems. For the last year, LTA, SI, and fleet IBFT coordinators have considered IBFTC as a resource for training delivery, using IBFTC training specialists to work with the host commands to commit IBFTC resources to IBFT requirements. Now that the NETC training centers are standing up, future coordination of the IBFTC resource will include NPDC and the appropriate centers, such as Center for IT, Center for Surface Combat Systems, Center for Surface Operations, and the Center for Cryptology.

What is the value to the Fleet?

One of the best examples of IBFTC value is the recently deployed Carl Vinson Carrier Strike Force. During her availability, USS Carl Vinson was able to accomplish 90 percent of her ISNS and GCCS-M C4I training in homeport. Not only did this improve the Sailor's quality of life, it improved readiness when the Vinson was surged to deploy early to support Operation Iraqi Freedom.

Ideally, all individual training is completed prior to the end of a ship's planned maintenance availability, with most individual training accomplished in NETC schoolhouses. However, training may be required later in the Inter-Deployment Training Cycle (IDTC) because of new system installations, curriculum updates, and detailing closer to deployment. The focus of the IBFTC schedule for training after a ship's Planned Maintenance Availability is usually limited to the shorter NETC Formal, Fleet and SYSCOM courses, since it is often difficult for the ship to send a Sailor ashore for the longer NETC courses during the Ready for Sail period. The IBFTC is a robust resource to deliver this type of training.

Other important services IBFTC provides are the classroom and lab resources in regions where there is no other facility with these capabilities. Traditionally, schoolhouse and TTE resources are funded by training throughput requirements and are based on building classrooms for a single course. In the case of IBFTC, the throughput is determined for multiple courses in a single classroom. This justifies funding for IBFTC classrooms where there was previously a lack of C4I training capability. With IBFTC in place, Training Agents have an improved opportunity to provide C4I training at the waterfront and resolve Regional shortfalls resulting from new systems installations and difficulty in getting individual training accomplished during the detailing process.

What's in the future?

Now that the IBFTC resources are in place, we must look at how to best use them to support the current and future training goals of the Navy. IBFTC exists as an opportunity refresh for Formal training, delivering training in the form of Reusable Learning Objects, meeting more individual training needs during ship maintenance and upgrade periods to improve surge capability, and acting as a tool to transition training from the SYSCOM.

With the formal stand up of Human Systems Integration Engineering in the SYSCOMS, IBFTC could also be used to deliver smaller portions of systems training and obtain direct feedback from the fleet on new system designs. The IBFTC training specialists and other local subject matter experts could be used to help review qualifications of individuals and validate portions of courses, as approved by the centers. Distance Learning and CBT training could be augmented with lab portions performed in IBFTC. IBFTC can also be used as a launching pad for visiting mobile training teams performing classroom training before completing training objectives on board ships. A "delta" course could also be delivered using the IBFTC classrooms, if a significant change in curriculum occurs. NAVSEA is piloting the use of the IBFTC to manage training during the IDTC; this means we will also

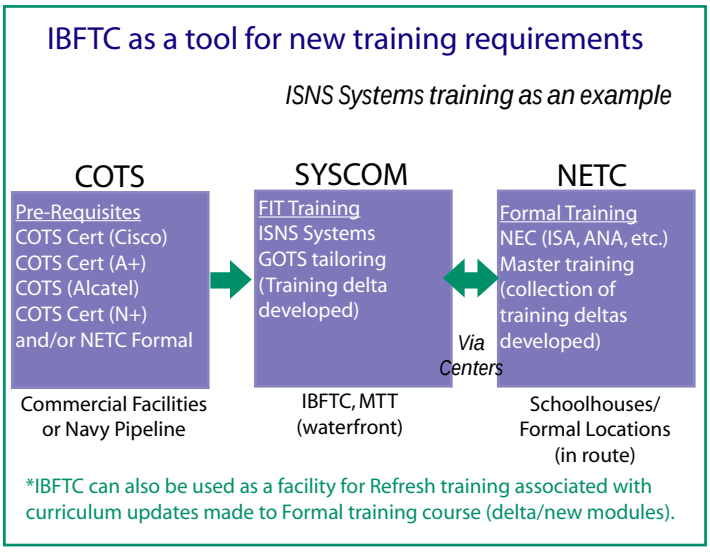


Figure 2.

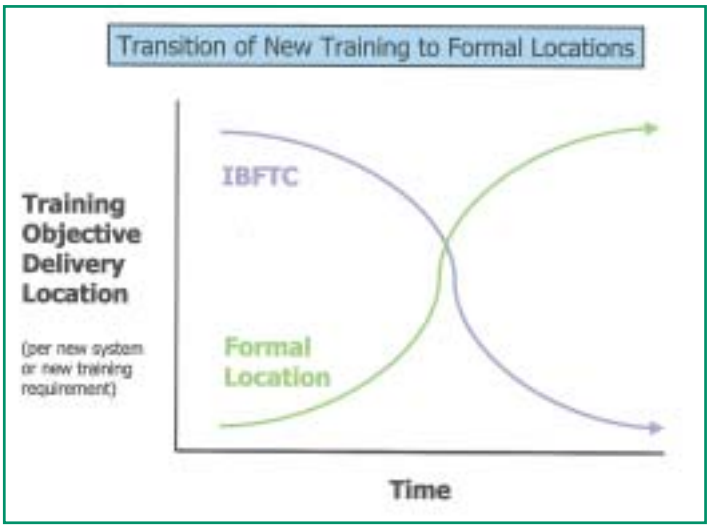


Figure 3.

begin to see more NAVSEA Combat Systems training entering the IBFTC schedule, expanding into C5I (Combat Systems, Command, Control, Communications, Computers, and Information) support.

To show how all this can fit together, Figure 2 depicts the continuum of training delivery associated with managing, maintaining, and operating the ISNS systems on Navy ships. As we improve our training development and delivery, IBFTC is an important tool to get Sailors initially trained on the new systems. The flexible schedule of IBFTC also allows us to pilot new ideas and test new equipment solutions to verify they will be successful when fielded at the NETC schoolhouses. To cite an example, this summer we will see the first use of simulation for ISNS TTE, using a 3-D interactive computer animated version of a TACLANE for training as part of the ISNS Systems Management course.

While IBFTC serves as a resource for initial and interim delivery of training, it is also important to transition any training delivered in IBFTC to formal locations to make room for the next round of new training requirements. The transition of training delivery responsibility from a developing agent to a training agent will generally be done on a course-by-course basis. The newly formed NETC centers will play a vital role in identifying which commands will support a specific training requirement, ensuring they possess the equipment, curricula and people. Figure 3 shows how this transition occurs over time. As we improve our management of Navy training, the time line required for transition will decrease.

The future of C5I training is bright. With resources like IBFTC and new approaches to solutions using existing resources, the Navy training revolution has become a reality. We are making smarter choices for the use of our assets — improving the capability to train the fleet better and faster than ever before.

To request classes in IBFTC, complete a job assignment on the IBFT Web site at https://c4isr.spawar.navy.mil/04/ibft/ and request a quota. You can also contact the host command, IBFTC coordinators, or IBFTC training specialists listed in the points of contact list with any questions or requests about training development and delivery capabilities. Afloat Sailors should propose all training requests through their training officer.

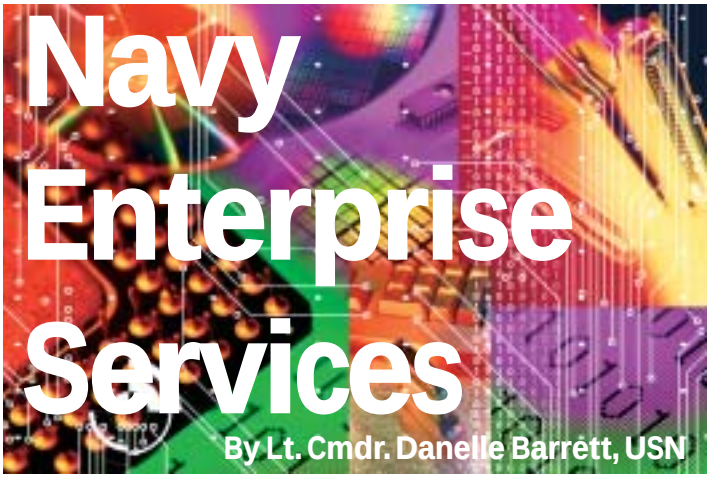
Dee Quashnock is the Head of the Human Systems Integration Department under the SPAWAR Chief Engineer (also the Chief Engineer for ForceNet). Her team is responsible for HSI policy, assessment and assistance to program managers, engineers, logisticians and training managers for C4ISR systems. She was part of the original team that developed the IBFTC and collaborative support concept.

The Integrated Battle Force Training Team Wins The Admiral Stan Arthur Award for Logistics Team of the Year

The Admiral Stan Arthur Awards recognize military and civilian logisticians who epitomize excellence in logistics planning and execution. A Flag/SES panel reviews candidates and selects winners based on innovations which merit special recognition.

The Integrated Battle Force Training Team, from Commander, Space and Naval Warfare Systems Command, was recognized as the Logistics Team of the Year. The team developed the means to provide continuous, up-to-date C4I training to the fleet, and the ability to track training — and to constantly upgrade C4I training curricula. Use of this program is now mandatory for all C4I training for fleet deployers. The team is exporting the program for Commander, Naval Sea Systems Command use.

The award ceremony is scheduled for the afternoon of June 27, 2003, in the Pentagon auditorium.



Navy Enterprise Services

By Lt. Cmdr. Danelle Barrett, USN

The Department of the Navy has a requirement for development of an enterprise architecture that includes the management and resourcing of key enterprise services.

Currently many disparate organizations manage separate pieces of the Naval infrastructure. This results in duplication of effort and resources. A standards-based, enterprise architecture is necessary to ensure the foundation for information transfer between these four main Naval enclaves:

Integrated Shipboard Network Systems (ISNS) - under the Information Technology for the 21st Century (IT-21) Program
Marine Corps Tactical Network (MCTN)
Navy Marine Corps Intranet (NMCI) for ashore networks in the continental United States, Puerto Rico and Hawaii
Base Level Information Infrastructure (BLII) for overseas networks

Additionally, the enterprise architecture must include seamless feeds between the general service and intelligence networks, and the ability to share information between different enclaves using National Security Agency approved multilevel security solutions. This functionality needs to be engineered from the beginning and not added on at a later stage.

Recent reorganizations in the DON and the emergence of new enterprise service initiatives, such as the Navy Enterprise Portal (NEP) and the Navy Global Directory Services (NGDS), have shed light on the requirement for an organization to be assigned responsibilities for governance and resourcing on an enterprise level. In order for ForceNet concepts to become reality, governance authority and resource sponsorship for the enterprise architecture's network services across the four main Naval information systems enclaves must be identified. This governance authority should be a council of lead agents under the direction of the Deputy Chief Information Officer (Navy) and the Deputy Chief Information Officer (Marine Corps) who would make joint decisions regarding these enterprise services and coordinate their efforts through the Department of the Navy Chief Information Officer (DON CIO). The first critical function that this council should perform is the development of an enterprise architecture that addresses the pieces that tie key enterprise services together. Through the DON CIO, this group should work closely with the Defense Information Systems Agency's Net-Centric Enterprise Services group and the National Security Agency to ensure unity of effort to improve joint interoperability. They should also act in a consortium with the other Services and key agencies (e.g., Department of Homeland Security) to determine which pieces of the enterprise architecture should be managed at an agency or government-wide level.

Currently, management authority and funding for enterprise services for each of these enclaves is done within these enclaves, in most cases without regard for the larger issue of building an open standards, vendor neutral, architecture. The inability to manage these services across the four enclaves has resulted in stovepipe solutions being implemented in many of these areas. These adversely impact interoperability between users in the different enclaves, limit access to information, and cause disruptions in mission critical information accessibility and continuity to operational units moving between enclaves (e.g., Marines deploying aboard Navy ships).

One of the most important tenets of a successful Naval enterprise architecture is adherence to industry standards. Standards-based products, without vendor unique proprietary add-ons and features, are essential for maintaining an environment where interoperability and product competition will thrive. Challenges created by technology vendors' products, such as proprietary elements placed on their products, can be overcome, as markets demand compliance with open standards without these elements to improve interoperability. (As in the evolution of video teleconferencing equipment from proprietary to open-based standards.)

Many of the enterprise services are interdependent, thus the importance of developing an architecture across all of the major enclaves. Additionally, the Navy's information interoperability with other Services, agencies, allied and coalition partners will be facilitated by a unified approach to these services. Critics will argue that it is too difficult and unmanageable to try and force single solutions on an enterprise as large as the Navy; that a "one-size fits all" enterprise solution is unachievable or unrealistic. However, there are certain critical functions as discussed, that Naval networks need in order to ensure that information is ubiquitously available to support the warfighter.

Enterprise services are not unprecedented in the Navy and Department of Defense (e.g., the organizational messaging system). Imagine the adverse outcome that an enclave specific approach to organizational messaging would have had on our ability to command and control Naval forces and interoperate with the other Services and coalition partners. That is not the case with many enclave specific solutions and parochial approaches to information infrastructure and services today. The changes required to implement an enterprise architecture are more cultural and political than technical and the benefits to improved knowledge management and information transfer far outweigh the costs of implementation.

Some work has already been done on several key services of the enterprise architecture. One area where the DON has had a measure of success with enterprise services is the Public Key Infrastructure. While execution of the architecture, including issuance of user hardware and software for operation has been slower than originally planned, there is a governance authority and process for implementation of this critical service across all enclaves. In other cases, efforts have not been started at all due to funding or lack of governance, or have been stalled through institutional inertia. Several key enterprise services and their status:

Navy Global Directory Services (NGDS). This effort provides the critical foundation that many of the other enterprise services rely upon to operate. The NGDS will provide an authoritative directory infrastructure across the enterprise identifying each Navy person (active duty, retired, reservist, civil servant and contractor) using a unique electronic identifier, or flat name (e.g., john.doe), referred to a Lifetime Digital Identifier. The NGDS directory should synchronize across the four enclaves and would provide support for many enterprise services such as Single Sign On, Navy Enterprise Portal, Universal E-mail, and Electronic Role-Based User Access, which all require this authoritative directory to function. An excellent architecture for NGDS and a replication process have been developed by Space and Naval Warfare Systems Command (SPAWAR) for the Navy. However, no organization has been assigned governance of this piece, it is unfunded, and does not include the Marine Corps.

Navy Enterprise Portal (NEP). The Navy Enterprise Portal effort falls under the purview of Task Force Web (TF Web). TF Web is a Vice Chief of Naval Operations special project chartered to set standards for Navy Web enablement and implement an enterprise infrastructure to support Web services. The NEP is currently the only enterprise Web services front-end solution that complies with the DON's Navy Marine Corps Portal (NMCP) Policy. Alignment of responsibility to oversee implementation of the enterprise portal solution is anticipated this year to provide continuity as Task Force Web reaches its lifecycle end in 2004. It is hoped that this new group will also be able to positively influence enterprise architecture development of other key services discussed here beyond the portal.

Single Sign On (SSO). There are many groups within Navy pursuing SSO solutions in which a user would have one login and password for all applications and services with credentials passed and authenticated behind the scenes. Unfortunately, most of these efforts are enclave or application specific solutions, and there is no group with governance and funding to implement an enterprise SSO solution for the Navy and Marine Corps. TF Web has done extensive testing on industry-standard compliant solutions and has a SSO solution implemented with the NEP. The Secure Access Markup Language (SAML) for inter-domain SSO is continuing to be refined by the standards bodies and TF Web has selected a commercial product for the enterprise solution that complies with this standard. TF Web is also working with the Fleet Numeric Meteorological Operations Center to leverage their work on an open source SAML version 1.0 compliant SSO solution that may be used at lower lifecycle cost. Imperative for the successful implementation of any SSO solution across the enterprise is the availability of the global directory services piece and an architecture to support replication of these directories between the enclaves.

Universal E-mail. Navy and Marine Corps personnel should have a universal e-mail address that they maintain "cradle to grave" so they never have loss of continuous communication as they move between duty stations. The Universal E-mail address, similar to that used within the NMCI enclave (john.doe@navy.mil) would follow the individual throughout their career and into retirement. Users would have the ability to forward their e-mail using a Web-based simple mail transfer protocol redirect service via the NEP to a local Microsoft Exchange account without ever having to change an e-mail display address. This would not be a centralized Exchange account solution like that implemented by the Army. A centralized mailbox solution for the Navy enterprise is undesirable as all Navy ships and remote users would still need local Exchange servers to handle mail when they are disconnected from their satellite links. Currently, lack of a global directory service, governance, and funding for the enterprise are stalling this effort.

