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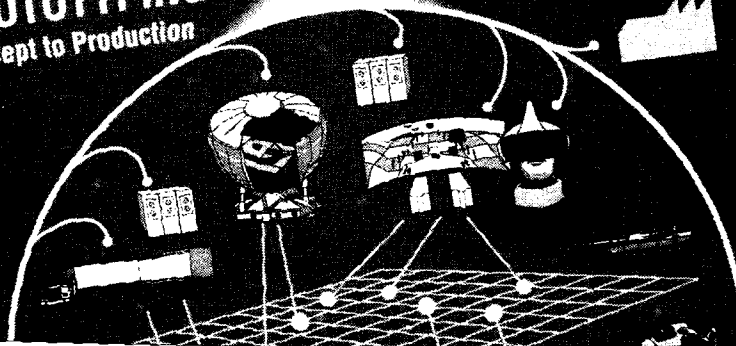
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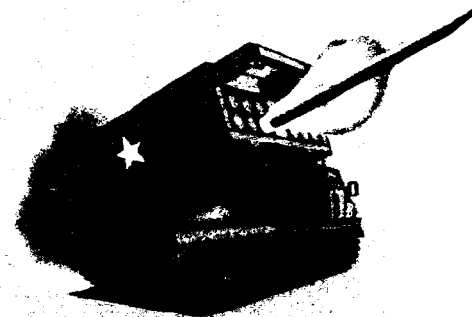
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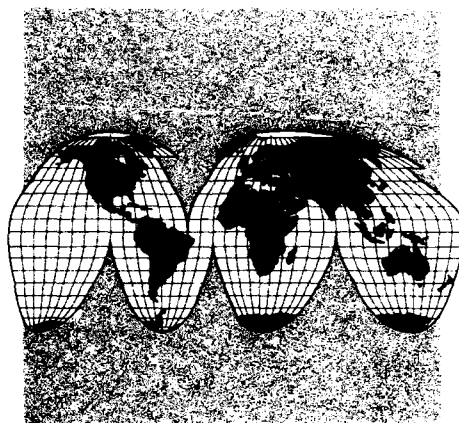
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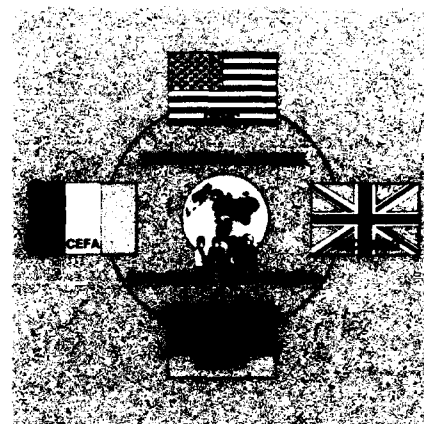
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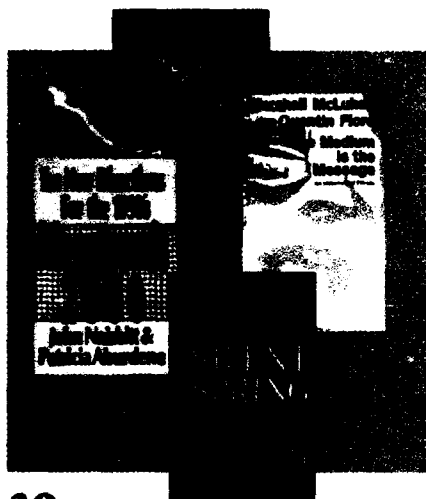
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CONTRACT FOR CHANGE

Challenges Ahead

Michael L. Tompkins

You are a program manager (PM) and you've moved to a new job in a new town. The family will join you after the children have finished the school year. Your new job is the same as the one you left — managing a program. You will be in the new town until you bring a new computerized tracking system from its prototype stage into production and to full fruition. Then, you either will move back to the town from which you came or, perhaps, to another program with a government contractor in another town.

What has this to do with defense acquisition and government service? In answering, let's relate the following to your role as this new PM.

Problems Encountered

Choices you will have to consider are housing and new furnishings, schools for your children, acquiring a new car, and how best to spend your money to obtain everything you will need for the move. Every dollar you spend will be an investment in your job, yourself and your family's future. You'll want to evaluate wisely.

Some decisions you must make are shown below:

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The author invites readers' thoughts and comments.

— *Housing.* Should you buy a house or rent an apartment in the new town? Should you keep the house in the old location and rent it out? Will you want new furniture for a new house? With limited transfer money available and what you have in the bank, can you afford the things you need and want?

