



Thinking Inside the Box

No single system, strategy or focus in the Army has been a greater change agent than computers and the networks that have linked them together. In fact, as early as 1984, officials with the U.S. Army's Information Systems Command forecasted the service's growing reliance on the computer. In doing so, they were determined to shorten the acquisition cycle, while mindful of the "total cost of ownership."

In those days, like today, new systems were being born, replacing old capabilities

and machines, and adding staggering capacity to the Army's voice, data and messaging process. By 1984, it became clear that the Army needed a place to test and validate information technology (IT) capabilities and tools for follow-on integration and application within the Army's infrastructure.

THE EARLY YEARS

Such was the brainchild of such visionaries as retired Lieutenant General

Emmett Paige, who launched the Small Computer Engineering Center (SCEC) in the Splinter Village at Fort Huachuca, AZ. In those days, computing was immature compared with today's supercomputers and broadband high-speed networks.

That decision represented a quantum leap forward in the Army's vision and commitment to the future of information-systems integration, sparked by the sweeping changes the personal computer was introducing to the world.

SIXTEEN YEARS AGO, THE ARMY OPENED THE DOORS OF A TECHNOLOGY CENTER TO TEST AND VALIDATE IT CAPABILITIES AND INTEGRATE THOSE CAPABILITIES INTO THE SERVICE'S COMPUTER INFRASTRUCTURE. THE FACILITY CONTINUES TO SERVE AS A TECHNOLOGY GATEKEEPER AS MORE SOPHISTICATED TOOLS ARE FIELDDED. **BY JAMES H. WARD**

In the years following World War II, many engineers and computer scientists swore by the old acquisition cycle. They believed the intensive waterfall method of design, build, test and field had served the military well; so if it isn't broken, why fix it, Paige said.

"There was no doubt in my mind that it was an almost impossible task to change the culture of the scientists and engineers who had come along after World War II," he added. "They wanted no part of using commercial communications and computers on the battlefield, and that attitude also permeated the Army combat development community at Fort Gordon, GA, and the troop units in the field. Most of them were unaware that the Army signal community had gone into World War II with commercial products from AT&T or Western Electric, and the ham radio [amateur radio], and it was that same equipment that took us through the Korean War."

With the advent of the personal computer, the Army needed to identify the machines with the right capabilities at a time when a lot of computer makers were bursting on the scene. The Army also needed to support signal leaders' decisions to purchase commercially built personal computers.

This meant establishing a center for computing excellence that could act as the honest broker in the world of claim and counterclaim made by vendors. These leaders felt it was critical to develop a capability to distinguish between market hype and product capabilities. At the U.S. Army's Information Systems Engineering Command (ISEC), this formed the basis for the initial SCEC.

"Our intent was that no computer would be purchased for Army use unless it had been evaluated by the SCEC. It was our intent that the project managers and program managers at Fort Monmouth, [NJ] would have a cell of experts to help

and advise them in their task of providing the Army with the capabilities they needed at the lowest total cost of ownership," Paige said.

ON THE GROUND FLOOR

In those days, the SCEC operated as a kind of "Skunk Works" group of 20 engineers, most of them young officers and students who could get in on the ground floor of equipment testing and evaluation. Then, as they moved up in rank or position, they were in place to influence how the military would use technology.

Jo Tate Osborne, who served as the center's senior electronics engineer and deputy in the early years, remembers the mission of the SCEC. "We were tasked to review each of the components on the Army's mini/microcomputer contracts. We also assisted the systems engineers in selecting the most appropriate platforms for their applications," she said.

Another key member of the staff was Ron Boggie, who served in a number of capacities within ISEC and the context of the SCEC, which later became known as the Computer Engineering Center (CEC). Boggie believed the "slick" advertising brochures and new product briefings that promised performance were directed more at outdistancing the competition than meeting the demands of military large-scale competitive procurement.

"The success of the SCEC and CEC as centers of technical excellence was, and still is, imperative. At stake [in the early years] was the development and transition of an Army expert technical force, capable of influencing and shaping the direction of the computer industry," Boggie said.

This process was also highlighted by the highest standard of integrity.

"The staff knew that their evaluations would influence the shape of information technology. We simply had to ensure that our reports were completely free of

personal opinion and based solely on empirical results. That's how seriously we took it then, and that's still the case today," said Dr. Frank Jenia, ISEC's deputy commander/technical director.

Echoing those remarks is one of ISEC's early CEC military engineers whose pioneering work led the military down the domain-name server road.

"One thing that the vendor community learned from us was that we stayed in our lane. We were the Underwriters' Laboratories for computing in the military, in that when we published a report, everyone who read it knew we had stuck to the facts," said Major Curt Vincent, who served in the CEC from 1985 to 1990.

"All small computer software and hardware had to pass our evaluations. They had to be nonproprietary. We take that for granted now, but back then, it was no fun. We had tons and tons of 'stovepipe' information systems, which could not talk to each other. Within a particular military organization, the personnel systems didn't talk to the logistics systems, so data had to be entered twice or printed out and re-entered. This had to go," Vincent added.