Collaborative Tools. In a policy memorandum issued November 1, 2002, the Secretary of Defense mandated that the Joint Interoperability Test Command must certify all collaborative tool solutions by October 1, 2003, or they would not be authorized for use on DoD networks. However, there is no process or governance authority in the DON that ensures that only approved collaborative tools that will work successfully across the enterprise are selected and implemented. The result is a proliferation of disparate collaborative tools being used throughout the Department of the Navy causing interoperability problems.

Document Management and Workflow Tools. There is no one group with governance or control of funding to implement an enterprise solution for these functions. Subsequently, there are many stovepiped document management and workflow tools implemented in the Navy resulting in duplication of data at various sites. This results in a loss of confidence in the fidelity and authoritativeness of data, inability to easily search and apply intelligent agents to find information across the enterprise, and high costs to the Navy for duplicative infrastructure.

Network Monitoring. Within each enclave different network monitoring hardware and software are used. There is no enterprise approach to ensure elimination of duplicative efforts, or at least increase the likelihood that these different elements will communicate.

Replication and Synchronization of Information Between Ship and Shore. While this capability exists today to some extent with Collaboration at Sea (CAS), Lotus replication tools are currently not capable of handling the large amounts of data that will be moved between ship and shore once all applications are Web enabled. What is needed is a capability to efficiently handle the replication of data between relational database management systems (RDBMS), static data, and flat files common in Naval application infrastructures. Engineering to support this requirement must include an option for robust asynchronous replication and synchronization of RDBMS, static data, and flat files required by afloat units. Additionally, enterprise architecture plans need to include identification of standards for data compression and prioritization, and a means to maximize their use so that afloat commanders can receive the information they need in the order they need it.

Shared application, content and data storage afloat. The traditional client-server architecture afloat places an enormous burden on the ship with respect to power, air conditioning, space consumption and manpower. In a Web services environment, shared infrastructure will alleviate much of this burden. Standards for Web services development have been established by TF Web in the Navy Enterprise Application Developer's Guide and the Web Enabled Navy Architecture Version 2.0. Per Vice Chief of Naval Operations directive, application owners are responsible to ensure compliance by April 2004. Enterprise architects must en-

sure sufficient capacity and capability of shared shipboard infrastructure to host these services. New systems design must comply with the enterprise architecture and this shared infrastructure as prerequisites. Program managers will be key beneficiaries of this shared infrastructure, as they will see vastly reduced cost and complexity in deploying new services for deployed forces.

Shared application, content and data storage ashore. Critical to supporting the afloat Web services environment in an enterprise architecture is a data warehousing capability for pre-staging content for afloat users. Infrastructure, connectivity, and processes need to be identified in the enterprise architecture to support pre-staging of content at the Naval Computer and Telecommunications Area Master Stations (NCTAMS) teleport sites for information to be moved afloat. Additionally, processes must be established and solutions engineered to ensure synchronization of afloat data from the teleport sites back to the authoritative sources of data throughout the shore Navy.

Today, the Navy has no enterprise solution for providing Web data services and content storage. The result is that each individual command pays for Web servers, database engines, content servers, Web server system administrators, engineers and developers. They either do this through divisions set up and maintained within their command, or they contract out for the service. Under the NMCI contract, commands can add data storage and Web site service to their contract, but this does not address cross enclave data service standardization issues, particularly replication and data accessibility for users outside NMCI. Additionally, it does not help to identify and eliminate duplicative sources of data as anyone willing to pay can host their content within NMCI.

Maintaining thousands of separate static and dynamic Web servers and databases for content hosting/storage throughout the Navy is inefficient operationally and fiscally. With the advent of the NEP, a presentation mechanism for Web service is in place through the enterprise for interface of data to the end user. As mentioned, the data warehouse could be collocated at the teleport sites managed by the NCTAMS to host the content for these services. The advantages to having Web services content hosting in the enterprise architecture include cost savings due to elimination of individual Web infrastructure at individual commands, savings in manpower and training, improved security by using only DoD standard firewall and router configurations at the teleport sites, easier implementation of a user role-based access service, easier identification of authoritative data sources and elimination of duplicative data sources.

Engineering of these key services into an enterprise architecture under an enterprise-wide governance structure will enable ubiquitous access to data securely, reliably, and rapidly throughout the Naval enterprise. This enterprise architecture will be the basis for achieving the seamless warfighting described in Sea Power 21.

Lt. Cmdr. Danelle Barrett is an Information Professional Officer assigned to OPNAV 09W. She works on the Task Force Web.

ITs NETWORKING THE FUTURE

By JO1 Jd Walter, Naval Personnel Development Command Public Affairs

In today's high tech, network-centric operational environment the Navy's Information Systems Technicians (IT) represent the core of a command's ability to get and stay connected. In an era of joint strike, multi-platform, network-centric warfare, information technology is central to mission accomplishment and operational readiness. To ensure the Fleet has the best trained Sailors at the ready, the Center for Information Technology (CIT) was stood up onboard Fleet Combat Training Center San Diego, Calif. The Center is charged with providing training that meets the needs of the Fleet using the most relevant and efficient delivery methods supporting the personal and professional development of all ITs in the Navy.

"This is a great day for the Navy," said Commander, Naval Personnel Development Command, Rear Adm. Kevin Moran. *"Establishing the Center for Information Technology marks a significant milestone in the Revolution in Training. In this Center we have created for the first time a single entity responsible for content, curriculum, delivery, and resources for IT training, and for management of information technology in the Navy."*

Working with the Naval Network Warfare Command (NETWARCOM) and the Information Professional Center of Excellence (IPCOE), CIT is building on the efforts of the Task Force for Education through Commitment to Education and Learning (EXCEL). The initial Job Task Analysis (JTA) for the IT rating is currently being used as a foundation for review of existing curriculum and development of new IT training. Additionally, an Information Professional (IP) Officer community JTA is under development in support of the IP Officer basic course and career planning tools for the IP community. Working closely with the Fleet to identify needs and requirements, this effort will ultimately give information technology professionals easier access to career development resources and opportunities, by providing the right training, at the right time, and in the most appropriate location. *"A key part of our mission is ownership of the process for Sailors' personal and professional development through the Sailor Continuum. We are responsible for training and education of all ITs in the Navy from the moment they enter the service to the day they depart,"* said CIT Commanding Officer Capt. Craig Turley. *"Our goal is to enhance both operational readiness and mission accomplishment. Ultimately, information technology touches each and every member of the Navy."*

Unique from its sister Learning Centers, CIT is taking a cross functional approach to the realm of information technology, and provides training to eleven ratings (IT, ET, CTO, CTM, CTT, CTR, STS, ET, FT, FC and OS).

"We are taking training and education to a new and unprecedented level," said Moran. *"We will make the greatest Navy in the world and the best Sailors in the world, even better. Together, we are going to create an educational system that will be the standard all others will follow."*

For more information on the Navy's Revolution in Training and the Center for Information Technology, please log into Navy Knowledge Online at www.nko.navy.mil.

Andrew Cox, Technical Director PEO-C4I & Space Talks about Rapid Prototype Insertion and Delivery System

CHIPS: What is your role at PEO-C4I & Space?

Mr. Cox: As the Technical Director for PEO-C4I & Space, I provide technical guidance for the development and engineering related activities to support the warfighters.

CHIPS: What is RAPIDS?

Mr. Cox: RAPIDS is a set of mandated software development guidance within the PEO. In short, it is technical guidance. From a contracting perspective, it is the way we will do business from now on. All new development will be compliant with RAPIDS guidance.

We are looking into a "limited open source environment," in which there will be several open source development projects where third party developers can contribute to the software or code baseline. Using this open source development model will extend the development community to anyone interested in a certain product line. This means that instead of one person writing the code for a program, the source code will be open to a larger set of interested developers so they can contribute to the baseline.

CHIPS: How was the concept of RAPIDS developed?

Mr. Cox: RAPIDS is about software development guidance for our development community to make sure that when we write software code it is portable, scalable, extensible and better supports the warfighters. This is a huge improvement in the way we do software development today. Value can be added to the application without having to do any real software development. This is the direction we are working toward with our product line.

The concept started a few years ago, during a trip to the Naval Strike and Air Warfare Center (NSAWC) at NAS Fallon, Nev. NSAWC is responsible for training aviators in strike warfare. While there, we noticed they built an application to manage strike targets. It was a well-built tool, however, they were not using the infrastructure that we provided, because the interface was cumbersome to operate. That sent a clear signal to all of us that we could enhance our products to better support the warfighters by making them more agile. We formulated a plan to support the warfighter better by putting tools in their hands. The advent of IT-21 enabled them to do their own development using commercial products. Our goal is to get the software development practice to support innovation, not only within the fleet, but at all levels and in a joint manner.

We are developing a Web site that lists the components for items such as targeting, weather, supply, logistics and situational awareness. Both internal and external developers and the fleet can take these components and customize their own applications.

CHIPS: What about the security issue in using an open source product?

Mr. Cox: The security issue has two sides — one side believes an open source product allows developers to see the internal mechanisms in the code and, therefore, this makes it more vulnerable. The other side believes that by offering source code to a wider community developers will be able to find and fix the holes faster. It is not our intention to make the source code for our software available on the Internet, but at the same time we will protect it and make it available to a wider community.

CHIPS: What are RAPIDS' objectives?

Mr. Cox: The main goal is to support the fleet and the warfighters by maximizing the reuse of software. We want to get to the point where we are not building capabilities two or three times over, but that we do it once in a single service that is improved, modified and reusable for other projects.

Another important goal is a concept we call "speed to capability." This capability means getting enhancements into the hands of the people who can use them while the technology is fresh. If we can go to a resource for a complete list of services and applications that can be utilized within a program, then we can get the capability to the warfighter faster. We believe by having all of these components in a particular area moving toward this distributed development model we can get software out the door significantly faster.

CHIPS: How soon will there be an improvement to IT-21 by using this method?

Mr. Cox: There are projects undergoing an improvement effort right now. The largest is something called Web COP (Common Operational Picture). Web COP is on our open source site now and we are currently migrating it to an open source model. Within six months this effort will be available for fleet use.

Currently, requirements that come in from the fleet take time to validate, fund and fold into a program baseline. In most cases, by the time that is done the requirement has either changed or evolved. We are going to get ahead of this cycle where the requirement may come in from the fleet, as a prototype, which they will write using our code. They may take the code and add a new interface, a new button, or make the interface more user-friendly — which may be the new requirement. In other words, they will be telling us how they want the software to look and operate. The unspoken question here is, *"Could you please put this into production and make it a real tool?"*

Now we can respond to that need and not necessarily have to go through that expensive process of interviewing the fleet to try to figure out what they need and translate that into technology. They can help us in the development process upfront in defining the requirements. Once the requirements are completed, the software, which is flexible, will provide the speed to capability, which is again, our main objective.

CHIPS: How are you working the contracting aspects associated with requiring "unrestricted government data and software rights" for all RAPIDS compliant software?

Mr. Cox: This is one of the more challenging parts of the RAPIDS development. In some instances, contracts do not explicitly give the government unrestricted data rights to the software which the govern-

ment has paid to develop so the code cannot be made available to other agencies for reuse. We will ensure that our development practices have unrestricted rights to the software, so that if a better way comes along or a better application is available we will have the flexibility to include that initiative into the development.

CHIPS: How are you going to integrate RAPIDS into the existing portfolio of C4I applications?

Mr. Cox: This will occur within a short amount of time. The plan is to dictate the RAPIDS development environment to all the software development activities so that the new applications undergoing development will be modified from an architectural standpoint to meet certain objectives. As GCCS, NTCSS and METOC applications evolve into this new architecture and as new patches or upgrades are developed they will be immediately deployed.

CHIPS: How are you going to enable or encourage reuse of RAPIDS software components for new warfighter capabilities?

Mr. Cox: One aspect of our contracting strategy will be to figure out how to entice people to reuse components. This approach involves some developers opening up the development environment and breaking down the walls and barriers to collaborative development. When we open the environment and make it more difficult to own all the code and dominate development in a particular area, we will compensate contractors by offering incentives to reuse software components. For example, when a contract is awarded, the developer can be compensated for a "loss of monopoly" on that particular development for the percentage of code reused. We want to encourage development contractors to participate. We are actively looking for incentives to encourage them to reuse code.

CHIPS: Can you tell us about the Distributed Development Website Environment (DDWE)?

Mr. Cox: DDWE will be the location for developers to submit their code and product line. This site will be managed by PEO C4I & Space. DDWE will provide the environment where applications and source codes can easily be managed. For example, if METOC receives a submission from one of their contractors, the application and source code will be available to them on DDWE. They will be able to control who receives the application code and who is allowed to see the source code. The program manager may decide to restrict the availability of the source code or open the source code to a larger community. The site will also provide the configuration management tools required to manage open source projects. If another developer sees an area of code he believes he can improve he will be able to check out the code, make the modifications and compare the code with the changes so it can be folded into the main baseline project. The DDWE is going to provide all these tools and the environment for code delivery, enhancement and configuration management.

CHIPS: How are you going to give access to the RAPIDS development site to fleet personnel — can you discuss how this will operate?

Mr. Cox: I do expect fleet users will be able to download components comprised of our Programs of Record. We will deliver products to the fleet, and they will have access to all the tools that went into building that product. Think of it as a child's Erector set, where we will be able to build a robot, but also be able to have the nuts, bolts and everything that came in the box available to the fleet. They are going to be able to assemble and reassemble capabilities in many different ways without rewriting the code.

CHIPS: Can you talk about how RAPIDS will result in time savings?

Mr. Cox: There are no statistics yet to describe the amount of reduced time to market or increased speed to capability because the project has just started. But, intuitively we are anticipating significant efficiencies simply by knowing that if we write the code and applications smarter — and that's an advantage of RAPIDS — capabilities will get to the market faster.

CHIPS: What about Navy Test and Evaluation requirements since Navy requires testing before implementing anything new on IT-21?

Mr. Cox: We are not expecting test requirements to change. Developers and programmers will take their programs through the standard development process. They will also take it through their proper certification authorities. However, we will require some small change in the way we do testing and fielding. Once a program has gone through that process, and they have had a product evaluated and certified, the components that went into building that product will be available for reuse in different ways. This means we will work with the test communities so they understand that we will not be rewriting the entire piece of software that we just certified or evaluated, but will be reusing those components in a different manner. The test community will need to figure out how to avoid complete recertification of essentially the same base code that just has already been certified and has only been reassembled in a different way than previously fielded.

CHIPS: Has the Navy used this method before?

Mr. Cox: There are many programs that have gone down this path. Currently, I think the difference is that we are mandating this as a development practice for an acquisition command. This differs from most efforts that we have seen to date. Basically we are formalizing a new development philosophy as a method of development for all our products. We concluded that our software must be more modular and flexible in order to effectively manage change. We are aggressively working with Naval Sea Systems Command and PEO IWS (Integrated Warfare System) to merge development documentation and philosophies among our organizations. This is significant because a majority of Navy products produced at the Systems Commands will be more flexible and we will all be able to send capabilities into the fleet faster.

CHIPS: How do you see this method working in a joint environment?

Mr. Cox: By making software code accessible to other development partners there will be more flexibility in interacting with the other Services. If a component performs an operation similar to what one of the other Services does, then we can collaborate on that development together and move forward with a single common product that is used jointly by all the Services. Interoperability will be greatly improved by this process and that is the name of the game in joint warfare.

CHIPS: Are you working with DARPA or industry partners?

Mr. Cox: Yes, portions of the first product that we put on RAPIDS, the Web COP, were developed by DARPA. Since this is such a relatively new project there is a very small list of developers that have come onboard as partners in this development process. We anticipate that will expand with time.

Deployable Multi-Channel SATCOM

By Lt. John P. Perkins, USN, Public Affairs Officer, Commander, Naval Special Warfare Group TWO

In an environment where information, intelligence, and communications shape the battlefield, United States Special Operations Command (USSOCOM) has developed, and is now testing a satellite system with the assistance of Naval Special Warfare Group 2 (NSWG-2) and two Army Special Forces units that will enhance Special Operations Forces (SOF) ability to execute special operations missions throughout the world.

U.S. Navy and Army Special Operations communicators-specialists pose in front of the Deployable Multi-Channel Satellite (DMCS) system Apr. 23, 2003. Developed by United States Special Operations Command, the Navy and Army Special Forces communicators are testing the new system. The DMCS will greatly enhance Special Operations Forces capabilities to deploy C4I combat support anywhere in the world. Official U.S. Navy photo by Lt. John Perkins.