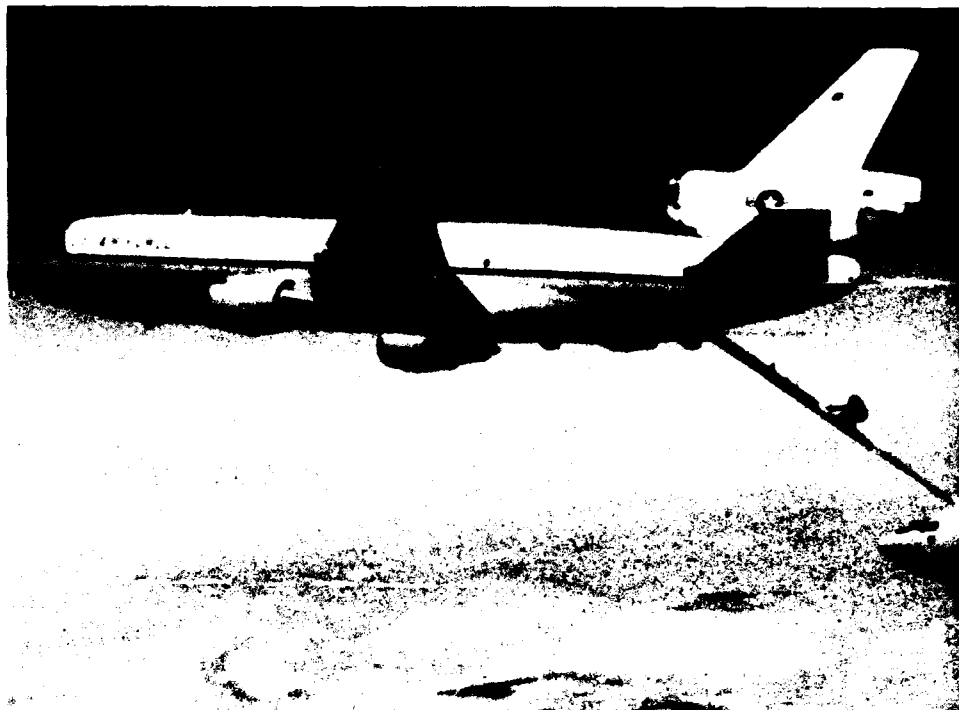
— *Transportation.* Should you buy or lease a new car? The old one has high mileage and is more than six years old. It worked well enough to go to and from the train station, taking the children to and from school, and for shopping, but these are all short

distances. In the new location, there are no trains and distances to be traveled are greater.

These choices can be put in a more structured form by asking yourself a few basic questions related to economy:

— What is the real or utility value of the things you need or want? What value will they provide to you and your family?

— What is the cost of each item in terms of their total cost? Is each item expensive, not just in dollar value



The Contractor Logistics Support Center, Oklahoma City Air Logistics Center, provides logistics support for the KC-10 59-aircraft fleet. The KC-10 is the world's largest tanker/cargo aircraft.

invested but in terms of space allocation and general upkeep? This question involves both your time and money.

— What is the likelihood of any of these purchases becoming outmoded, thus, requiring storage and cost of upkeep without a benefit derived from their possession? For example, you may need to store the furniture and yard equipment from your old home if you decide to move into a smaller house or apartment.

Where We Are

This country has gone through an extended period of knowing what we needed to buy, because we knew who our enemies were and their adversarial capabilities. We knew where the things we bought would be used, how long they would be needed, for what purpose, in what operating environment, and what personnel skills would be required to use and maintain them. Our situation was clear and accepted easily by almost everyone. The cost was not as important as the sense of security our systems could provide.

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So, we spent our money and stocked up on systems, personnel and their

training, supplies, buildings and facilities, support equipment, and all the other vendors and things required to use and maintain everything we purchased. Suddenly, because of a political change of mind somewhere far away, we were forced to move to "a new job in a new town where things would be different."

Using Reason

A great deal of our nation's money is invested in items and in the highly trained and skilled people required to use them. But, what value do they have now and in the future?

Let's return to the new job in the new town. Consideration must be given to all the challenges this brings. Better transportation must be found — a new car or a later model with low mileage. Housing chosen may not be as convenient as in the old location where the stores and schools were within walking distance. The new town may be somewhat isolated, resulting in a longer drive to the new job and driving to a distant, larger town for shopping.

Longer trips mean more frequent servicing of the car; added mileage means trading in sooner than ever before. Also, since a move may occur again within 2-3 years, equal consideration should be given to leasing as to buying.

Is buying a new home the right decision or, since another move may come up in a few years, is renting a townhouse or apartment best? Should the home in the former location be sold and proceeds banked, or rented out since returning to it upon job completion is a possibility?

Factors To Consider

When making these decisions, the following should be considered:

- What is the real or utility value?
- What are the total investment costs?



Official USAF photos

The AAR Corporation recently was awarded a limited-term subcontract to provide total line maintenance and scheduled heavy maintenance on the AWACS E3 radar and communications training aircraft.

— What is the period before newly acquired items become obsolete and no longer used?

You've decided to buy a new car because you will keep it for a long time. Although you know you will put many miles on it, you have decided that if you take a car-care course at the local vocational-technical school and invest in a few specialized tools, you can keep it well maintained. The car will serve you for more than 100 thousand miles. So, purchasing a new car, in this situation at least, is the better choice for you than leasing because it will have:

— A high utility value, because you must have a car to drive. A leased car would provide this as well.