THE NEXT PHASE

But this was only the beginning. By the late 1980s and early 1990s, it became clear that the CEC would be asked to do systems of systems or end-to-end integration testing. At first, this meant sending engineers to Army installations, establishing a parallel system to the one being used in the field and running the evaluations. The CEC then evolved into the Technology Integration Center (TIC). The leap from single-box evaluations to where the TIC is today, ensuring "systems integration," began with evaluations the team conducted on servers, routers, switches and local area networks.

It didn't take long for ISEC to realize that this method would be far too costly and disruptive to the Army. That's when the practice of placing terminal emulators in the TIC laboratory began.

"The real breakthrough came when we were able to capture all the keystrokes being used in the field under what was

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A TIC engineer performs an evaluation at the Fort Huachuca, AZ, facility. Photo courtesy of ISEC.

called Installation Transition Processing (the forerunner to Sustaining Base Information Services) and simulate on a broad scale how that system would operate. For the first time, we could 'see' where the bottlenecks were, and recommend hardware and software 'fixes,' recalled Dr. Michael Gentry, the Army Signal Command's senior technical director. "Now, we had a place that could evaluate the entire system and could also help the Army look into the future with a certain high level of certainty and credibility."

TODAY AND TOMORROW

Throughout its 16-year history, ISEC's TIC—now a part of the Communications-Electronics Command—has also served as the Defense Department's information technology gatekeeper.

"Everyone in the vendor community knows that if they want to sell a product to the Army, they should make plans to work with ISEC and get their box on our evaluation schedule. Most of them know this and, because of our reputation, they want to do business 'the TIC way,'" Jenia said.

And what exactly is the TIC way? According to Jenia, the TIC staff also acts as an innkeeper. They are responsible for the laboratories, test equipment, computers, networks and facilities, and maintain them in a ready state to emulate any Army infrastructure for complete and unbiased evaluations.

In computer technology terms, this also means having access to ISEC's full intellectual capacity. The command has critical skill engineering experts in all areas of technology who operate as an integrated team to run the vendor equipment

and emulated infrastructure through the full range of evaluations. The TIC then provides the Army and the vendor the empirical evidence needed to shorten the acquisition cycle at dramatically lower cost and risk to the government.

According to Osbourne, the TIC is respected throughout the defense establishment as an organization that has changed how computing is done on every post, camp and station in the military.

"Without the efforts of that very focused group, thousands of Army offices would not have gotten the products they needed. And not only the Army has benefited. The Defense Department now has cost-effective contract vehicles for commercial computing/networking capabilities because of Lieutenant General Paige's vision and the hard work of ISEC's focused team," she said.

MAINTAINING FOCUS

According to Paige, TIC's value continues to grow because it has stayed close to its original charter as the one place in the defense community where IT professionals can get a true picture of the system they are working on.

This includes such cutting-edge technologies as gigabit Ethernet, which should help speed up traffic flow on an installation's campus area networks; modeling and simulation; Public Key Infrastructure; security; knowledge management; multimedia; voice and data over Internet Protocol; and a host of other applications and technologies.

Recently, the TIC conducted an intensive cost-benefit analysis of most of the major gigabit vendors to determine which boxes would provide directors of installation management the lowest total cost of ownership and the greatest efficiency.

This report, along with the TIC's end-to-end system evaluation, led to significant changes in the Department of Defense's Joint Technical Architecture. IT planners now have a choice when they seek ways to speed up traffic in the local or campus-area network.

Efforts in the modeling and simulation arena have led to a partnership between the TIC and the University of Arizona,

Tucson, to develop and staff a modeling and simulation center on the university's campus. Such progress serves to strengthen the hand the TIC plays in future technology development, said a center staff member.

In another area, the TIC, working with ISEC's Fort Detrick, MD, Engineering Office, now can emulate the action of thousands of keystrokes on all posts, camps and stations. This is significant because as new technologies such as gigabit Ethernet become more accepted, the ability to "see" how their insertion will affect network and systems operations becomes critical.

Additionally, because of this database, the TIC and other ISEC engineers can perform a complete cost analysis on existing and programmed improvements at each installation and find ways to save the customer money.

The TIC also supports the Army by performing the functions of the Common User Installation Transport Network Engineer, which assists the Army with installation, information and infrastructure components.

"Although the TIC has grown in size, it has [also] grown in importance to the Army and the Defense Department," Paige observed.

The TIC has added to the military's ability to get the right box, thoroughly evaluated prior to fielding, in the hands of the end user.

"We've been able to leverage the expertise of ISEC and combine this with the fact that the TIC holds the reputation as the top lab of its kind to really change the whole nature of information technology. Members of ISEC evaluate and design integrated commercial information technology we use out there, and that's significant," Jenia said. ★

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