NSWG-2, 112th Signal Battalion, 7th Special Forces Group, and USSOCOM Acquisitions and Logistics started a User Assessment Test (UAT) of the Deployable Multi-Channel Satellite (DMCS) system Apr. 10, 2003, at the NSWG-2 command building. This tri-band antenna is capable of transmitting and receiving in the X-, C- and Ku-bands at bandwidths of greater than 10Mbp. The UAT concluded with a final test at the NSWG-2 command building Apr. 22 and 23. The antenna has the newest design in satellite reception. "The DMCS will greatly enhance SOF capabilities to deploy with C4I [Command, Control, Communications, Computers and Intelligence] combat support anywhere in the world," said Senior Chief Electronics Technician Andrew Hale, NSWG-2 communications leading chief petty officer.

The new system, which is smaller and lighter than existing systems, can process information and data faster and handle greater bandwidth. Using the DMCS, the Mobile Communications Detachments that deploy with SEAL (SEa, Air, Land) Teams will be able to provide SEALs with more information and intelligence via unclassified and classified e-mail, telephone access, and Web browsing. This system provides a leap in technology over what the Mobile Communications Detachments have been able to provide previously. This significantly lessens the existing burden on other SOF commands that are currently providing vital C4I services to the deployed SOF warriors in the field.

"DMCS worldwide access puts information, intelligence, and communications at the warfighters' fingertips," said Hale. "We can provide these services in remote or deserted areas — anywhere in the world. It represents a great C4I advantage for the forces we support."

What makes the DMCS unique is its ability to transmit and receive data in three channel radio frequencies, and its unheralded capability to be reconfigured to transmit and receive data from one frequency to the other quickly and easily. Current systems can only receive and transmit the X- and C-bands and take hours to reconfigure the entire system between the two frequencies.

"This new system will make deploying Naval Special Warfare commands and SEAL Teams more independent and flexible in meeting the C4I needs of today's and tomorrow's Special Forces," said Hale.

CHIPS: How soon do you expect to deploy the DMCS in real combat?

ETCS Hale: The system is under test right now. We are going to have to wait for certification letters to come back from multiple agencies. Once that's done, we expect to have about another 60 days of testing. So we may be looking at August for deployment.

CHIPS: How much time and how many operators does the DMCS take to assemble? Do you need any other equipment to operate the DMCS?

ETCS Hale: By the operational requirements document, the ORD, there is a requirement for the system to be able to be constructed in 30 minutes by two operators. When we deploy forward, obviously we have to maintain battlefield quiet so we use big diesel generators. The gasoline driven generators we use in testing just provide the power we need to drive the antenna. We would have to use the 6500 because the antenna draws a lot of power. The average run of the mill generator doesn't cut it. You can't just plug that antenna into a wall socket.

CHIPS: What technical advancements led to the technology leap to make the DMCS capabilities possible?

ETCS Hale: We have broadened our SHF baseband signal and we have taken it out to an SHF level 4 IF [Intermediate Frequency] transmission. Currently that frequency transmission will handle everything at the SHF level. What we have done with this system is use an L-band intermediate frequency to handle everything going out. We bring in our baseband, we run it through commercial modems, and bring it up to an L-band IF and use that all the way out until we get to the final amplifier. The benefit is that it works in X-, C- and Ku-bands. We can use that L-band IF to work in all three of those frequency bands. So it gives us the ability to rapidly change out the components to reconfigure for another

band because we don't have to change everything to change that intermediate frequency. The other side is that we can remote (or remove) our baseband interface module within well over 200-feet for remote use of the antenna because we can use fiber optic at that L-band. We have a fiber optic interface and we can run it out remote that way.

CHIPS: How does the DMCS improve capabilities in the field?

ETCS Hale: It all gets down to bandwidth. The DMCS can pull in more bandwidth than we have ever had before. I can trunk in a T-1 without batting an eye, as long as my distance gives me that bandwidth. I can bring in a T-1 and set up a command and control facility for Special Operations Forces that is unparalleled to what we have ever been able to do in the past. That's more computers, more telephones, more secure lines, and VTC capability — anywhere, anytime.

CHIPS: What about imagery?

ETCS Hale: Absolutely, we can move higher resolution imagery at a faster rate but essentially we still get down to where we have 24 DS-0 (DS Zero) circuits. We have a T-1 or better so I can shove whatever I want into it — a high-resolution image, VTC or voice over IP (VoIP) capability with telephone systems — with quality of service at the very high end, extremely high-fidelity. We have echo canceling capability as well. The voice quality literally sounds like we are picking up from a telephone in your house.

CHIPS: Can ground forces using the DMCS communicate with the fleet?

ETCS Hale: Absolutely, once we tie back into our network operation support center, once we are the NOSC we have SIPRNET connectivity. We are in the SIPRNET, we can communicate via commercial telephone lines and the Defense Red Switch — and they [the fleet] can call us too.

We have a 2.4-meter dish made of composite material with easy construction. From that the beam gets focused down into the projector which is the piece sitting at the very front end of the dish. And that's one of the key components that we can change out rapidly — we can change out the projector from X- to C- or Ku-band. The beam comes back down through the waveguide into an amplifier. On the transmitter side the amplifier obviously is going out. On the receive side, it goes through a low noise amplifier back into the system. All that information is trunked down into what we call an antenna electronics case that is environmentally conditioned. It can handle humidity. It can handle rain. It can handle extreme cold. It has everything built into it, so that we can leave it out with the antenna system. From there, it goes through a down-converter, it's put on the fiber and brought into our baseband side.

The operators are put through some pretty intense training. To be a special warfare communicator you have to be able to work with radio equipment from ELF (Extremely Low Frequency) all the way up to EHF (Extremely High Frequency) and beyond. It takes a great deal of skill to be a special warfare support communicator. There is not much that these guys can't do. We put them through the ropes before we put them out in the field.

CHIPS: So all of the operators are capable of troubleshooting the equipment if it is not working the way it should?

ETCS Hale: Yes, they are troubleshooters, they are configurers, most of our Information Systems Technicians are network configuration types. A good number of our Electronic Technicians can do it too. They program routers and switches and build an IP structure. They know the operations side of the world as well as the RF portion and on top of that we require SOF people to be able to pick up any manpack radio and get on the horn and talk. In the same way, the Army folks who are supporting us have specialized training also. Special operations support and communications are critical — we only pick the very best. Those who don't quite make it, we will move on their way. We hold on to the best. These folks working on the DMCS are the stars of SOF.

ETC Alan Willis operates the remote control panel that controls the satellite frequency for the DMCS.

Staff Sergeant Brown, USA, 112th Signal Battalion, Fort Bragg, N.C., said, *"This is a special piece of equipment. We can go in the middle of nowhere and provide local communications. I'm really ready to get out in the field and put it to the test."* Sergeant Treloar, USA, 7th Special Forces Group, Fort Bragg, N.C., said, *"This system provides us with a lot of capabilities that most Special Operations Forces have not worked with. It provides us with wide capabilities via telephones, Internet, SIPRNET, NIPRNET and more."*

DMCS Delivery

SPAWAR is responsible for Life Cycle Sustainment Management of the DMCS to include Configuration, Management, Logistics, Item Manager and Training. There will be 20 DMCS terminals issued as part of the first order with additional orders planned. The Psychological Operations (PSYOPS) program will be issued nine from the first order. CHIPS asked Frank Glover, team lead, Tampa Operations Center, SPAWAR Systems Center Charleston about SPAWAR support once the DMCS is deployed in the field.

Mr. Glover: If there is a faulty or missing component, they can call us and in CONUS, within 24 hours we will have a replacement to them, for OCONUS we can deliver within 48 hours. If there is a technical problem or an issue to be resolved, we will try to work the issue from here, but if they need on-site support — we will send a technician. We send technicians to various locations worldwide whenever it is required.

Some of the equipment will be continuously upgraded, but some is fairly stable. It depends on what portion, for example, the antenna, amplifiers and up- and down-converters are stable components. The baseband pieces, multiplexors, and routers will be upgraded because they will become obsolete fairly quickly. We will do technical insertions and software and firmware upgrades continuously.

Talking with Captain Mark Greer, USN
Director of the Office of Naval Intelligence IT Directorate

Capt. Mark Greer is the 2003 recipient of the Award for Meritorious Service to the Intelligence Community by the Armed Forces Communications and Electronics Association (AFCEA). The award recognizes Greer's accomplishments in the discovery and application of creative technical solutions to complex information management challenges. His achievements include the introduction of an XML-based Digital Intelligence Environment, the goal of which is to improve intelligence support to end-users by fundamentally changing the way analysts produce and disseminate intelligence to warfighters at sea and ashore.

CHIPS: Can you talk about the technology for the XML-based Digital Intelligence Environment in relation to disseminating intelligence to warfighters at sea and ashore? How it was developed and how it is used?

Capt. Greer: The XML-based Digital Intelligence Environment at the Office of Naval Intelligence (ONI) has three principal components: a Maritime Intelligence Portal, a Topic Map-enabled Knowledge Base, and an XML authoring environment. The Portal is the only component most people will see and it directly supports warfighters both at sea and ashore. The Portal provides a single interface to every bit of intelligence data at ONI. It enables the precise retrieval of data from multiple databases and its display in a manner chosen by the warfighter. It is sort of analogous to creating your own homepage on AOL. Precise retrieval of data from standard relational databases is pretty straightforward. However, as anyone who has ever used a commercial search engine can tell you, precise retrieval of unstructured text is a far different matter. That's where XML comes in.

The IT Directorate Watch Floor

Extensible Markup Language (XML) is a standard means of "tagging" or describing text in such a way as to permit an automated understanding of its underlying structure and content. It is sometimes useful to think of XML "metadata" as being akin to the Dewey Decimal System we have all used in the library. The Dewey Decimal System is a standardized mathematically-based way of categorizing the subject matter of books. In much the same way, XML data tags categorize the content and structure of the text they are associated with. We use an XML-based authoring environment (built to very closely resemble Microsoft Word) so that XML tags are applied as each analyst creates text. This XML-tagged text is then stored in a Topic Map-enabled Knowledge Base. A Topic Map is a really neat way of organizing data, which allows for each data element to have multiple associations or relationships to other data elements. So now we have a way for a warfighter to log into our Portal and precisely retrieve any data he needs, whether it is in a traditional structured relational database (for example, Order-of-Battle data) or textual analytical reports.

CHIPS: I see that the directorate built the Digital Intelligence Environment using commercial-off-the-shelf (COTS) products. Did you use COTS because it was less expensive — you could deploy your products more quickly, what were your reasons?

Capt. Greer: When there exists commercial technology or COTS that meets your operational requirements, you are almost always much better off using it than government designed and built software or GOTS. Because it already exists you can deploy it much more quickly and the government has found that over the entire life cycle of a system or application, the costs are much lower when using COTS technology.

CHIPS: What has the directorate's participation been in meeting the demands of assisting in the Global War on Terrorism, Operation Iraqi Freedom and global maritime intercept operations?

Capt. Greer: ONI's IT Directorate has been extensively involved in supporting the Global War on Terrorism, Operation Iraqi Freedom and global maritime intercept operations. First and foremost, we are responsible for providing the entire IT infrastructure at ONI regardless of which classification level or security domain is being used. We provide about 3,000 desktops for approximately 1,500 users operating at three principal classification levels — Unclassified, Secret, and Top Secret/Sensitive Compartmented Information (TS/SCI). Each of these security domains is supported by its own unique Local and Wide Area Network (LAN and WAN). We also provide video teleconferencing (VTC) capabilities on all three networks. The directorate maintains all the associated storage, application, e-mail and various other servers.

We also have a department, which maintains any GOTS applications developed by ONI and integrates new COTS software products into our environment. We have been actively engaged in searching for new technology to meet the increased demands placed on ONI in these new mission areas. There is an increased emphasis on data mining and link analysis software to make sense of the volumes of data we are receiving and we have introduced some promising software in support of these needs.

ONI's support to the Global War on Terrorism and global maritime intercept operations has required a significant expansion of our 24X7 intelligence watch. In support of this effort, the IT Directorate recently finished a complete redesign and renovation

The Office of Naval Intelligence

of our watch floor [shown on previous page]. This state of the art watch floor now supports 35 analysts on a 24X7 basis and all the accompanying IT infrastructure including a Knowledge Wall composed of 10 (75-inch by 48-inch) monitors capable of displaying multiple video feeds for enhanced situational awareness.

The IT Directorate is home to the Joint Deployable Intelligence Support Systems (JDISS) Joint Program Office (JPO). The Navy is the Executive Agent for this joint program which provides a variety of intelligence support systems to joint warfighters, including the Global Command and Control System-Integrated Imagery and Intelligence (GCCS-I3); which is the joint counterpart to the Navy's Global Command and Control System-Maritime (GCCS-M) system, the Collection Management Workstation (CMWS), which provides support to Intelligence, Surveillance, Reconnaissance (ISR) managers, and several systems which support intelligence sharing with coalition partners. It is no exaggeration to say that virtually every command center (both joint and Service specific) in the U.S. Central Command's forward theater of operations supporting Operation Iraqi Freedom used at least some of the systems built and maintained by the JDISS JPO.

CHIPS: I can't imagine the level of security required in the Office of Naval Intelligence. Can you talk a bit about this?

Capt. Greer: As I mentioned earlier, we support IT operations at three principal security levels. Security requires us to keep these domains separate, so we have three parallel cabling and switch infrastructures. Care must be taken to ensure that the physical separation of these networks prevents inadvertent data exchange. We have a very robust Information Assurance posture (firewalls, intrusion detection systems, filters, etc.) supporting our operations at each of these security levels. In addition, individual systems and applications are subject to extensive security testing prior to being allowed to operate in this environment. Intentional movement of data between these networks is very carefully controlled to prevent the introduction of more highly classified data on a network or system operating at a lower classification level.

Capt. Greer reported to ONI in 1998, as program manager for the JDISS. In June 2000, he assumed his current post as Chief Information Officer. Under Greer's leadership, the IT Directorate carried out the infrastructure work to relocate the Chief of Naval Operations Intelligence Plot and the entire staff of the Director of Naval Intelligence several times following the September 11 terrorist attack on the Pentagon. The IT Directorate has also created new, and tailored existing systems and databases to meet the demands of the Global War on Terrorism, Operation Enduring Freedom, Operation Iraqi Freedom, and global maritime intercept operations.

Announcing New Contracts under the DON IT Umbrella Program

PeopleSoft Enterprise Agreement Established

On behalf of the Department of Defense Enterprise Software Initiative, the Department of the Navy IT Umbrella Program and the Navy Inventory Control Point, Mechanicsburg, Pa., have established an Enterprise Agreement for PeopleSoft enterprise resource planning software and services. The agreement provides software license, maintenance, training, installation and implementation technical support.

PeopleSoft USA, Inc. (N00104-03-A-ZE89)
(800) 380-SOFT (7638)

Enterprise Agreements Established for IBM/Informix Database Products and Popkin Enterprise Architecture Tools

On behalf of the DoD ESI, the Army Small Computer Program has established an Enterprise Agreement for IBM/Informix database software licenses and maintenance support at prices discounted 2 to 27 percent off GSA Schedule prices. The products include IBM Informix Dynamic Server Enterprise Edition (version 9), IBM Informix SQL Development, IBM Informix SQL Runtime, IBM Informix ESQL/C Development, IBM Informix ESQL/C Runtime, IBM Informix 4GL Interactive Debugger Development, IBM Informix 4GL Compiler Development, IBM Informix 4GL Compiler Runtime, IBM Informix 4GL RDS Development, IBM Informix 4GL RDS Runtime, IBM Informix Client SDK, IBM Informix Dynamic Server Enterprise Edition (versions 7 and 9), and IBM Informix D.M. Gold Transaction Processing Bundle.

IBM Global Services (DABL01-03-A-0002)

On behalf of the DoD ESI, the U. S. Army Small Computer Program and Popkin Software have entered into a Department of Defense (DoD)-wide Enterprise Software Agreement for Popkin enterprise architecture and modeling tools, also known as Architecture Modeling Solution - Popkin, or AMS-P. Available products and services include the System Architect enterprise architecture and modeling tool set, and add-on options such as the C4ISR Extension, SA Simulator, XML Architect and DOORS Interface.

The U.S. Army Enterprise Software Initiative
Popkin Software & Systems Inc. (BPA DABL01-03-A-0001)

For more information go to the DON IT Umbrella Web site at **www.it-umbrella.navy.mil** or ITEC-Direct at **www.itec-direct.navy.mil**.

The JTRS Revolution

By Capt. Todd G. White, USAF

Have you ever imagined the Radio Frequency (RF) spectrum as a weapon system? Software defined radios in the form of the Joint Tactical Radio System, referred to universally as JTRS (pronounced jitters), have led warfighters throughout the Department of Defense (DoD) to join forces and look at the RF spectrum from a completely new perspective.