— A high investment cost. The cost of a leased car would remain constant and, accumulated over time, would be high. Payments on a purchased car would end, but its service would go on beyond the last payment, thereby reducing its real investment.

— By valuing the new car for its transportation or utility value rather than for its newness or market value, its period before obsolescence will be extended. A leased car would not become obsolete. A new car has:

1. High utility value
2. Low investment cost, considering all factors related to its cost and projected operating expenses over the period it will be kept
3. A long period before its obsolescence because it will be kept a long time, and it's not likely a better mode of transportation will be available.

A new car, then, is a good acquisition because of the cost.

A new house would have:

1. High utility value, but so would an apartment

FIGURE 1. Evaluating the Decision

Utility Value	
Low	High
Investment Cost	
High	Low
Period Before Obsolescence	
Short	Long

2. High investment cost (The apartment has no investment cost, only a monthly charge for living space rental.)

3. A relatively short period before its obsolescence. You may have to move.

Based on the above reasons, buying a new house is ruled out in favor of leasing an apartment.

Extending Personal Financial Logic To the Job

Consider the PM's computerized tracking system and applying this same method of new acquisition assessment to it.

Utility Value. How useful is the total system including its equipment, facilities and people? Does it have many other applications, or is its value limited to narrow parameters requiring specific threats or operational applications and environments? What about the equipment needed to field it? Can any of it be used or modified to support other systems, thereby increasing their own utility value? What about the utility value of the people required for operation and maintenance. Aren't they and their training a part of this system's acquisition?

Investment Cost. Is the system expensive, in real terms, considering its total cost including its people and their training? If a new building must be built to house the new system and its people, isn't the cost of that building part of the system's cost, too?

What about the investment in repair parts, their handling and repair and storage equipment to stock them, and all the other related expenses involved in the system's acquisition, including new transportation vehicles and security requirements?

Period Before Obsolescence. What if it is likely that a smaller, simpler and more portable system will come along — a system at lower cost to buy and operate. After all, we are talking about a relatively new and changing technology.

Use the chart in Figure 1 to evaluate the decision.

Using the chart in Figure 1 and the PM's new computerized tracking system as an example, we can see this new acquisition has a:

— High utility value (far right on chart)

— High investment cost (far left on chart)

— Long period before its obsolescence (far right on chart).

The best two-out-of-three choice is to buy the new system.

What the new system had was a:

— High utility value (far right on chart)

— High investment cost (far left on chart)

— Short period before its obsolescence because of an impending change in system technology that could cause it to become obsolete very soon (far left on chart)?

The new choice is to lease the new system rather than buy it, because leasing limits government investment in this system and allows for change so a better system can be adopted more easily when it comes along. Of

course, a new system could be contracted or leased for its period of service, too.

The Other Choice

When our country needed to be able to react to the threat of a total nuclear war, we relied heavily on our absolute possession of our means to field and support our nation's defenses. Everything needed to do that job had to be owned and controlled in order to be depended upon at a moment's notice, moved quickly over possibly great distances, and used for the purpose for which they were intended.

That is no longer the case. Today, in our "new world order," we are left with a huge investment in things that may very well have become obsolete due to change. If these tools-of-war can be adapted to new uses, their utility value will increase, their overall investment cost will be reduced, and their period before obsolescence will be extended. In other words, they will be kept because they are needed and the cost to keep and maintain them is not prohibitive considering their benefits.

In the commercial world, two ways to acquire the use of things needed have been to buy and own them, or rent them for the time period during which they will be needed and used. Both acquisition methods have always been equal in the personal and business finance worlds.

In defense acquisition, we have the same latitude of choices as the business and personal worlds have always enjoyed, and we can save our country a lot of money besides. If you were the PM mentioned earlier in this article, would you limit yourself to buying and owning only the things you need? Or, would you go through a process of cost evaluation and risk assessment in order to get the things you need at the lowest possible cost to you? Is it necessary to buy a system, its supporting data, paperwork,

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hardware lines of logistical support, trained personnel, and all else related that is required to field it just to have the system available for use? Wouldn't

it be more prudent from its acquisition to be able to buy some things and contract for the service or use of others, even the complete system itself? Is the point of acquisition derived benefit or property ownership?

Contracted support can:

- Limit government risk in the long and short term by limiting its real investment in people and things

- Reduce overhead and operating expenses by paying for only that portion of goods and services actually used

- Reduce the need for storage, overall system management, and parts inventory controls because we do not have the support responsibility of ownership

- Substantially reduce changeover costs in order to adopt new, rapidly changing hardware and technologies

- Increase accountability and our means of total overall cost assessment for decision making by limiting costs to a single service source and relating costs to real-use time



The Ground Launched Cruise Missile System is maintained by contracted support.

— Decrease the need for sole-source hardware vendor support, thereby reducing regional political involvement (Vendors who provide service and commercial support will be more numerous and competitive than those who provide only a stock of sole-source hardware and information.)

— Decrease the cost and need for buildings, maintenance personnel, and depth of operator training.

Most important, contracted support can adapt more readily to change.