"JTRS is much more than just another radio ... it's a revolution in the way warfighters will access and employ the RF spectrum in DoD in the future. The JTRS revolution ranks among the most significant transformation events within the world of communications taking place in the RF spectrum domain today, delivering virtually the entire RF spectrum to the warfighter in a single family of radios. JTRS cuts across all operational platforms, all Services, all frequencies, throughout the tactical, operational and strategic levels of warfare," said Col. Charles "Whitey" Whitehurst, Director of the Global Communications & Information Directorate (SC) of the Air Force Command and Control and Intelligence, Surveillance & Reconnaissance Center, Langley AFB, Va.

As the military moves toward a network-centric communications environment, it is imperative that we move from legacy equipment that performed one function (HF, UHF, VHF, SATCOM) to a family of radios that provides the means for digital information exchange. JTRS supports joint operations by providing the capability to transmit, receive, bridge and gateway among similar and diverse waveforms and network protocols within the RF spectrum. Connectivity to civil and national authorities is possible as well as connectivity to vertical, horizontal, and joint and coalition warfighting elements.

Advances in areas such as embedded processor technology, digital converter performance, and object-oriented programming have enabled a shift from hardware-intensive radios to flexible, multi-band, multi-mode software radios, in which functionality is provided through software rather than hardware. A software-defined radio permits operators to tailor the radio to meet specific operational needs by using relatively generic hardware and loading multiple software waveform applications that meet identified requirements. The flexibility of a programmable software radio allows the warfighter to accommodate various physical layer formats and protocols. This allows the Services to host the entire RF spectrum, HF, UHF, VHF, SHF, etc., on a software format and install those waveforms inside the JTRS radio system. JTRS is a family of radios that is "platform-agnostic" yet "mission-specific" for each platform, and represents the OSD solution for spectrum dominance.

On Oct. 14, 2002, the Assistant Secretary of the Air Force for Acquisition (SAF/AQ) tasked the AFC2ISRC to develop the Air Force JTRS migration plan, utilizing the current 32 different primary waveforms currently being developed by the JTRS Joint Program Office. "Six months ago, we were talking in terms of 2 MHz to 2 GHz," said Whitehurst. "We looked at the JTRS airborne radio only in terms of the channels on the radio, a power amplifier and additional RF frequencies. That way of thinking was fine to meet current operational requirements, but it didn't address future requirements which we anticipate will reach 54GHz. JTRS is far more than a radio replacement program ... it's a totally new way of thinking about communications," Whitehurst added.

A major tenet for JTRS is the easy insertion of advanced technology. Since the radio is software driven, any inherent change in the software capabilities has minimal (if any) impact on the resident hardware. In the first iteration of the JTRS system, it was possible to install a variety of different frequencies on available ports, but the number of ports was limited. While this equated to a major leap forward from previous technical solutions, it did not fully exploit the capability of JTRS since it did not fully exploit the processing capacity of the radio. The latest JTRS system will migrate away from this type of thinking entirely and incorporate all programmable components within one relatively small unit.

When we think of multi-mission platforms, an airborne platform that can perform more than one mission, we usually think in terms of large wide-body platforms. We are driven to this due to the space required to host electronic, communications and support equipment. One example of this is employment of the Roll On/Off Beyond Line of Sight Equipment (ROBE) on the KC-135, which allows the aircraft to perform both the air-refueling mission and Line of Sight/Beyond Line of Sight extension of Link 16. The scalability of JTRS allows it to be easily installed in virtually any platform within the Air Force inventory, including hosting waveforms on missiles and smart bombs.

Imagine a flight of F-15s en route to a theater of operations. On their ingress/egress, equipped with JTRS radios, they perform a variety of missions currently being conducted by large, wide-body platforms. They transmit and receive RF signals over the entire frequency spectrum, functioning as both fighter aircraft

Cont'd on page 47

Col. Charles "Whitey" Whitehurst demonstrates a current JTRS Cluster-1 radio (left) and a two-channel Cluster-4 prototype radio. Photo by Capt. Todd G. White.

Cont'd from page 18

and XP all have good security starting with requiring a user log on. There are other operating systems available that offer security and a GUI-based interface such as IBM OS/2, Linux and Unix. There are many flavors of Unix from AIX (IBM's version of Unix) to Santa Cruz Operations (SCO), Solaris, Sun, etc. Unix is designed for the expert user and suited for people who know how to program in the C language or write script files. Unix, just like Linux, is very flexible making detailed configurations possible.

Linux is a Unix flavor that is open source or freeware. If you want support there is a fee. There are numerous variations of Linux but providers such as Debian, Caldera, Mandrake, Redhat, SuSee, etc., all offer different interfaces. I will discuss the Redhat version because it is what I am most familiar with after working with the client and server versions 7.x through 9.x.

Redhat lets the user choose between the Gnome or KDE GUI when it is installed. I found that you can easily select either interface or you can select the command mode. Linux still lacks driver support and this is where Microsoft seems to excel. However, Redhat does provide an open packaging system, RPM Package Manager files that assist in the installation of devices with some devices being recognized automatically. Redhat hardware requirements are: 200MHz Pentium or faster, 4.5GB of available disk space, 192MB of RAM for the graphical mode and separate partitions for its file system. If you purchase Redhat, it will include Basic Support.

OS/2 Warp is IBM's client/server system that will typically run on a RS6000 or Intel compatible PC. IBM is still working to make the OS/2 interface easier to use. OS/2 Warp 4 requires a minimum of a 486DX, 16MB of RAM and 10GB of available space, however, I suggest a system that is a 300MHz Pentium or faster with 128MB of RAM with 20GB of available space.

Macintosh's operating system is now Unix based with release X designed to run on the iMac™, eMac, Power Mac™ G4, Power Mac G4 Cube and PowerBook G3/G4 systems. It requires a minimum of 128MB of RAM, 4GB of available disk space, and it will only run on Apple and Macintosh systems. Macintosh systems can run Window applications with use of third party software products such as Virtual PC from Connectix.

Today's market includes a buffet of operating systems. If you are a novice user, then MS Windows or Macintosh would be the better choice. If you are an average user and desire greater flexibility with your O/S, then you could use an open source system such as Linux with a GUI interface or if you are running IBM equipment, you could use OS/2. If you are an expert user you could consider one of the many flavors of Linux and Unix. MS Windows 2000 and XP Pro both offer a wide assortment of features to delight an expert's appetite as well.

When you select your operating system know what you need according to hardware, cost, knowledge level and your project tasking. *Does your day-to-day work include only word processing tasks or are you testing C programs? Do you work with graphics? What are your future plans? Do you have to follow certain corporate or command policy standards for an operating system?*

Use the links below for more information:

www.apple.com www.ibm.com
www.linux.com www.microsoft.com
www.redhat.com www.unix.com

If you have questions on the operating systems offered under our IT Umbrella Contracts, please go to our Web site at: www.it-umbrella.navy.mil.

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NKO Puts Learning Tools at Your Fingertips

By JO1 Jd Walter, USN, NPDC Public Affairs Office

Writing a paper or need information for college, work or pleasure? Need more material than you can find through Internet searches or can't get to the local library? Visit Navy Knowledge Online and tap into the Gale Expanded Academic ASAP, and Student Resource Center - College Edition.

Brought to NKO by the Naval General Library Program, the Gale resources are the result of a partnership between the library program and the Gale Group. This partnership provides Sailors access to full-text resources including over 41,000 primary source documents and one of the most comprehensive collections of magazines and journals in virtually all subject areas. You can find topical essays and biographies and critical analyses with current full-text periodicals and newspapers. A member of the Thomson Corporation, Gale is a world leader in eResearch and educational publishing for libraries, schools, and businesses.

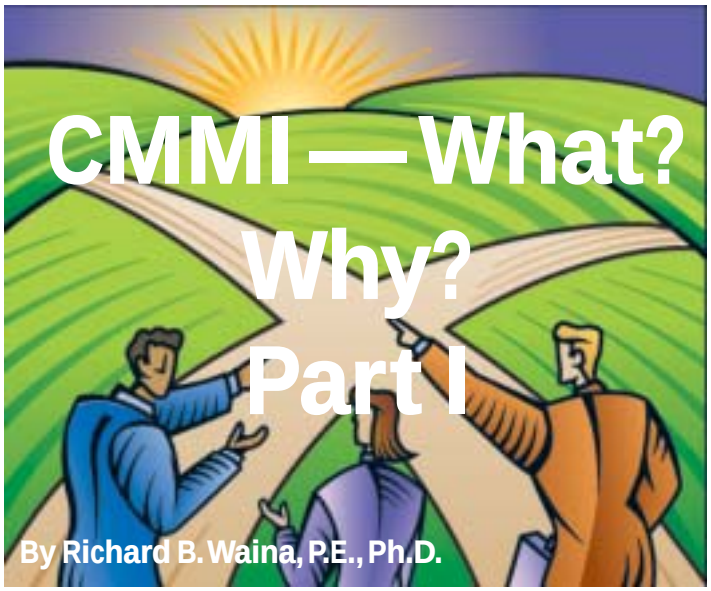
Also featured on NKO, courtesy of the Naval General Library Program, is Peterson's, another Thomson Corporation Company, dedicated to connecting individuals, educational institutions and corporations through numerous online products. For locating facts and figures try Gale Student Resource - College Edition for balanced, in-depth coverage in all the academic disciplines, delivering answers for both the novice and experienced researcher — all in one seamless search.

Other student resources include: sample CLEP and SAT tests and CLEP Study Guides; college and university links; a distance learning program, financial aid and test preparation assistance; and career exploration materials.

"These resources are the perfect fit for NKO," said Capt. James Kantner, Naval Personnel Development Command Knowledge Management Director. *"We are creating a learning environment that is dedicated to providing Sailors the tools and resources to excel, whether the Navy creates them or not."*

The Naval General Library Program in partnership with NKO is continuing its transformation into a "brick and click" organization providing research services to Sailors Afloat and Ashore that began in 1995 with Library Multimedia Resource Centers installed onboard ships and submarines.

To explore Gale or Peterson's visit **https://www.nko.navy.mil** and click on **My Education**.



This series of articles is intended to provide insight into the development, structure and application of the CMMI.SM The next article will focus on appraising organizational practices using a CMMI (Capability Maturity Model Integration) reference model.

Overview

The Software Capability Maturity Model® (CMM®) was produced by the Software Engineering Institute in 1991 to provide guidance for software organizations to use when developing processes. Its successful application resulted in the development of other CMMs for a myriad of disciplines, including systems engineering, software acquisition, and workforce management and development. Some of these were developed by national bodies, and some by individual organizations. For example, I architected and implemented the Electronic Data Systems Value Delivery Framework utilizing maturity modeling principles. Although these models have proven useful to many organizations, the use of multiple models has been problematic.

The differences among these discipline-specific models limit an organization's ability to successfully focus their improvement efforts across the various disciplines employed. Further, applying multiple models that are not integrated within and across an organization is more costly in terms of training, appraisals and improvement activities.

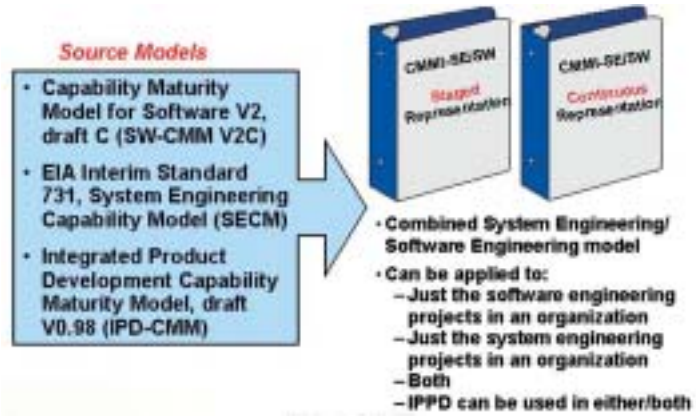


Figure 1.

The CMM Integration project was formed to address the problem of multiple CMMs. The CMMI Product Team's mission was to combine three source models into a single improvement framework for use by organizations pursuing enterprise-wide process improvement. The team built a CMMI Framework which permits the generation of multiple CMMI models addressing various disciplines (see Figure 1). The first model created was the CMMI for Systems and Software Engineering. Currently available CMMI models are shown in Table 1.

Table 1. Currently Available CMMI Models
CMMI-SW, Version 1.1 (Software only)
CMMI-SE/SW, Version 1.1 (Systems and Software Engineering)
CMMI-SE/SW/IPPD, Version 1.1 (add Integrated and Process Development)
CMMI-SE/SW/IPPD/SS, Version 1.1 (add Supplier Sourcing)

Additionally, there are two different representations available for each model— staged and continuous. Consequently, an organization has to decide (considering both disciplines and representations) which of the available CMMI models best fits their process improvement needs.

Representations

The staged architecture, employed in the Software CMM and others, is portrayed in Figure 2. Each Maturity Level has specific Process Areas (PAs) associated with it. The Maturity Level 2 Process Areas focus on getting documented processes in place at the project level. Maturity Level 3 provides a framework of standard processes for leveraging best practices across the organization. Maturity Levels 4 and 5 focus on detailed process and product metrics for control and improvement. The staged architecture provides a proven sequence of improvements, beginning with basic management practices and progressing through a predefined and proven path of successive levels, each serving as a foundation for the next.

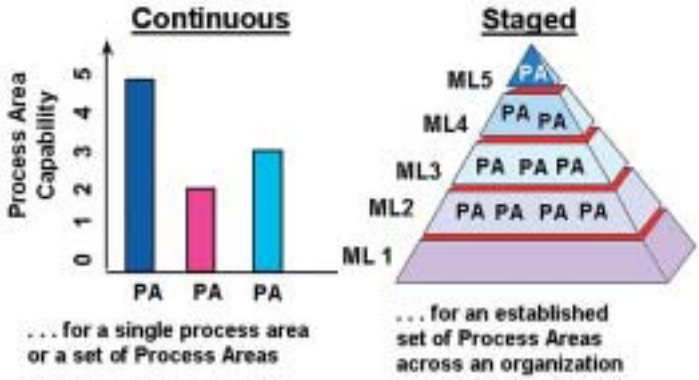


Figure 2.

The continuous architecture, also illustrated in Figure 2, was first implemented in the Systems Engineering CMM. It focuses on specific Process Areas; each PA can be rated at a Capability Level ranging from 0 to 5. These Capability Levels are analogous to the Maturity Levels of the staged architecture, but applied at the Process Area level. Each Capability Level has an associated Generic Goal, discussed in the next section. The continuous architecture has the advantage of providing a fairly well-defined improvement path for a specific PA. It allows the organization to select the order of improvement that best meets their business objectives. However, using the continuous architecture can make it difficult

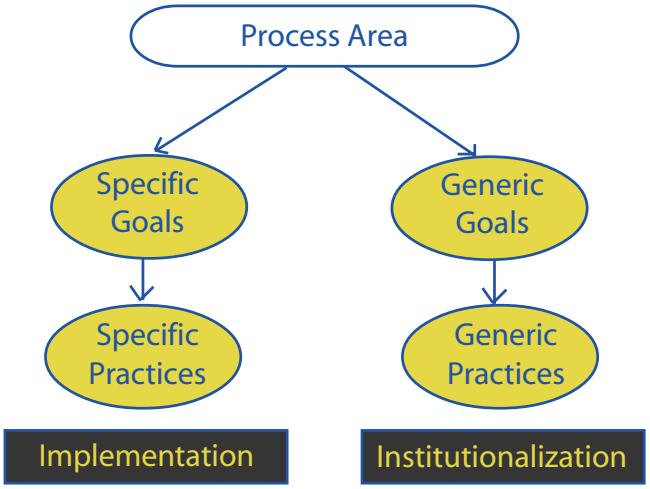


Figure 3.

to provide guidance to an organization which is attempting to rationally allocate limited improvement resources across a number of PAs.

The staged and continuous representations of the CMMI models are identical at the detailed goal and practice level (except for the base and advanced practices in the continuous representation). Therefore, implementation of the two versions (for the same components) will be identical. The only question is the order of component implementation. These priorities will be driven by the needs of the organization, which are a function of the business purposes and current problems.

Process Areas, Goals and Practices

Process Areas are the major building blocks in establishing the process capability of an organization. They contain clusters of related practices which collectively achieve a set of goals (e.g., project planning). Each PA has one or more goals. A goal is a high level statement of the outcome to be achieved by effective implementation of a group of practices. Practices describe actions necessary to enact key elements of a process area.

Each Process Area within the CMMI has Specific and Generic Goals and Practices (see Figure 3). The Specific Goals and Practices focus on the activities performed to achieve the objectives of that Process Area. For example, the Requirements Management Process Area has one Specific Goal and five Specific Practices. The Specific Goal is "Requirements are managed and inconsistencies with project plans and work products are identified." The Specific Practice short titles are: Obtain an Understanding of Requirements, Obtain Commitment to Requirements, Manage Requirements Changes, Maintain Bidirectional Traceability of Requirements, and Identify Inconsistencies between Project Work and Requirements.

Generic Goals and Practices focus on institutionalization; institutionalization implies that the process is ingrained in the way the work is performed in the organization. In the continuous representation each Capability Level has an associated Generic Goal, as portrayed in Table 2. Generic Goal 1 requires only the performance of the Specific Practices associated with Capability Level 1. Generic Goal 2, Institutionalize a Managed Process, requires the implementation of ten Generic Practices addressing issues such as organization policy, process planning and documentation, training, stakeholder involvement, and process performance verification and review.

In the staged representation the Process Areas associated with a given Maturity Level are required to achieve the Generic Goals associated with that Level. For example, at Maturity Level 3 the Requirements Development Process Area must achieve Generic Goal 3, Institutionalize a Defined Process. In addition to the Generic Practices for Level 2 there are two Practices associated with Level 3: Establish a Defined Process, and Collect Improvement Information. These reflect the fact that Maturity Level 3 expects an organizational approach to process development and implementation.

Institutionalization Issues

Institutionalization is a critical aspect of process improvement and it is an important concept within each Maturity or Capability Level.

Table 2. Continuous Representation Capability Levels

Capability Level	Process Description	Generic Goals
0	Incomplete	None
1	Performed	The process supports and enables achievement of the specific goals of the process area by transforming identifiable input work products to produce identifiable output work products.
A performed process is a process that satisfies the specific goals of the process area. It supports and enables the work needed to produce identified output work products using identified input work products.		
2	Managed	The process is institutionalized as a managed process.
A managed process is a performed (Capability Level 1) process that is also planned and executed in accordance with policy, employs skilled people having adequate resources to produce controlled outputs, involves relevant stakeholders; is monitored, controlled, and reviewed; and is evaluated for adherence to its process description.		
3	Defined	The process is institutionalized as a defined process.
A defined process is a managed (Capability Level 2) process that is tailored from the organization's set of standard processes according to the organization's tailoring guidelines, and contributes work products, measures, and other process-improvement information to the organizational process assets.		
4	Quantitatively Managed	The process is institutionalized as a quantitatively managed process.
A quantitatively managed process is a defined (Capability Level 3) process that is controlled using statistical and other quantitative techniques.		
5	Optimizing	The process is institutionalized as an optimizing process.
An optimizing process is a quantitatively managed (Capability Level 4) process that is changed and adapted to meet relevant current and projected business objectives.		

Institutionalization, as noted previously, is addressed by the Generic Goals and Practices. Each of the Maturity or Capability Levels has the following characteristics.

A managed process is institutionalized by:
•Adhering to organizational policies
•Following established plans and process descriptions
•Providing adequate resources (funding, people, tools)
•Assigning responsibility/authority for performing the process
•Training the people performing and supporting the process
•Placing designated work products under appropriate levels of configuration management
•Identifying and involving relevant stakeholders
•Monitoring and controlling the performance of the process against the plans for performing the process and taking corrective actions
•Objectively evaluating the process, its work products, and its services for adherence to the process descriptions, objectives, and standards, and addressing noncompliance
•Reviewing the activities, status, and results of the process with higher level management, and taking corrective action.

A defined process is institutionalized by:
•Addressing the items that institutionalize a managed process
•Establishing the description of the defined process for the project or organizational unit
•Collecting work products, measures, and improvement information derived from planning and performing the process.

A quantitatively managed process is institutionalized by:
•Addressing the items that institutionalize a defined process
•Controlling the process using statistical and other quantitative techniques such that product quality, service quality, and process performance attributes are measurable and controlled throughout the project

An optimizing process is institutionalized by:
•Addressing the items that institutionalize a quantitatively managed process
•Improving the process based on an understanding of the common causes of variation inherent in the process such that the process focuses on continually improving the range of process performance through both incremental and innovative improvements

Process Area Grouping

Process Areas are grouped into four categories: Process Management, Project Management, Engineering, and Support. Table 3 shows the grouping, as well as the Maturity Levels associated with each PA in the staged representation. Keep in mind that for an organization to be rated at Maturity Level 3 in the staged representation, all the Level 2 Process Areas must satisfy both Generic Goal 2 and Generic Goal 3; that is, the Level 2 PAs must be operating at Capability Level 3.

Table 3. Process Areas by Group and Maturity Levels

Group	ML2	ML3	ML4	ML5
Process Management		• Organizational Process Focus • Organizational Process Definition • Organizational Training	• Organizational Process Performance	• Organizational Innovation and Deployment
Project Management	• Project Planning • Project Monitoring and Control • Supplier Agreement Management	• Integrated Project Management • Risk Management • Integrated Teaming • Integrated Supplier Management	• Quantitative Project Management	
Engineering	• Requirements Management	• Requirements Development • Technical Solution • Product Integration • Verification • Validation		
Support	• Configuration Management • Product and Process Quality Assurance • Measurement and Analysis	• Decision Analysis and Resolution • Organizational Environment for Integration		• Causal Analysis and Resolution

Maturity Levels 4 and 5 also require all relevant PAs to achieve at least Capability Level 3. It may be that particular Process Areas of a Level 4 or Level 5 organization attain Capability Level 4 or Level 5, but this is not a requirement of the staged representation.

Conclusion

This article provided a brief overview of the development and structure of the CMMI. Future articles will focus on providing more details about CMMI appraisals and implementation and transition.

Capability Maturity Model® and CMM® are registered in the U.S. Patent and Trademark Office.
CMM℠ Integration is a service mark of Carnegie Mellon University.

Sources:
Capability Maturity Model Integration, Version 1.1, CMU/SEI-2002-TR-002, December 2001.
Capability Maturity Model for Software, Version 1.1, CMU/SEI-93-TR-24, February 1993.

Richard B. Waina, P.E., Ph.D., Principal of Multi-Dimensional Maturity, has over 35 years experience in information technology. He worked for five years at White Sands Missile Range, and worked on a number of missile programs at Hughes Aircraft Company, including Maverick for the USAF, Phoenix for the DON and TOW for the USA. At EDS he was responsible for deploying process maturity assessment methodologies globally. Dr. Waina is an SEI-authorized CMM and CMMI Lead Assessor/Appraiser and instructor for the Introduction to CMMI. He has conducted over 70 CMM/CMMI assessments in nine countries since 1990. He holds engineering degrees from Carnegie Mellon University, New Mexico State University, and Arizona State University. His Web site is www.mdmaturity.com.

SPAWAR Europe

By Maria Whittington, Media Specialist

SPAWAR Europe is a Department of the Navy (DON) leading-edge engineering organization specializing in providing Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR), and information technology support to the joint warfighter. With a highly-skilled technical support staff of nearly 70, SPAWAR Europe has become the premier source for C4ISR and IT support in Europe.

The need for SPAWAR Europe became apparent when Dave Arellanes, an employee from SPAWAR Systems Center (SSC) Charleston was chosen to permanently relocate to Germany and lead the Bosnia Command and Control Augmentation (BC2A) project. Due to requests for assistance from European commands, SSC Charleston quickly decided to open a European office to provide high-quality in-theater C4ISR and IT support for Department of Defense (DoD) commands. Located in Stuttgart, Germany, this office is now headquarters for SPAWAR Europe. SPAWAR Europe continued to expand operations with offices in Spain, Italy, England, Bahrain and Switzerland. Our mission is to enable knowledge superiority for the joint warfighter by planning, developing, implementing, and managing effective and integrated C4ISR, IT and space systems.

SPAWAR Europe is organized into three branches, each with a distinctive focus. The C4ISR Information Systems Branch, led by Tim Mooney, is located in Stuttgart, Germany with a staff of 17, consisting primarily of engineers and computer specialists. This branch supports all C4ISR and special IT related projects. Their scope of projects includes satellite communications, LAN/WAN engineering, Web/database development, systems integration, exercise support and commercial communications support. This branch also provides on-site technical staff support for key customers such as the U.S. European Command (EUCOM).

The C4ISR Systems Engineering Branch, located in Heidelberg, Germany, is led by Mark Held. This branch is comprised of 29 personnel supporting U.S. Army Europe, V Corps and 5th Signal Command. Personnel provide services that include C4I project engineering, systems engineering, network engineering, systems administration, Web development, and communications exercise planning.

The Maritime Information Systems Branch, collocated with U.S. Naval Forces Europe in London, is temporarily led by Joe Keane. This branch is comprised of a staff of eight, geographically dispersed at major Navy commands in Europe and Bahrain. Their primary focus is the Navy and Joint Maritime environment in Europe and Southwest Asia — the largest group of personnel collocated with the fleet in Italy. Jim Condon provides overall leadership and is responsible for all aspects of the technical and business operations for SPAWAR Europe.

Customers and Projects

SPAWAR Europe supports virtually every major command located in Europe. Our largest customers include: U.S. Naval Forces Europe (NAVEUR), EUCOM, U.S. Army Europe (USAREUR), U.S. Marine Forces Europe (MARFOREUR) and U.S. Air Force Europe (USAFE).

Major C4I projects include:

- EUCOM Information Dissemination Management (IDM) Engineering
- EUCOM Global Broadcast Service (GBS), Theater Information Management
- GBS support to numerous commands
- U.S. Army MWRNet
- V Corps C4 engineering and technical support
- U.S. Army Europe G6 C4 engineering and technical support
- U.S. Navy Base Level Information Infrastructure (BLII)
- Software, database and Web development for numerous commands
- 5th Signal Command Program and Project Management Office (PPMO)
- Electronic Security Systems (ESS) for the entire Stuttgart military community

Operation Iraqi Freedom

We also provide engineering and IT support to the joint warfighter in support of Operation Iraqi Freedom. We provide high-tech support to EUCOM and V Corps for communications network planning, satellite management, information dissemination management and global broadcast service. SPAWAR Europe personnel have deployed to the Persian Gulf to support operations. Keith Robertson, a member of the Heidelberg Branch, is traveling with and providing technology support to the three most senior generals in V Corps. The Stuttgart Branch is providing technical support to Special Operations units.

SPAWAR Europe Now and in the Future

When SPAWAR Europe stood up in 2000, it was comprised of nine personnel located in Stuttgart, London and Naples. Due to our record of providing outstanding customer service with a highly-skilled staff, SPAWAR Europe has doubled in size each year and now totals almost 70 personnel. The greatest growth area has been in support of the joint warfighter.

With the added incentive of a living quarters allowance and the opportunity to frequently travel throughout Europe, we have attracted some of the most highly-skilled engineers and technical specialists available anywhere. Mark Held summarizes the future of the organization best, *"Our growth is a result of delivering quality, cost-effective technical support and turnkey solutions to commands throughout Europe."* Future plans include continued joint warfighter emphasis, perfecting customer service — and expansion into additional European countries.

SPAWAR Europe continues to excel at their mission by enabling knowledge superiority for the joint warfighter by providing effective and integrated communications, networks and intelligence systems.

For more information visit the SPAWAR Europe Web site at https://www.eur.spawar.navy.mil.

Building The Problem Solving Machine: Team Building Guidelines for IT Project Managers

By Eric Verzuh, PMP

Successful Information Technology projects may depend on using a specific technology, but when projects require more than one person to complete they also require teamwork. This article will provide a vision of a high-performance team and guidelines every project leader can follow to improve team performance.

How big a difference does successful teamwork make? Read just the opening lines from one of the classic books written on IT management, first released in 1987 and updated again in 1999, *Peopleware: Productive Projects and Teams*, by Tom DeMarco and Timothy Lister. Chapter One, entitled *"Somewhere today, a project is failing,"* says it all: *"Since the days when computers first came into common use, there must have been tens of thousands of accounts receivable programs written. There are probably a dozen or more accounts receivable projects underway as you read these words. And somewhere today, one of them is failing. Imagine that! A project requiring no real technical innovation is going down the tubes. An accounts receivable program is a wheel that's been reinvented so often that many veteran developers could stumble through such projects with their eyes closed. Yet these efforts sometimes still fail."*[1]

DeMarco and Lister coined the term "peopleware" to analyze an often ignored dimension of Information Technology management: *the human beings who develop and maintain the IT infrastructure.* Routinely referred to as "our most important asset" and at other times merely as "resources," the individuals who make up IT project teams are more often than not the primary determining factor in a project success or failure.

Use your own experience to test this hypothesis. Think of the projects that stumbled along with interminable meetings that mercilessly beat the same immobile horse; the paralysis associated with consensus; designs where every ounce of innovation was sacrificed to the lowest common denominator among the stakeholders — finally leading to a completion that should have taken six weeks, but actually took a full year. Over and over again it becomes clear that our biggest obstacle often isn't technology — it is the way in which we work together.

A high-performance project team — a team that accomplishes much and enjoys the process — has many attributes, many more than can be fully addressed in a single article. In this article, the second in a four-part series on the art and science of project management, we will focus on the capabilities that enable a team to quickly, confidently, and consistently produce high-quality solutions to complex problems. I refer to such a team as a "Problem Solving Machine" and this article will reveal the three characteristics that you can develop to unleash the productivity of your own PSM. We'll finish with specific steps you can take to build one yourself.

The Problem Solving Machine

What is this machine and how does it relate to project management? Think of IT projects as essentially a series of problems to be solved. This is the difficult part of IT projects — solving problems — and this is the part that can slow our progress to an imperceptible crawl. What problems? Start with the business need for the project. That's usually a problem or an opportunity that we need to understand before the IT requirements can be clarified. Then comes the problem of defining the IT requirements, the problem of selecting the solution, the problems associated with detailed design, etc., — one long series of problems. To make matters worse, most of these problems require group solutions. The more abstract the problem and the larger the group of people that influence the decision, the less likely any progress will be made. This is why we need the PSM. The PSM is the kind of team that can take on problem after problem, working through each one in a steady, predictable manner, producing realistic decisions in a timely manner and, most amazingly of all, emerging from each problem stronger, more energized, and excited to take on the next challenge.

Most of us have been part of these teams and we would love to repeat the experience. If you are a project manager, creating a PSM is the greatest gift you can give your team members and yourself.

Characteristic 1: A Positive Environment

Project work can be hard work. The problems that we try to solve in IT projects can be difficult, and the process of solving them can be draining to team members. It is no wonder IT workers continue to report a high degree of "burnout." That is why a positive team environment is so important, because it acts as a source of energy for the team. There are at least four components that are necessary for a positive environment:

√ Trust among team members. Trust is the foundation of productive team relationships. Teamwork is highly interdependent work. When you can trust that I will keep my commitments and my word can be taken at face value then you can begin to rely on me.

√ Open communication characterized by effective listening. Effective communication is necessary to discuss and analyze problems and solutions. More than any other communication skill, the ability to listen well — to truly understand the meaning and intent of another person — will enable the group to work together successfully. An often recommended listening skill is to be able to paraphrase and summarize what another person said to ensure we understand the meaning. Equally important is the ability to suspend our own judgments and abandon our own argument while we try to understand the ideas of our teammates. As

the team exhibits this skill it increases its ability to explore complex ideas and, consequently, it strengthens its ability to disagree on a subject without threatening team relationships.

√ Value people for their individuality. Each team member brings a unique set of skills, style and experience — make use of it. This is easy to say, but in practice many of us would rather surround ourselves with team members whose skills or style of problem solving resembles our own. However, mature teams recognize that diversity strengthens the team in the way that biodiversity strengthens a forest. Mature teams seek out members whose participation will broaden the skills and perspectives of the group, and accept the reality that some members will see the forest, some the trees, and others the leaves. Valuing the individual also means actively drawing out all team members, and asking each of them to play to his or her strengths.

√ Acknowledge the need to make mistakes. A PSM knows that the journey will contain twists and turns. Solving tough problems requires tenacity and creativity. If we are afraid of making mistakes we are likely to miss opportunities as well. A healthy PSM does not avoid admitting a mistake, but they do avoid repeating it.

Another component that exists on many PSMs is a sense of humor. These teams can poke fun at themselves and often laugh together. This is exactly the type of attitude that allowed the term "Problem Solving Machine" to be coined in a playful, upbeat, confident conversation about why a team was working so well.