Contracted support is no longer the last alternative in a selected program's acquisition. It is now, as it has always been, simply the other way of doing business.

Contracted support, or renting rather than owning the things we need, has been used successfully for the air refueling aircraft KC-10; Special Air Mission (SAM) C-137; Ground Launched Cruise Missile program; more recently, the E3 AWACS; and many other systems. These systems always have been consistently reliable and fully capable of fulfilling all of their mission needs. Yet, is contracted support considered equal to what is termed in our acquisition world as "organic" ownership?

The Deciding Variable: Cost vs. Time

When a system or piece of equipment was needed to counter the threat of total war, a war that could threaten not only the system but also its lines of maintenance and material support, it was necessary for the entire system to be bought and maintained for a long period of time. We and our enemies were caught up in a real war of massive indebtedness and spending to do this, we had to buy everything needed to meet or exceed what the other side had bought, and we had to be able to field each system as a complete and fully supportable "unit"

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of combat that could stand by itself in the exploding furnace of earth's "last great war."

Enemies today may very well be friends tomorrow, and our defense needs are in a constant state of change. Why should we continue to invest our nation's resources in the same old system of purchasing "total capability," with its resulting duplication of hardware and effort? Like the PM and his house and car, the choices we have are the cost of our investments vs. the length of benefit or utility value we can expect to derive from their use and service. The threat of total war is not as great as it once was. Contracted support can help us to take advantage of that change by helping us to buy only the service we need rather than all the things needed to produce that service.

Sharing the Load

Contracted support is service without the encumbrance and cost involved in ownership. And, it lets business and industry share with us equally in the risks, investments and created employment derived from our nation's defenses. As long as we continue on our path of business-as-usual, using the same old system of organic ownership preferred over contracted service, we run the risk of tying up our nation's resources in things we may not need. After 50 years of waging the Cold War, our regulations, our organizational structures, our training, and our methods of acquisition and decision making are clearly in favor of doing business in the same old way. Isn't it time to consider change?

Taking Advantage Of Change

Of course, all the things we need cannot be contracted. Defense is not a for-profit business constantly driven by profit and the bottom line. As professionals, though, we can conserve our nation's wealth by taking advantage of change and altering how we do business when new opportunities are presented. "Contracted support" and organic ownership are equal in our daily lives and in business. Shouldn't they be equal in every decision phase of defense acquisition, as well?

Department of Defense Instruction (DoDI) 5000.2, "Defense Acquisition Management Policies and Procedures," states: "Total System Acquisition. Acquisition programs shall be managed with the goal to optimize total system performance and reduce the cost of OWNERSHIP [author's emphasis added]." (As stated, ownership is the driving purpose of defense acquisition.)

Contracted service is not an equal force in acquisition. In fact, it is seldom mentioned in acquisition texts. When dealing with the forces of change, it is the best way of doing business because it reduces both risks and our investment in things.

Change can work for us. Because of it, new opportunities are being offered and new, specialized skills and jobs created as well.

This theory is advanced in DoD Directive 5000.1, under "Contract Type Selection. The contracting approach selected for each acquisition phase must permit an equitable and sensible allocation of RISK between Government and Industry." (How best is this done than by sharing the cost in both people and things with business?)

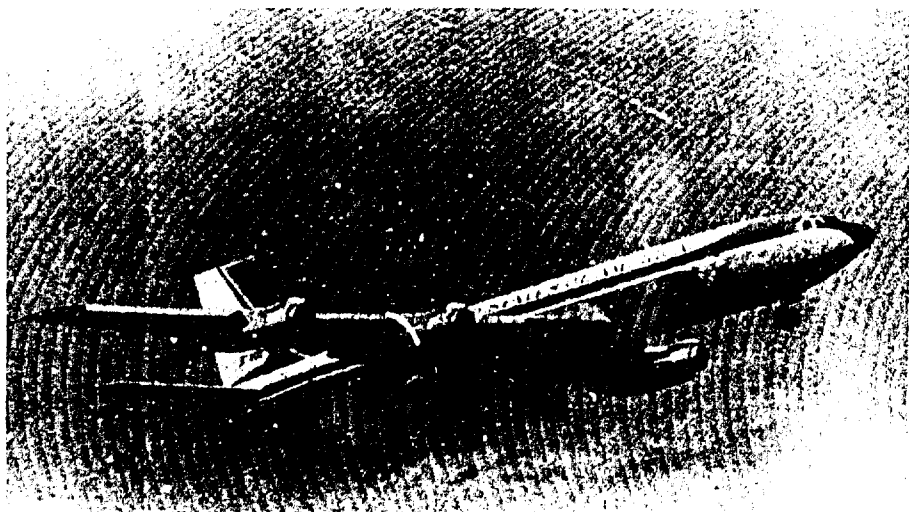
The DoDI 5000.2, further states: "Acquisition Strategies. The following statutorily imposed requirements apply during Phase 0: Competitive Alternative Development and Production. Acquisition strategies must be prepared by the Secretary of Defense (as delegated) and must allow the option for COMPETITIVE ALTERNATIVE SOURCES [author's emphasis added] for the system and EACH [author's emphasis added] major subsystem under the program throughout the period from the beginning of full scale (engineering and manufacturing) development through the end of procurement. (10 U.S.C. 2439 (reference (f)))" (Hardware purchase rather than service sources are

implied in this and other statements and texts.)