A positive environment makes it safe to challenge ideas and each other. That's vital because if we are to innovate, to be creative, we must take risks. If I am afraid to suggest a novel approach or take a contrary stand then the team loses the one unique advantage humans will always have over computers and machines: our imagination.

Characteristic 2: A Conscious Collaborative Process

When a group of individuals tries to understand and solve a complex problem, one of the challenges they face is that each member has a unique method and speed for working through the facts and testing ideas. The detail-oriented team member may want to check some facts while the big-picture thinker is already choosing a solution. At the same time, a conflict can emerge over what, exactly, is the problem we are trying to solve? A PSM avoids this frustration by having explicitly-defined methods of working together through these decisions. There are essentially three categories of processes for which the PSM has defined practices:

√ Decisions. Teams make decisions in several ways, including voting, consensus, in a subgroup, or autocratically. Each approach has its advantages and drawbacks. For example, consensus decisions offer the greatest participation of the group and therefore tend to be both thorough and well-supported. But consensus decision-making is time consuming and laborious and not always warranted. The PSM understands that there are different methods for making a decision and will shift among them, according to the importance, complexity and speed required.

√ Conflict. Disagreements arise among the closest of friends, so it is also natural to find them on a project team. Choosing a vendor, a technology tool, a risk mitigation strategy, etc., can all generate conflict between team members as each strives for the best solution. This kind of conflict, while natural, is an obvious threat to team relationships. Immature teams often respond to conflict with unproductive behaviors; one member may try to aggressively push his solution on the group while another may have a pattern of acquiescing at the first sign of disagreement to avoid any damage to relationships. The PSM, because it knows conflict is inherent, even healthy, also knows how to acknowledge conflict and respect relationships while systematically working through problems.

√ Problem solving. It is relatively easy to state the steps of problem solving, but it is a rare team that can follow them. Though there have been many books and seminars devoted to this important process, they all have in common these general steps:

- *Clearly understand the problem.*
- *Clearly describe the criteria for the solution, i.e., "What will the situation look like when the problem is solved?"*
- *Seek many possible solutions.*
- *Compare the benefits, costs, and limitations of the possible solutions.*
- *Choose the best one given the cost, schedule and environmental constraints.*

The reason so many books and seminars have been devoted to these steps is that they each require skill. A PSM has a problem-solving method understood by all team members — so well understood that team members use the same terms to describe it, even going so far as to have it documented with specific steps and outcomes. The structure of the process gives focus to each activity and clarity to the group about where they are in the decision. It also prevents them from making the simple but commonplace errors humans seem so prone to, such as prematurely jumping to solutions and making decisions based on assumptions.

The benefit of a conscious collaborative process is that the team awareness of how things are done enables them to analyze their effectiveness and improve; the more complex the activity, the greater the value of this consciousness. This is true whether managing an automobile assembly line or hitting a baseball. In addition, it provides a framework for analyzing the effectiveness of the team's behaviors, giving them language to express frustration or dissatisfaction with some aspect of their process. When a team has developed strong collaboration skills they move through both simple and complex problems with speed and superior results.

Characteristic 3: Goal Clarity

Why is the project worthwhile? What are we really trying to accomplish? The answer to these simple, fundamental questions will influence nearly every decision the team makes and can even influence how the team makes decisions. Again, this is pretty obvious: effective teams have clear goals. The difference between most teams and a PSM is that the PSM has overlearned the goal. Many teams take the time to clarify their goal and write it down, usually in a charter or statement of work. But they also forget the goal soon afterward. Think of it as crossing a desert and using your compass only once to start the journey, then carefully packing the compass away. You are likely to lose direction. The PSM, usually thanks to the efforts of the project manager, uses the compass constantly. As meetings begin, they remind themselves of the project's purpose. When a problem is identified, part of the problem statement describes how the problem relates to the project goal. Whether it is risk management, allocating people to

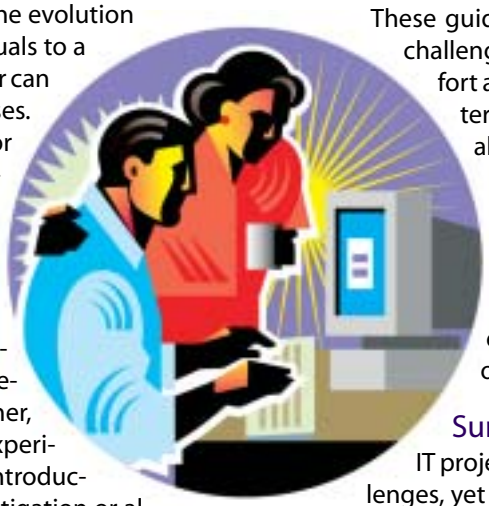
the team, technical decisions or communicating with customers, the team is conscious of the overall project goal.

The benefit of goal clarity is that the PSM keeps their energy focused on the primary goal. Every action is a step toward that goal. The team is energized through their unity of purpose.

Build Your Own Problem Solving Machine

When you belong to a PSM you have a sense of unity, effectiveness and accomplishment. For IT professionals whose job it is to implement new technology and new business processes, the power of the PSM can change your work attitude 180 degrees — from frustration to a sense of achievement. Now that you know the characteristics of a PSM, you can build one for yourself by following these guidelines.

√ Focus on team building activities early in the project. Project teams, like projects, have a beginning. The often-cited team cycle of "form, storm, norm, perform"[2] describes the evolution of a team from a disparate group of individuals to a cohesive, functioning unit. The project leader can assist the team to move through these phases. Build time into the project plan specifically for team building activities such as those described below. Be aware of the characteristics you are trying to foster and look for opportunities to build or model these characteristics during every team meeting.



√ Use a kickoff meeting to model the characteristics of your ideal team. Find a way to begin introducing team members to each other, helping them understand the skills and experience of the group. Whether you make the introductions based on your own pre-meeting investigation or allow them to introduce themselves, realize that this is an important component of your first meeting and give it due time. The kickoff is also the time to begin goal immersion. Give the team the background to thoroughly understand the purpose of the project. Finally, show them the right way to run a meeting. Have an agenda, use it and follow other good meeting management tactics. At your first meeting people will be on their best behavior, so with proper planning this meeting will set a positive precedent, a momentum you can build on in future meetings.

√ Set "Ground Rules" early in the project. These set expectations for behaviors that build the positive environment. It may go without saying that team members should show up at meetings on time, prepared and ready to cooperate with the group. But when we specifically list those expectations it is more likely to happen. What other behaviors would the team like? Let them tell you and each other. Devote twenty minutes of one of your early meetings to creating this list, then bring it to the next few meetings and post it in a visible place until you no longer need to reference it during a meeting.

√ Focus on communication skills. We have already discussed the importance of listening skills. Learn them yourself and find a way to teach the team. Personality and behavior style inventories are another way many teams develop their communication skills. In my company's team leadership course, we use a simple, easy to administer tool that helps people recognize various styles of problem solving and working in groups. As a result of these insights, team members have greater appreciation for other's strengths and they begin to develop tolerance and patience for alternate styles. There are many such personality assessment tools. Invest in one and you will see the advantages of knowing your team members.

√ Make your collaborative process conscious. As the team begins to work you will see what types of problem solving skills and work habits each person brings. If necessary, use training to build team awareness of the options for decision-making and conflict resolution. Like any skill, these improve through use, but only if the team is aware of what they are doing. After initial training in these skills, use a "plus/delta" exercise to wrap up meetings. Simply make two lists, the plus list should contain effective behaviors; the delta list recognizes what should be done differently in future meetings.

These guidelines are not meant to oversimplify the challenge of building a PSM. It takes consistent effort as the team's leader to build the key characteristics. And while your team is developing, it also needs to be making progress against the project schedule. The trick is to work these activities into routine project meetings and the team's work processes. If you invest at least 10 minutes at each project meeting for the team to address some aspect of its effectiveness, you will make steady progress on the road to becoming a PSM.

Summary

IT project teams are formed to face technical challenges, yet their success often relies as much on the team's ability to work together as their technical capability. This article, the second in a four-part series on project management, describes three characteristics of a high-performing team that is able to smoothly and efficiently work through complex group decisions. The characteristics of a Problem Solving Machine are a positive environment, a conscious collaborative process and goal clarity.

The primary ingredient for turning your team into a Problem Solving Machine is your leadership and a focus on developing the key PSM characteristics. Team members and the project leader must commit their energy and purpose to achieving this goal. This requires the team to be able to communicate effectively, appreciate individuality and work cohesively, but the payoff in productivity is worth the effort in building the PSM.

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The Lazy Person's Computing Crystal Ball

Last issue we completed our one-year, four-issue journey through a history of personal computing. Having stowed the Way Back Machine in the closet, it is now time to examine some new technologies and trends that I believe will affect how we compute over the next decade or so. Predicting the future can be fun as long as you don't bet large sums of money solely on blind optimism. My intent with this article is to give you some insight into what is actually in the works right now that will translate into real computing power in the near future.

Part of the fun with predicting future technologies is the *churn rate* at which they evolve. Intel cofounder Gordon Moore stated in 1964 that the amount of information storable on a given amount of silicon had roughly doubled every year since the technology was invented. Known as *Moore's Law*, this held true until the late 1970s, at which point the doubling period slowed to 18 months, where it still sits today. Thanks to this effect, there is an excellent chance that the computer equipment inside whatever box you are opening today has already been surpassed by something currently rolling off an assembly line. Regardless of how fast our technology evolves, though, I believe there are four things you can count on over the next 10 years: (1) Miniaturization. Devices will continue to get smaller. (2) Convergence. Devices will try to incorporate more functions. (3) Connectivity. The world will become more connected, as both wired and wireless networking advance. (4) Convenience. Technologies that make things simpler will win. At the end of this article I will also discuss technologies and trends that I think will die off in the next decade.

Twin Triumphs

Speaking of deadly technology, I have not given a detailed report on Zippy and his family since the twins were born. As you can imagine, life has gone through a few changes at *Chez Zip*. The twins, Cassie and Paul, are now a little over a year old. They are cute, cuddly, adorable little toddlers who love music, books and toys. Of course, their toys are a little different. Most one-year-olds don't have Palm Tungsten PDAs. It's just a little unnerving watching children who are still pre-verbal solving PDA games that beat me like a drum.

The big event last weekend was Zippy inviting me to his cabin in the woods. Despite his ineptitude with technology, Zippy has many other talents. He is a competent woodsman, fisherman and hunter, though his ability may be due more to luck than skill. The last time I went fishing with him, I watched him cast a large lure with three huge treble hooks about 100 feet from the boat and hit a six-pound bass on its head as the unlucky fish broke the surface. The lure stunned the bass and two of the hooks latched onto the side of the hapless fish.

Deer hunting for him apparently involves walking about 100 yards from his cabin, waiting five minutes, and then shooting whatever 8-point buck happens to wander by. He is living proof that it is better to be lucky than smart. His luck was not going to hold on this trip, though. After he got me in the car and we had driven too far to turn back, he casually mentioned he had made some "improvements" to his cabin. "Uh, what kind of improvements?" I asked, desperately hoping that they were anything but electronic. "Oh, the whole cabin is wired now," he replied with a wild gleam in his eye. It was too much to hope that the wires were connected to explosives, which would be less dangerous than letting him play with computers. I had one faint hope. "Uh, Zip, does your wife know about this?" "Oh, no! I wanted to surprise her when we go up there for vacation next month, so it's *Top Secret*. Promise you won't tell?" Since it was likely I would not survive the weekend in Zippy's "smart cabin," it would be an easy promise to keep.

A few years ago, a major power utility, television cable company, and software company, among others, started a project to create a "smart house." The goal was that everything in the home, including power, telecommunications, appliances, security, and all other electronic components could be controlled and monitored by the computer system. The whole system would be run by a universal remote with a friendly user interface, voice commands or automatic sensors. Zippy had volunteered to be a beta tester. I had a bad feeling about this.

Everything started out pretty well. Zippy let me drive while he used his cellular telephone to turn on the heat and lights, set the thermostat up few degrees, and preheat the oven so we could make pizza when we arrived. Much to my surprise, everything worked perfectly. Maybe this would work after all. I was impressed with the universal remote, a Palm-type PDA with wireless networking. Whoever had designed the interface knew what they were doing. Despite the small screen, everything was laid out logically and easy to find and activate.

Paradise, however, was quickly lost. The first problem appeared that night. The house has two very sophisticated systems that do not coexist very well: the entertainment and security systems. Zippy has a home entertainment system that would put most commercial digital movie theaters to shame. Remember the scene from *Jurassic Park*, where the impact tremors generated by the Tyrannosaurus Rex's footsteps appear in Jeff Goldblum's cup? With Zippy's sound system, they appear in your own drink cup, as well.

Unfortunately, playing the speakers louder than 25 decibels triggers the vibration sensors built into the windows. Imagine our surprise when the local police broke down the door midway through the movie because the security alarm had interpreted the window vibrations as someone breaking in and silently called the police. And, because the sensors were going off repeatedly as the movie progressed, the messages to the police had escalated from "*possible break-in*" to "*full-scale attack*" warning. With apologies to the local constabulary, we turned off the security system.

The next morning the kitchen "crashed" when Zippy opened the refrigerator door to get his orange juice and the light bulb blew. A second later, everything else electrical in the kitchen went dead — refrigerator, lights, toaster, coffee maker, microwave, wall clock — everything. We unplugged and re-plugged all the appliances and reset the circuit breakers, but nothing would coax the kitchen out of its coma.

We called the Help Desk, where a nice lady ran some remote diagnostics. She said the problem was being caused by an "unanticipated failure mode." The designers had never anticipated having a refrigerator bulb fail while the door was open. When the bulb blew, the kitchen system interpreted the burn out as a power surge, went into "prevent/protect" mode, and shut down the entire kitchen. But when the electrical power system's sensors reported that there had not actually been a power surge, this set up a logic loop that confused the kitchen system, which then refused to respond to restart commands. The Help Desk lady swore that this was the first time this had ever happened. Restoring the kitchen took two hours.

The final straw was the virus that got in via the broadband connection after we had turned of the security system the first night. It seems the security system was a one-size-fits-all deal that protected everything from the windows to the network server and the climate control system. The security documentation didn't mention that turning off the window sensors would also shut down the firewall. Haven't these people heard of *segmented security*? When we woke up on the third day, the bedrooms were saunas, the kitchen was a skating rink, the freezer had defrosted, the washing machine was flooding the mud room, the water heater was venting steam and the stereo was playing the banjo music from "Deliverance." Lights were flickering like the strobes in a disco until they burst into shards from the strain. Flashing across the screen of every computer in the house were the words: "Be it ever so humble, there's no virus like HomeWrecker!"

We evacuated. The tech support team eventually had to disable the cabin with an electromagnetic pulse weapon. Zippy and I then spent the next few days having a wonderful holiday canoeing and backpacking in the forest, sleeping in tents and cooking over an open fire. Mother Nature did her best to cheer him up, but no matter how many fish he hit in the head with his lures, (not to mention the 12-point buck that dropped dead of an apparent heart attack not 50 feet from our camp), Zippy remained depressed and disconsolate. His dreams of creating a computer-controlled "Nerdvana" in the wilderness were dead.

There are a couple of lessons here as we move into using new technologies ourselves. First, trying to do everything all at once can be dangerous if you inadvertently mix technologies that compete for the same space. Second, no matter how much we plan for, we cannot plan for the unforeseen. We can only set up systems and processes that we hope will allow us to recover as quickly as possible when something catastrophic happens. Finally, new is not always better, particularly if it makes us so dependent that we no longer understand how it works. No matter how sophisticated a system is, someone still needs to be 10 percent smarter or we will abdicate so much control that we cannot take charge when we need to. With that cautionary tale under our thinking caps, let us now turn to some of the technologies that I expect will influence computing over the next 10 years.

Size Matters

Earlier in the article I predicted that devices will continue to get smaller and that we will see more and more multifunction devices. This is going to require some leaps in technology to reduce the size of computing components. There are three components that determine the size of our current computing devices: storage media, processors and display area. The first two are affected by physical limitations of what you can pack into a square inch, and the third by what you can reliably produce given the available viewing area. We will begin with storage and processing.

Nanotechnology is the science of making devices with features measuring less than 100 nanometers. A single nanometer measures roughly 10,000 times smaller than the width of an average human hair. Nanotech is not new, though. In the early 1990s, futurists predicted a booming market for microelectromechanical systems (MEMS). However, difficulties in manufacturing, packaging and other problems with producing MEMS so small that they have to be viewed with high-powered microscopes slowed development.

The most prominent effect of nanotech in the computing world will be on the size of storage devices. A recent report by NanoMagnetics, a British company, claims that computer hard drive capacity could be increased a hundredfold by using a common protein to fabricate nano-scale magnetic particles. Their process uses a common protein called apoferritin to create a material consisting of magnetic particles each just a few nanometers in diameter. Apoferritin is, by the way, the main molecule in which iron is stored in the human body. Each particle can store a bit of information and together they can be packed onto a disk drive at much greater density than is possible using existing hard disk manufacturing methods.

Seagate, a well-known manufacturer of computer storage devices, is also reportedly working on a nano-magnetic material that is fabricated chemically, rather than by using proteins. At the moment, we can pack, at best, 450 gigabits of data onto a square centimeter of conventional storage media. With nano-storage, this could eventually be improved to anywhere from 3,000 to 5,000 gigabits per square centimeter. Combine that with other predictions that new computers in 2005 will come with 500 gigabyte hard drives, and you can see where this is all going. In apparent violation of various physical laws, computers will get smaller on the outside and bigger (virtually) on the inside. The companies working on this technology believe that it will surpass conventional hard disk density by the end of this year and that a nanotech-based storage material could be available between 6 to 10 years from now. That means the question isn't whether we will get storage based on nanotech, but when.

Another application of nanotech will be in chips. NASA scientists have reportedly developed a new manufacturing process that uses extremely tiny carbon nanotubes instead of copper conductors to interconnect parts within integrated circuits. The main advantage of using carbon nanotube interconnects within integrated circuits is that they will have the ability to conduct very high currents, reportedly more than a million amperes of current in a one square centimeter area. Because copper's resistance to electrical flow increases greatly as the metal's dimensions de-

crease, there is a limit to how small copper conductors can be. However, because carbon nanotube electrical resistance is very low, they will allow development of smaller chips that use less power and produce less heat, allowing manufacturers to increase the number of circuits on a chip beyond the current limits of copper circuits.

As chips and storage get smaller, they will subsequently allow much smaller "boxes" for computing devices. Fifty years ago, a single computer would fill a large room. Today, there are handheld calculators with more processing power. In ten years, your watch may outperform today's 3 GHz Pentiums. As with any new technology, it will take time to absorb nanotech into computing. After all, it took 15 years from the invention of the transistor in the 1940s before it became a real player in the electronics industry. However, there is one other limiting factor concerning miniature devices, which will become the principal constraint on miniaturization: display size.

Electronic Paper

One of the ergonomic problems with using computers is that the screens cannot approach the clarity of ink on paper. The cathode-ray-tube (CRT) screens on most desktop PCs achieve a resolution of 80 to 100 pixels per inch (ppi), at best. The human eye, on the other hand, can reliably distinguish around 200 ppi. Good quality liquid crystal displays (LCDs), now seen on what most people recognize as "thin, flat-screen" monitors, have better resolution than CRTs. The best commercial LCDs resolve up to 120 ppi. While this is better than CRTs, it still is not as easy to read as paper and ink. By comparison, images in most commercial magazines are printed at around 150 lines to the inch, better than the best LCD, but you can still see the dots if you look hard.

However, better screens are on the way. IBM Research has reportedly developed an active matrix LCD named "Roentgen" that has a resolution of 200 ppi, or 40,000 pixels per square inch. For normal viewing, that is pretty much the same detail our eyes can see on paper. In addition to Roentgen, various other researchers are working on tiny, lightweight and low-power virtual displays for portable electronic devices like pagers, cellular telephones and wearable computers. Current color cell phone screens display 320x320 pixels, with large displays running at 320x480 pixels. Considering the amount of information the average Web site tries to push that does not give you a lot of room to work with. There are still low-resolution screens where you can count every pixel. Any advance in resolution will theoretically be a good thing.

Toy Shopping

So what are we seeing now for new convenient, compact or multifunction devices? Well, first up would be the WRISTOMO "wrist phone" being built by Seiko for the Japanese market. As its name implies, it is a telephone worn like a wristwatch. It allegedly supports Web browsing at up to 64 kbps and can receive and transmit e-mails with maximum size of 3,000 characters. Weighing in at 171.5x40.4x18.5mm and 113g, it is advertised as being able to provide 120 minutes continuous talk time.

A bit closer to home are combination devices like the Handspring Treo 300 or the Kyocera 7135 cellular telephone, both of which include a fully functional Palm PDA. In addition to integrating the hardware, these new combination telephones are integrating their functions. You can share one contact database between your computer, PDA and cell phone. You can tell your telephone to "call Russ Fraser," and it will pull the name from the PDA contact database that came from your PC and then dial the number.

Another technology integration we will see more of is "voice over Internet Protocol" (VoIP). Until 20 years ago, telephone networks were primarily analog systems. Over the last two decades, though, digital telephone technology has become more prevalent. Most of the major players in the voice telecommunications industry are pushing to move voice communications onto IP networks. It is not a completely mature technology yet, but it does offer certain advantages over traditional telephone systems. I plan to address VoIP more thoroughly in a future article.

I'll Meet You on the Network

Before we close, here is one more useful new technology to look at: self-configuring networks. Last year, Apple Computer demonstrated a technology called "Rendezvous." It is apparently the first mass-market implementation of what can be called "zero-configuration networking," and allows devices to talk to each other without requiring manual configuration. Apple first demonstrated Rendezvous using their iTunes music management software. It demonstrated that a user holding a Rendezvous-enabled laptop with a wireless networking card could walk into a room and automatically see the iTunes music files of everyone else in the room with similar systems. That is cool if you like file swapping, but what I am really looking for is something business-oriented that won't get me raided by a Recording Industry Association of America SWAT team.

Apple is delivering that now. Over the last year, Apple and some associated vendors have embedded Rendezvous in an increasing number of applications. Most of the major printer manufacturers that support Apple systems have upgraded their machines to support Rendezvous. One that network administrators might appreciate is that Apple's new Safari browser allows you to change Rendezvous-compatible printer configurations without having to hunt down specific IP addresses. The practical impact of this is that if you are far away from your office and need to print a document from your wireless laptop, you can do it from any Rendezvous-capable printer within range of your laptop. You do not even need to be on the office local area network or logged into any directory software.

What would it be worth to no longer need to configure a computer for network printing? This routine normally involves wading through dozens of folders in search of the proper IP addresses for your office printers, and I defy anyone other than a hardcore techie to write, from memory, the path and name of even one of the printers currently set up on their computer. Most networks today require file and print servers. With Rendezvous, you won't need them. With the functionality that Rendezvous provides, we could reduce the cost of managing the network as a whole by using Rendezvous-ready software to broadcast printer and file sharing service changes to every machine on the network, which could eliminate the overhead and system bugs inherent in individually changing settings on each desktop.

On the storage side, network storage device maker Chaparral has built Rendezvous into the latest version of their storage-management software. Configuring a network that uses Chaparral storage is now allegedly a point, click, configure and go have coffee

process. You can allegedly back up the contents of the network to the storage device with pretty much zero tweaking. Finally, Rendezvous is finding a role in database management. Sybase has apparently built Rendezvous into its client software, which allows authorized machines to log into Sybase databases without any additional configuration. How many database administrators would just like to authorize new users without reconfiguring their machines, as well?

Individually, each of these little tweaks might not count for much. But if you add enough of these functions together, it becomes clear to me that it will cost less to run a network with Rendezvous-like functionality than it does to run today's networks. One last thought: It is rumored that Rendezvous will have the ability to check processing usage on other Rendezvous-enabled machines around the office and share processor-intensive tasks. Distributed parallel computing is useful; having it without configuration issues would be cutting edge. As usual, I don't expect everyone to go out and buy Macintoshes just to get Rendezvous. Eventually someone will migrate the technology to Windows or Unix. My point is that technology like Rendezvous, which is firmly grounded in *convenience*, will become a force as our networks evolve over the next 10 years.

Fond Farewell

I would like to close with my list of things that I hope either burn out or fade away. Here they are:

1. Lock-In Licensing. *"Agree to send me money forever now and save; buy later and we will be forced to charge you more."* As I predicted last spring, licensing and support issues are starting to make open source software more attractive this year. The companies with restrictive licenses are making modifications almost monthly to try and attract or keep business. But there are some who have moved on and are not looking back.

2. Proprietary file formats. While I understand that the makers of word processing, presentation and database software have a desire to protect their market share, proprietary file formats remain one of the biggest barriers to progress in the computing world. Web staples like Hypertext Markup Language (HTML) and Extensible Markup Language (XML), and open source software are making inroads here. People are moving away from proprietary solutions and toward competition on merit, not inertia. Again, companies that own proprietary standards are opening them up to compete.

3. Spam. Junk e-mail allegedly now constitutes almost half of all Internet e-mail traffic. Laws against it have been ineffective largely because of jurisdictional issues. However, I remain hopeful that some combination of legislation, international treaty, and ISPs choking off spammers' air supplies will resolve this before spam chokes the Internet to death first.

That's all for this issue. We will come back to this in a few years and see how I did. In the meantime...

Happy Networking!

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as well as communications and gateway nodes to perform such missions as signal intelligence collection and radio jamming — performing whatever RF mission is required to deny enemy access to the RF spectrum.

JTRS will eventually be integrated into 64 different types of aircraft in the Air Force inventory, as well as a myriad of ground-based platforms, during scheduled depot level maintenance. JTRS is programmed to replace 750,000 radios within the inventory covering operations such as navigation, positioning, location, identification, Air-to-Ground, Air-to-Air, Ground-to-Ground and satellite communications. Capitalization of integration costs will be realized by reducing 124 different radio sets to approximately 10 to 20 form-fit radio sets.

There are several challenges yet to be resolved to fully exploit the inherent capabilities that JTRS will bring to the battlefield. Two of these include antenna research and legal constraints affecting all radio systems, especially those designed to access the entire RF spectrum, due to potential conflicts with non-U.S. authorized frequencies and non-military systems. While several challenges have yet to be resolved to fully exploit the capabilities that JTRS will bring to the battlefield, JTRS is a revolutionary way of doing business. Once fielded, warfighters will no longer think of the RF spectrum in terms of hardware but as capabilities. Multiple software modules will allow implementation of different standards in the same radio system (including the capability to employ multiple waveforms resident on the same set). Radio receivers will be reconfigured over-the-air, thereby reducing maintenance requirements.

"In the past, if you were equipped with an HF radio, you were limited to communicate with HF waveform subscribers. Once JTRS has been fielded, a warfighter will be able to talk to another warfighter on multiple waveforms, and it will be totally transparent to him that this is what he is doing. We are only beginning to appreciate the realm of the possible that JTRS brings to the battlefield," concluded Col. Whitehurst.

Capt. Todd White is the Chief of Public Affairs for the Air Force Command and Control and Intelligence, Surveillance & Reconnaissance Center at Langley Air Force Base, Va. Commanded by Maj. Gen. Robert F. Behler, the AFC2ISRC is the lead organization to integrate and influence command and control, intelligence, surveillance and reconnaissance strategies, roadmaps, and investment plans for the Air Force. The center also oversees the Air Force Experimentation Office (AFEO) in Hampton, Va.; and the Command and Control (C2) Battlelab, located at Hurlburt Field, Fla. In addition, the center has Officer Liaisons (OL's) assigned to 16 additional agencies.

Our sincerest apologies to Mr. Cray Henry for incorrectly listing his name in The High Performance Computing Modernization Program article in the Spring 2003 issue of CHIPS. Our thanks to Mr. Henry for his graciousness. Please visit the HPCMP Web site at: www.hpcmo.hpc.mil.

www.it-umbrella.navy.mil

ViViD Contracts

N68939-97-D-0040

Contractor: Avaya Incorporated

N68939-97-D-0041

Contractor: General Dynamics

ViViD provides digital switching systems, cable plant components, communications and telecommunications equipment and services required to engineer, maintain, operate and modernize base level and ships afloat information infrastructure. This includes pier side connectivity and afloat infrastructure with purchase, lease and lease-to-own options. Outsourcing is also available. Awarded to:

Avaya Incorporated (N68939-97-D-0040); (888) VIVID4U or (888) 848-4348. Avaya also provides local access and local usage services.

General Dynamics (N68939-97-D-0041); (888) 483-8831

Modifications

Latest contract modifications are available at http://www.it-umbrella.navy.mil

Ordering Information

Ordering Expires:
26 Jul 05 for all CLINs/SCLINs
26 Jul 07 for Support Services and Spare Parts

Authorized users: DoD and U.S. Coast Guard

Warranty: Four years after government acceptance. Exceptions are original equipment manufacturer (OEM) warranties on catalog items.

Acquisition, Contracting & Technical Fee: Included in all CLINs/SCLINs

Direct Ordering to Contractor

Web Link

http://www.it-umbrella.navy.mil/contract/vivid/vivid.html

TAC Solutions BPAs Listed Below

TAC Solutions provides PCs, notebooks, workstations, servers, networking equipment, and all related equipment and services necessary to provide a completely integrated solution. BPAs have been awarded to the following:

Compaq Federal, LLC (N68939-96-A-0005); (800) 727-5472

Control Concepts (N68939-97-A-0001); (800) 922-9259

Dell (N68939-97-A-0011); (800) 727-1100, ext. 61973

GTSI (N68939-96-A-0006); (800) 999-4874, ext. 2104

Hewlett-Packard (N68939-97-A-0006); (800) 222-5547

SUN (N68939-97-A-0005); (800) 786-0404

Ordering Expires: Indefinite with annual review for all BPAs.

Authorized Users: DON, U.S. Coast Guard, DoD, and other federal agencies with prior approval.

Warranty: IAW GSA Schedule. Additional warranty options available.

Web Link

http://www.it-umbrella.navy.mil/contract/tac-solutions/tac-sol.html

Enterprise Software Agreements Listed Below

The Enterprise Software Initiative (ESI) is a Department of Defense (DoD) initiative to streamline the acquisition process and provide best-priced, standards-compliant information technology (IT). The ESI is a business discipline used to coordinate multiple IT investments and leverage the buying power of the government for commercial IT products and services. By consolidating IT requirements and negotiating Enterprise Agreements with software vendors, the DoD realizes significant Total Cost of Ownership (TCO) savings in IT acquisition and maintenance. The goal is to develop and implement a process to identify, acquire, distribute, and manage IT from the enterprise level.

In September 2001, the ESI was approved as a "quick hit" initiative under the DoD Business Initiative Council (BIC). Under the BIC, the ESI will become the benchmark acquisition strategy for the licensing of commercial software and will extend a Software Asset Management Framework across the DoD. Additionally, the ESI was incorporated into the Defense Federal Acquisition Regulation Supplement (DFARS) Section 208.74 on October 25, 2002.

Authorized ESI users include all Defense components, U.S. Coast Guard, Intelligence Community, and Defense contractors when authorized by their contracting officer. For more information on the ESI or to obtain product information, visit the ESI Web site at http://www.don-imit.navy.mil/esi.

ASAP (N00039-98-A-9002) for Novell products; and (N00104-02-A-ZE78) for Microsoft products; Small Business; (800) 883-7413 for Novell products and (800) 248-2727, ext. 5303 for Microsoft products

CDW-G (N00104-02-A-ZE85) for Microsoft products; (703) 726-5011

COMPAQ (N00104-02-A-ZE80) for Microsoft products; (800) 535-2563 pin 6246 or (317) 228-3424 (OCONUS)

CorpSoft, Inc. (N00104-01-A-Q506) for Adobe products; and (N00104-02-A-ZE82) for Microsoft products; Call (800) 862-8758 or (509) 742-2308 (OCONUS)

Crunchy Technologies, Inc. (N00104-01-A-Q446) for PageScreamer Software (Section 508 Tool), Crunchy Professional Services and Training; Small Business Disadvantaged; (877) 379-9185

Datakey, Inc. (N00104-02-D-Q666) IDIQ Contract for CAC Middleware products; (301) 261-9150

DELL (N00104-02-A-ZE83) for Microsoft products; (512) 723-7010

GTSI (N00104-02-A-ZE79) for Microsoft products; Small Business; (800) 999-GTSI

HiSoftware, DLT Solutions, Inc. (N00104-01-A-Q570) for HiSoftware (Section 508 Tools); Small Business; (888) 223-7083 or (703) 708-9658

Micro Warehouse (N00104-03-A-ZE87) for Microsoft products; Large Business; (703) 909-3295

Northrop Grumman (N00104-03-A-ZE78) for Merant PVCS products; Large Business; (703) 312-2543

SAP Public Sector and Education, Inc. (N00104-02-ZE77) for SAP software, installation, implementation technical support, maintenance and training services; (202) 312-3640

Schlumberger (N00104-02-D-Q668) IDIQ Contract for CAC Middleware products; (410) 723-2428

Softchoice (Beyond.com) (N00104-02-A-ZE81) for Microsoft products; Small Business; (877) 804-4995, ext. 305

Softmart (N00104-02-A-ZE84) for Microsoft products; (610) 518-4000, ext. 6492

Software House International (N00104-02-A-ZE86) for Microsoft products; Small Business Disadvantaged; (301) 294-9439

Spyrus, Inc. (N00104-02-D-Q669) IDIQ Contract for CAC Middleware products; (408) 953-0700, ext. 155

SSP-Litronic, Inc. (N00104-02-D-Q667) IDIQ Contract for CAC Middleware products; (703) 905-9700

Ordering Information

Ordering Expires:

Adobe products: 14 Aug 03
CAC Middleware products: 06 Aug 05
Crunchy products: 04 Jun 04
HiSoftware products: 16 Aug 04
Merant products: 15 Jan 06
Microsoft products: 26 Jun 04
Novell products: 31 Mar 07
SAP products: Upon expiration of the GSA schedule

Authorized Users: Adobe products, CAC Middleware, Merant products, Microsoft products, SAP products and Section 508 Tools: All DoD. For purposes of this agreement, DoD is defined as: all DoD Components and their employees, including Reserve Component (Guard and Reserve) and the U.S. Coast Guard mobilized or attached to DoD; other government employees assigned to and working with DoD; non-appropriated funds instrumentalities such as NAFI employees; Intelligence Community (IC) covered organizations to include all DoD Intel System member organizations and employees, but not the CIA nor other IC employees unless they are assigned to and working with DoD organizations; DoD contractors authorized in accordance with the FAR; and authorized Foreign Military Sales.