Contracting for Service

Having what is needed when it is needed to ensure a system's use and survivability has always been the goal of logistics and mission support. The factor that has overshadowed all acquisition decisions for the past 50 years has been how to do this and still maintain a system's long-range mobility during the threat of an all-out nuclear war. The answer to this problem has been to buy and own everything, and in large redundant quantities.

To have a system fully capable in a time of need no longer requires owning it and its means of support, too. The system must only be fully capable of achieving its purpose at the time it is needed. Contracted service puts more risk in the hands of business, and it creates new jobs for us and the public as well. It lets them share in the costs and the responsibilities of providing and maintaining our nation's defenses. To turn change to our advantage requires the time and effort to study it, and seeing our world of defense acquisition in newer, bolder ways.



Spectral Air Mission (SAM) C-137.

DSMC REGIONAL OFFICES

In addition to the main campus at Fort Belvoir, Va., the Defense Systems Management College (DSMC) has four regional offices. Conveniently located at major defense acquisition centers, they are much like our main campus and offer customers a wide variety of services.

In 1993, more than 100 DSMC classes were provided in the regions. This accounted for 48 percent of all DSMC students. The regions also provide consulting services, information dissemination and research assistance to their customers.

Write, telephone or fax one of the following regional offices for acquisition assistance:

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INTEGRATIVE EXPERIENTIAL LEARNING

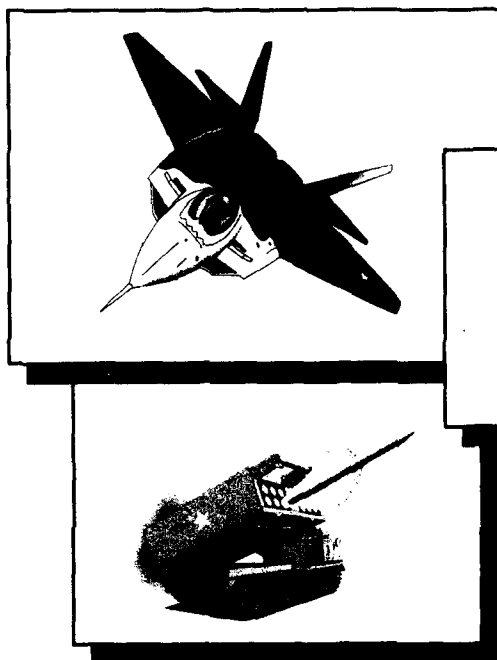
A Key to Program Management Education Success

William R. Fournier

For more than 20 years, the Defense Systems Management College (DSMC) has consistently provided one or more Program Management Course (PMC) capstone integrative experiential exercises. These exercises have been refined and revamped to adjust to changing world events and acquisition policy shifts.

The DSMC Integrative Program Management Department is unique in its all-encompassing use of integrative experiential learning. Integrative learning is critical for successful program management. It helps program managers (PMs) understand the trade-offs and natural conflicts that arise as a result of functional interest. It provides functional managers with a better understanding of the interrelationships among different functions on any particular issue.

Integrative learning is defined as the learning which combines two or more functional disciplines; i.e., contract management, funds management, systems engineering, logistics management. Experiential learning is



defined by F. Gerald Brown as "learning how to perform a specific act or operation by doing it ('how to' learning); or learning complexities of a professional role by experiencing the milieu in which the role is performed and attempting to perform parts of the role (role socialization)."¹

Requiring Students to Take an Active Role

Experiential learning includes exercises beyond lecture/discussion such as simulation, case study, practical exercise, role play and critical incidents. They require students to take a more active role and partici-

pate with a higher level of commitment during the educational process.

The experiential learning cognitive domain has the major advantage of giving a student the opportunity to deal with Bloom's taxonomy in levels of comprehension, application, analysis, synthesis and evaluation.² The major disadvantage of experiential learning is that it is time-consuming. The main focus of the exercises should be on the process issues as proposed to the specific content of the topic at hand. All integrative experiential learning exercises build upon the students having knowledge-based func-

Mr. Fournier is a Professor of Engineering Management, Integrative Program Management Department, Defense Systems Management College.

tional classes and on members of the class freely sharing their experiences in program management.

Currently, the PMC includes four types of integrative experiential learning lessons which are predominately integrative experiential learning in the PMC core curriculum. The four types are Industry Programs (IP), Program Management Decision Briefing (PMDB), Integrated Subjects (IS), Experiential Learning (EL), and Grand Slam (GS). Some other functional subject areas such as manufacturing management, principles of program management, and managerial development use integrative experiential learning along with other types of learning as a capstone to their other types of classes.