Warranty: IAW GSA Schedule. Additional warranty and maintenance options available. Acquisition, Contracting and Technical fee included in all BLINS.

Web Links

ASAP Software Express
http://www.it-umbrella.navy.mil/contract/enterprise/microsoft/asap/asap2.html

CorpSoft, Inc.
http://www.it-umbrella.navy.mil/contract/enterprise/adobe/adobe.html

Crunchy Technologies, Inc.
http://www.it-umbrella.navy.mil/contract/508/crunchy/crunchy.html

Datakey, Inc.
http://www.it-umbrella.navy.mil/contract/middleware-esa/datakey/index.html

Government Technology Services, Inc. (GTSI)
http://www.it-umbrella.navy.mil/contract/enterprise/microsoft/gtsi/gtsi.html

HiSoftware, DLT Solutions, Inc.
http://www.it-umbrella.navy.mil/contract/508/dlt/dlt.html

Microsoft Products
http://www.it-umbrella.navy.mil/contract/enterprise/microsoft/ms-ela.html

Northrop Grumman
http://www.feddata.com/schedules/navy.merant.asp

SAP
http://www.it-umbrella.navy.mil/contract/enterprise/sap/sap.html

Schlumberger
http://www.it-umbrella.navy.mil/contract/middleware-esa/Schlumberger/index.html

Spyrus, Inc.
http://www.it-umbrella.navy.mil/contract/middleware-esa/spyrus/index.html

SSP-Litronic, Inc.
http://www.it-umbrella.navy.mil/contract/middleware-esa/litronic/index.html

Department of the Navy Enterprise Solutions BPA
Navy Contract: N68939-97-A-0008

The Department of the Navy Enterprise Solutions (DON ES) BPA provides a wide range of technical services, specially structured to meet tactical requirements, including worldwide logistical support, integration and engineering services (including rugged solutions), hardware, software and network communications solutions. DON ES has one BPA.

Computer Sciences Corporation (CSC) (N68939-97-A-0008); (619) 225-2412; Awarded 07 May 97; Ordering expires 31 Mar 06, with two one-year options

Authorized Users: All DoD.

Web Link

http://www.it-umbrella.navy.mil/contract/tac-don-es/csc/csc.html

Information Technology Support Services BPAs Listed Below

The Information Technology Support Services (ITSS) BPAs provide a wide range of IT support services such as networks, Web development, communications, training, systems engineering, integration, consultant services, programming, analysis and planning. ITSS has five BPAs. They have been awarded to:

Booz Allen Hamilton Inc. (N68939-97-A-0014); (415) 281-4942; Awarded 02 Jul 97; Ordering expires 31 Mar 04

Lockheed Martin (N68939-97-A-0017); (240) 725-5950; Awarded 01 Jul 97; Ordering expires 30 Jun 05, with two one-year options

Northrop Grumman Information Technology (N68939-97-A-0018); (703) 413-1084; Awarded 01 Jul 97; Ordering expires 12 Feb 05, with two one-year options

SAIC (N68939-97-A-0020); (703) 676-5096; Awarded 01 Jul 97; Ordering expires 30 Jun 05, with two one-year options

TDS (Sm Business) (N00039-98-A-3008); (619) 224-1100; Awarded 15 Jul 98; Ordering expires 15 Jul 05, with two one-year options

Authorized Users: All DoD, federal agencies and U.S. Coast Guard.

Web Link

http://www.it-umbrella.navy.mil/contract/itss/itss.html

Research and Advisory BPAs Listed Below

Research and Advisory Services BPAs provide unlimited access to telephone inquiry support, access to research via Web sites and analyst support for the number of users registered. In addition, the services provide independent advice on tactical and strategic IT decisions. Advisory services provide expert advice on a broad range of technical topics and specifically focus on industry and market trends. BPAs listed below.

Gartner Group (N00104-03-A-ZE77); (703) 226-4815; Awarded Nov 02; one-year base period with three one-year options.

Acquisition Solutions (N00104-00-A-Q150); (703) 378-3226; Awarded 14 Jan 00; one-year base period with three one-year options.

Ordering Expires:

Gartner Group: Nov 06
Acquisition Solutions: Jan 04

Authorized Users:

Gartner Group: This Navy BPA is open for ordering by all of the DoD components and their employees, including Reserve Components (Guard and Reserve); the U.S. Coast Guard; other government employees assigned to and working with DoD; non-appropriated funds instrumentalities of the DoD; DoD contractors authorized in accordance with the FAR and authorized Foreign Military Sales (FMS).

Acquisition Solutions: All DoD. For purposes of this agreement, DoD is defined as: all DoD Components and their employees, including Reserve Component (Guard and Reserve) and the U.S. Coast Guard mobilized or attached to DoD; other government employees assigned to and working with DoD; non-appropriated funds instrumentalities such as NAFI employees; Intelligence Community (IC) covered organizations to include all DoD Intel System member organizations and employees, but not the CIA nor other IC employees unless they are assigned to and working with DoD organizations; DoD contractors authorized in accordance with the FAR; and authorized Foreign Military Sales.

Web Links

From the DON IT Umbrella Program Web Site:

Gartner Group
http://www.it-umbrella.navy.mil/contract/r&a/gartner/gartner.html

Acquisition Solutions
http://www.it-umbrella.navy.mil/contract/r&a/acq-sol/acq-sol.html

SEWP III
Listed Below

NASA's Scientific and Engineering Workstation Procurement III government-wide contracts provide Class 10 Computer Support Devices and Class 12 Security Systems and Tools. SEWP III is an indefinite delivery, indefinite quantity (IDIQ) type contract. Contracts have been awarded to the following:

Hewlett-Packard (NAS5-01133); (781) 505-7676

GTSI/SUN (NAS5-01134); (703) 502-2172

IBM (NAS5-01135); (800) 426-2255

Silicon Graphics Federal, Inc. (NAS5-01136) and (NAS5-01140); (301) 572-1980

GMR/Cray (NAS5-01138); (703) 330-1199

Compaq Federal, LLC (NAS5-01139); (301) 918-5360

GTSI (NAS5-01142) and (NAS5-01146); (703) 502-2172

Northrop Grumman IT (NAS5-01143) and (NAS5-01147); (301) 446-3100

UNISYS Corporation (NAS5-01144); (800) 398-8090

Government Micro Resources (NAS5-01145); (703) 330-1199

Ordering Expires: 30 Jul 06 (Contracts awarded for five years starting 30 Jul 01.)

Authorized Users: DON, U.S. Coast Guard, DoD and other federal agencies

Warranty: 36-month extended warranty available.

Web Link

http://www.it-umbrella.navy.mil/contract/sewp3/sewp3.htm

The U.S. Army Small Computer Program (ASCP) Maxi-Mini and Database (MMAD) Program
Listed Below

The MMAD Program is supported by two fully competed Indefinite Delivery/Indefinite Quantity (ID/IQ) contracts with IBM Global Services and GTSI Corporation. The Program is designed to fulfill high and medium level IT product and service requirements of DoD and other federal users by providing items to establish, modernize, upgrade, refresh and consolidate system environments. Products and manufacturers include:

	IBM Global Services	GTSI
Servers (64-bit & Itanium)	IBM, HP, Sun	Compaq, HP
Workstations	HP, Sun	Compaq, HP
Storage Systems	IBM, Sun, EMC, McData, System Upgrade	HP, Compaq, EMC, RMSI, Dot Hill
Networking	Cisco	Cisco, 3COM

Ancillaries include network hardware items, upgrades, peripherals and software.

Services include consultants, managers, analysts, engineers, programmers, administrators and trainers.

MMAD is designed to ensure the latest products and services are available in a flexible manner to meet the various requirements identified by DoD and other agencies. This flexibility includes special solution CLINs, technology insertion provisions, ODC (Other Direct Cost) provisions for ordering related non-contract items, and no dollar/ratio limitation for ordering services and hardware.

Latest product additions include HP Itanium, HP storage, Sun products and Remedy software.

Awarded to:

GTSI Corporation (DAAB07-00-D-H251); (800) 999-GTSI

IBM Global Services-Federal (DAAB07-00-D-H252); CONUS: (866) IBM-MMAD (1-866-426-6623) OCONUS: (703) 724-3660 (Collect)

Ordering Information

Ordering: Decentralized. Any federal contracting officer may issue delivery orders directly to the contractor.

Ordering Expires:
GTSI: 25 May 06 (includes three option periods)
IBM: 19 Feb 06 (includes three option periods)

Authorized Users: DoD and other federal agencies including FMS

Warranty: 5 years or OEM options

Delivery: 35 days from date of order (50 days during surge period, August and September)

No separate acquisition, contracting and technical fees.

Web Links

GTSI
http://pmscp.monmouth.army.mil/contracts/mmad_gtsi/mmad_gtsi.asp

IBM
http://pmscp.monmouth.army.mil/contracts/mmad_ibm/mmad_ibm.asp

The U.S. Army Enterprise Software Initiative BPA
DAAB15-99-A-1002 EP07 (Oracle)

As of February, 28, 2002, the Navy holds inventory of Oracle Database Enterprise Edition (9i and 9ias) perpetual licenses (either named-user, multi-server or processor), and additional options and tools (i.e., security options, partitioning, spatial, clustering, diagnostics management packs, Tuning Management Pack, Change Management Pack, Internet Application Server Enterprise, Internet Developer Suite, and Balanced Scorecard). Initial orders will include software support for the period June 1 through May 31, 2003. Placing orders early will result in the best deal for end users. Four (4) additional out years of Silver Technical Support and product update support have also been negotiated.

The initial purchase price for end users is an average of a 64 percent discount off GSA prices and total package discounts (including out year technical support) average a 70 percent discount off GSA prices. Customers with small requirements can benefit from discounts normally reserved for customers with orders over $10 million. These licenses can be distributed throughout the Navy. In accordance with the Federal Acquisition Regulations (FAR) and DoD policy, Navy customers who have selected Oracle to satisfy new requirements must purchase the "new" Oracle licenses from the inventory.

This virtual inventory was established through the Department of the Navy Chief Information Officer (DON CIO) Enterprise Licensing Team and the Department of Defense Enterprise Software Initiative (DoD ESI). The DoD ESI is a joint initiative, which has been approved by the DoD Business Initiative Council (BIC). This inventory will be managed by the Department of the Navy Information Technology (DON IT) Umbrella Program Office at Space and Naval Warfare Systems Center, San Diego.

The U.S. Army Enterprise Software Initiative BPA DAAB15-99-A-1003 (Sybase)

Through the contract, Sybase offers a full suite of software solutions designed to assist customers in achieving Information Liquidity. These solutions are focused on data management and integration, application integration, Anywhere integration, and vertical process integration, development and management. Specific products include but are not limited to Sybase's Enterprise Application Server, Mobile and Embedded databases, m-Business Studio, HIPAA (Health Insurance Portability and Accountability Act) and Patriot Act Compliance, PowerBuilder and a wide range of application adaptors. In addition, a Golden Disk for the Adaptive Server Enterprise (ASE) product is part of the agreement. The Enterprise portion of the BPA offers NT servers, NT seats, Unix servers, Unix seats, Linux servers and Linux seats. Software purchased under this BPA has a perpetual software license. The BPA also has exceptional pricing for other Sybase options. The savings to the Government is 64 percent off GSA prices.

Ordering Expires: 15 Jan 08

Authorized Users: Authorized users include personnel and employees of the DoD, Reserve components (Guard and Reserve), U.S. Coast Guard when mobilized with, or attached to the DoD and non-appropriated funds instrumentalities. Also included are Intelligence Communities, including all DoD Intel Information Systems (DoDIIS) member organizations and employees. Contractors of the DoD may use this agreement to license software for performance of work on DoD projects.

The U.S. Army Enterprise Software Initiative BPA BPWin/ERWin (Computer Associates) DAAB15-01-A-0001

This Enterprise agreement provides Computer Associates Enterprise Modeling tools including the products, upgrades and warranty. ERwin is a data modeling solution, that creates and maintains databases, data warehouses and enterprise data resource models. BPwin is a modeling tool used to analyze, document and improve complex business processes. The contract also includes warranties for these two products and upgrades for older versions of the products. In addition, there are other optional products, services and training available.

Ordering Expires: 30 Mar 06

Authorized Users: DoD and DoD contractors.

The U.S. Army Enterprise Software Initiative BPA DABL01-03-A-0001 (Popkin Software & Systems Inc.)

The Department of the Army Architecture Modeling Solution initiative provides Architecture Tools including: the System Architect software license for Enterprise Modeling and all Popkin add-on products including the Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) Extension, Envision XML, Doors Interface, and SA Simulator as well as license support, training and consulting services. The main product on the BPA, System Architect, includes a C4ISR option that provides specific support for the U.S. Department of Defense's Architecture Framework (DODAF). Products vary from 3 to 15 percent off GSA depending on dollar threshold ordered.

Ordering Expires: 13 April 04

Authorized Users: DoD and their direct support contractors as well as the U.S. Coast Guard and the Intelligence community.

Web Link

http://pmscp.monmouth.army.mil/contracts/ams-p/ams-p.asp

The U.S. Army Enterprise Software Initiative BPA DABL01-03-A-0002 (IBM Global Services)

The Department of the Army DEAL-I/D (Database Enterprise Agreement Licenses - I/D) initiative provides IBM/Informix database software licenses and maintenance support at prices discounted 2 to 27 percent off GSA schedule prices. The products included in the enterprise portion are: IBM Informix Dynamic Server Enterprise Edition (version 9), IBM Informix SQL Development, IBM Informix SQL Runtime, IBM Informix ESQL/C Development, IBM Informix ESQL/C Runtime, IBM Informix 4GL Interactive Debugger Development, IBM Informix 4GL Compiler Development, IBM Informix 4GL Compiler Runtime, IBM Informix 4GL RDS Development, IBM Informix 4GL RDS Runtime, IBM Informix Client SDK, IBM Informix Dynamic Server Enterprise Edition (version 7 & 9), and IBM Informix D.M. Gold Transaction Processing Bundle.

Primary Goods & Services: IBM/Informix database software licenses & maintenance support.

Ordering Expires: 30 Sep 04

Authorized Users: DoD and their direct support contractors as well as the U.S. Coast Guard and the Intelligence community.

Web Link

http://pmscp.monmouth.army.mil/contracts/deal-ibm/deal_ibm.asp

For complete information go to the DON IT Umbrella Program Web site: www.it-umbrella.navy.mil

The DON IT Umbrella Program offers a full range of IT services and solutions to meet any requirement, including software, hardware, networks, information assurance, project management, security, engineering, data warehousing, training, consulting and research.

Program Features:

= Pricing substantially lower than GSA Schedule and retail
= Access to tens of thousands of IT products and services
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= Continuous competition for customer purchases among leading companies
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= Meets the the DoD initiative to provide best-priced, standards-compliant IT
= No need to spend hours negotiating with vendors
= Convenient and flexible — order by phone, fax or online
= Decentralized ordering
= Improves tracking of IT purchases and life-cycle management
= Assistance from program managers for complex or large volume purchases
= Meets the Clinger-Cohen Act for IT Management Reform
= No more ordering mistakes
= The easiest acquisition solution and best prices available — anywhere

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