IP Students Organize the Program

The IP uses an outsider's perspective to examine a program and see the differences between government and contractor PMs. The IP students organize and run the program. The faculty role is administrative and facilitated learning. Its broad goals are to promote the understanding of industry's role in acquisition, production processes, and types of issues typically encountered during management, of real acquisition programs. It encourages considerable tailoring to their learning desires, goals and needs.

The PMDB is an individual exercise that requires students to create and present a decision briefing on an acquisition issue. It emphasizes a logical thought process and professional briefing skills. The PMDB encourages each student to research a chosen acquisition issue deeply.

The IS are faculty-organized topics concerning events after Milestone (MS) II. The two types are work-group, lesson-learned exercises and role-playing exercises. They utilize real and hypothetical system examples to promote the successful application of acquisition management. This in-

cludes a multiple disciplines approach to specific critical topics. The IS exercises are more involved in the leading and controlling aspects of program management.

Hypothetical Program Management Office (PMO)

The GS simulations are the most flexible and the longest exercises in the PMC curriculum. Students plan, organize and role play a hypothetical PMO from the pre-Concept Exploration Phase to shortly after MS II. The GS is wider in scope than IS; however, students obtain less shared depth in the understanding of issues.

In a specific GS, as all students cannot role play the PM, many students obtain detailed knowledge of operating in one functional area and a general understanding the responsibilities of other functional areas. The GS utilizes section outbriefs and role rotation to normalize the learning to the application level or above. The GS tends to be concentrated on the organizing and planning aspects of program management. The IS, IP and PMDB lessons learned should be used in planning a section's GS program. The GS is a unique exercise as it is one of the longest continuous program-management educational simulations in use.

The GS allows the following parameters that few other education exercises provide:

1. Students must make and abide by their decisions in a fairly realistic, nonthreatening environment.
2. Provides a chance to test current acquisition policy (i.e., the current GS is first to test many DoD acquisition initiatives for a simulated multiple-phase program).
3. Provides an opportunity for students to work in an unfamiliar area and obtain a wider perspective by spending a few days "wearing someone else's shoes."

4. Provides an opportunity for the inexperienced or junior-ranked students to experience being a PM.

5. Provides a chance to explore different leadership styles, organization concepts and management strategies in a flexible, nurturing environment.

The GS reinforces good management practices, clarifies limitations of less-desirable management practices, and highlights challenges of the acquisition processes. It provides students with an opportunity to reflect on the differing demands of early phases in the acquisition life cycle.

In summary, these integrative experiential exercises are critical to the program-management education process. They provide students with a chance to take risks and apply new and different program-management techniques in a comfortable, nurturing classroom environment. The wisdom students obtain should improve management of future DoD programs.

Endnotes

1. F. Gerald Browne, "Three Types of Experiential Learning: A Non-trivial Distinction," *New Directions for Experiential Learning: Developing Experiential Learning Programs for Professional Education*, Vol. 8 (San Francisco; Jossey-Bass Publishing, 1980), p. 14.
2. Ted Bloom, *Using the Taxonomy of Educational Objectives*, 1956, p. 37, "Comprehension is defined as the ability to grasp the meaning of material. Applications refers to the ability to use learned material in new and concrete situations. Analysis refers to the ability to break down material into its component parts so that its organizational structure may be understood. Synthesis refers to the ability to put parts together to form a new whole. Evaluation is concerned with the ability to judge and evaluate the value of material for a given purpose."

THE ARMY REUSE CENTER AND PROGRAM MANAGER SUPPORT

Software Reuse Implementation for PEO STAMIS

Marrea H. Riggs

Many program managers (PMs) have been absorbed by the debate about whether or not software reuse offers real benefits in terms of increased quality, lower cost and shortened schedules without major, up-front investment of scarce resources.

The Army Reuse Center (ARC) is in the business of making reuse beneficial by supporting PMs in integrating reuse into the software development life cycle (SDLC). In providing this support, the ARC has developed and maintained a full range of products and services geared toward assisting projects of all types and sizes. It has successfully initiated reuse activities that have taken Management Information Systems (MIS) software reuse from "concept" to "proof of concept" and realized actual cost savings/cost avoidance.

Real Reuse Successes

The ARC supported the Program Executive Office, Standard Army Management Information Systems (PEO STAMIS), in successfully achieving its FY-1993 reuse goals.

Ms. Riggs is Director of the Army Reuse Center, U.S. Army Information Systems Software Center, Information Systems Command, Falls Church, Va.



Left to right: Roy Lloyd, Henry Marshall, Brenda Lawter and Debbie Laforme in front of the Army Reuse Center exhibit.

Reuse activities focused on establishing the infrastructure within PEO STAMIS essential for long-term systematic reuse, implementation of the FY-1993 Reuse Plan, and pursuit of continued FY-1993 cost avoidance.

The final cost avoidance estimates for the FY-1993 PEO STAMIS software reuse implementation effort show that a total of 10,473 lines of code were reused. Using the ARC cost model, the total FY-1993 cost avoidance for PEO STAMIS is estimated at \$568,226. In addition to code components, the ARC certified

and installed "Lessons Learned" and "Cookbook and Standards" IEF products. These reusable products will be useful in achieving technology transfer of the IEF software development methodology.

Another reuse success was realized by the Joint Operations, Planning and Execution System (JOPES) Scheduling and Movement (S&M) subsystem. The JOPES S&M software is designed to allow users with proper permissions access to a large-scale database of Department of Defense (DoD) operational plans

Photo by Richard Mattox

(OPLANS). The system incorporates features that are common to many other large information systems, including the generation of standard reports and *ad hoc* retrieval. The JOPES S&M designers felt that these common capabilities were good candidates for reuse.

The ARC recently certified and installed selected parts of the Standard Installation/Division Personnel System-3 (SIDPERS-3) software, an Army personnel system under PEO STAMIS, into the reuse library. The design of the SIDPERS-3 system emphasized a layered architecture. This approach contributed to the successful completion of the immediate development goals, and paved the way for future reuse of major portions of the SIDPERS-3 design and code.

Through advanced planning, JOPES developers knew that portions of the reusable code donated by the SIDPERS-3 system were a close match to their S&M requirements. In the final count, JOPES S&M reused more than 27,000 lines of Ada code from the SIDPERS-3 components. Through the ARC cost modeling, JOPES S&M realized an estimated cost avoidance of approximately \$1.15 million in design and development costs. As a senior computer scientist stated, "The reuse process was critical to provide JOPES with the necessary

The Reuse Steering Committee encourages the exchange of information and ideas on current and planned software reuse initiatives within the Army and DoD.

capabilities and stay within the budget and schedule constraints."

Proven Products and Services

The ARC is a recognized leader in software reuse in the DoD MIS community and the primary focal point for implementation of software reuse within the Department of the Army (DA). It was established to support the development and fielding of reliable, high-quality systems, while reducing time and resources required to develop and maintain those systems. The ARC is a true reuse support center, providing a cadre of analysts, en-

gineers, and trainers skilled in reuse identification, support and integration throughout the SDLC.

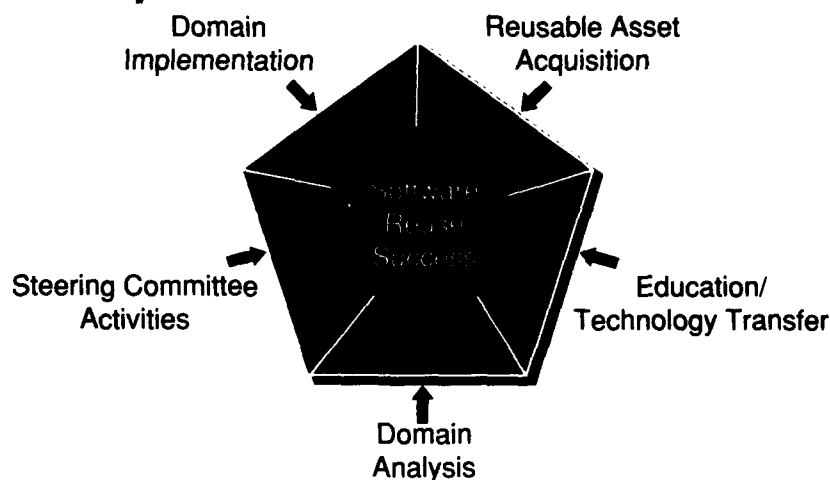
The FY-1993 reuse activities focused on critical aspects of the PEO STAMIS reuse program. These included management by the Reuse Steering Committee, Reuse Education and Technology Transfer, Domain Engineering and Reusable Asset Management. Figure 1 depicts this multifaceted approach.

Reuse Steering Committee. The Reuse Steering Committee is an executive-level management committee which guides and facilitates the incorporation of software reuse within PEO STAMIS. This committee provides a forum for identifying and discussing requirements, issues and opportunities associated with software reuse within PEO STAMIS. The Reuse Steering Committee encourages the exchange of information and ideas on current and planned software reuse initiatives within the Army and DoD.

Reuse Education and Technology Transfer. Since the reuse of software represents a radical transformation in software engineering practices and requires a dramatic change in skills required for the development of software, retraining personnel is necessary to ensure success and to develop a base of support among managers and developers for these new technologies. The ARC works in coordination with the PEO STAMIS to establish and implement short- and long-term reuse training goals to support this transformation for all levels of personnel from software engineers and support staff to manage executives and software development trainers.

Domain Engineering. A domain is a family of systems that share a common mission, function or set of common capabilities and data. Domain Engineering is an evolving, state-of-the-art software engineering pro-

FIGURE 1. Multifaceted Approach to Software Reuse Implementation



cess for identifying modeling, building and verifying the commonality present among the different software systems within a domain. It identifies how systems relate to other systems that have been built, as well as how reusable software components (RSCs) providing capabilities common throughout a domain can be taken from one set of systems and reused and integrated into systems being built today and those in the future. Two major components of the ARC Domain Engineering method are *Domain Analysis* and *Domain Implementation*.

— *Domain Analysis.* Domain Engineering begins by identifying and bounding a particular domain. Domain analysts take this information and produce a model of the common requirements in the domain. This shows what is similar among systems and, just as importantly, exactly which aspects of each system are unique. Domain analysts then identify the high-demand components that have the greatest potential utility within an application area and provide guidance on how to adapt them if they do not meet requirements.

— *Domain Implementation.* Domain implementors then create (or obtain from the ARC library) the RSCs that fit the requirements specified in the domain model. Domain implementation consists of analyzing reuse opportunities, targeting specific RSCs and their donor/client systems, and providing guidance to systems developers in the building of reusable software. The second effort focuses on investigating alternative approaches for storage, display and reuse of the captured domain information. During this process, requirements analysts and functional experts will gain in-depth knowledge of multiple systems related to their development.

Reusable Asset Acquisition. Finally, the ARC engineering staff works with the project/product managers to certify and install donor system RSCs in the ARC library and to facilitate

future reuse of those selected, high-demand components. The heart of this support is the ARC library of RSCs. The library system is an interactive, multiuser system that allows users to classify, store, analyze and retrieve RSCs. The faceted classification scheme used to search for needed components describes RSCs in domain-specific terms descriptive of the common components found within a domain. This process facilitates software reuse by offering developers the opportunity to match their applications needs with existing software products.

The ARC library is part of the Defense Software Repository System (DSRS), which provides ARC customers with access to similar libraries of RSCs at Defense Information Systems Agency/Center for Information Management (DISA/CIM) and other Service and agency support centers. As of 1 December 1993, the library contained more than 2,400 reusable design, code and document components — representing well over 2 million lines of quality code.

Plan for Future Reuse

To maximize the benefits of reuse within PEO STAMIS, a reuse infrastructure must be established to support aggressive pursuit of planned, systematic reuse at each phase of the SDLC. The FY-1993 reuse activities provided an opportunity to plan for coordinated reuse within PEO STAMIS by identifying specific reuse opportunities within and across PEO STAMIS domain boundaries, that could be achieved during FY-1994 and beyond. Fiscal 1993 was seen as an opportunity to conduct the domain analyses, provide education, and support intra- and inter-Service coordination that is required to implement cohesive, long-term reuse plans within PEO STAMIS, DA and DoD.

Recommended FY-1994 reuse activities take advantage of the infrastructure and other prior reuse invest-

ments to focus efforts on planned, systematic reuse within PEO STAMIS. The FY-1994 Reuse Implementation Plan (RIP) focuses on coordinated and mutually supportive reuse activities within PEO-STAMIS, on-site reuse engineering support for key programs, continued evaluation and incorporation of developing technologies, and planned reuse within PEO-STAMIS and across principal Army domains. Primary FY-1994 objectives are to complete the institutionalization of software reuse within PEO STAMIS and achieve significant, quantifiable cost avoidance/cost savings.

Return on Investment

In addition to other reuse benefits, the RIP targets short-term cost avoidance and longer-term cost savings. The reuse of software components within the SDLC can introduce savings, or cost avoidance, in terms of reduced time, resource and testing requirements. Cost equations and data points validated by the U.S. Army Cost and Economic Analysis Center (USACEAC) were used to project the short- and long-term software reuse benefits.

The estimated cost benefit for FY-1994 includes cost avoidance from opportunistic reuse and cost savings that could be achieved through aggressive planned reuse within PEO STAMIS. Actual cost avoidance and/or cost savings are highly dependent on PEO/PM support and implementation of recommended activities.

Although reuse will not solve all SDLC problems, it is one engineering approach that offers *proven* potential for increasing quality, productivity and programmer effectiveness while significantly reducing the costs and time associated with developing and maintaining software. To learn how the ARC can assist you, contact the Army Reuse Center, USAISSDC-W, ATTN: ASQB-IWE-R, STOP H-4, Ft. Belvoir, VA 22060-5456; (703) 285-6272; Fax (703) 285-6377.

VIRTUAL PROTOTYPING: CONCEPT TO PRODUCTION

New DSMC Publication Is Available

Computer technology has reached a level of maturity where virtual prototyping can be a major benefit to the DoD acquisition process. Virtual prototyping is a computer-based simulation with a degree of functional realism comparable to a physical prototype. It is an automated method that can maximize the benefits of integrated product teams through the use of scientific data visualization, three-dimensional drawings and animated simulations.

Virtual prototyping facilitates the DoD dual-use thrust because of its electrical transportability, the reuse of designs, and the ability to reconfigure system characteristics rapidly throughout the engineering design process. It has the potential for providing DoD decision makers the ability to select optimum weapons systems based on their impact in an electronic battlefield simulation—the "marketplace" of the future.

The new Defense Systems Management College Press publication, *Virtual Prototyping: Concept to Production*, explains the defense environment and the role of virtual prototypes in the S&T program. It also discusses the entire spectrum of synthetic environments, examines the application of synthetic environments in the acquisition process, and gives a detailed account of synthetic environments applications. Specific recommendations for acquisition policy, program management uses of virtual prototyping and industry adoption are included.

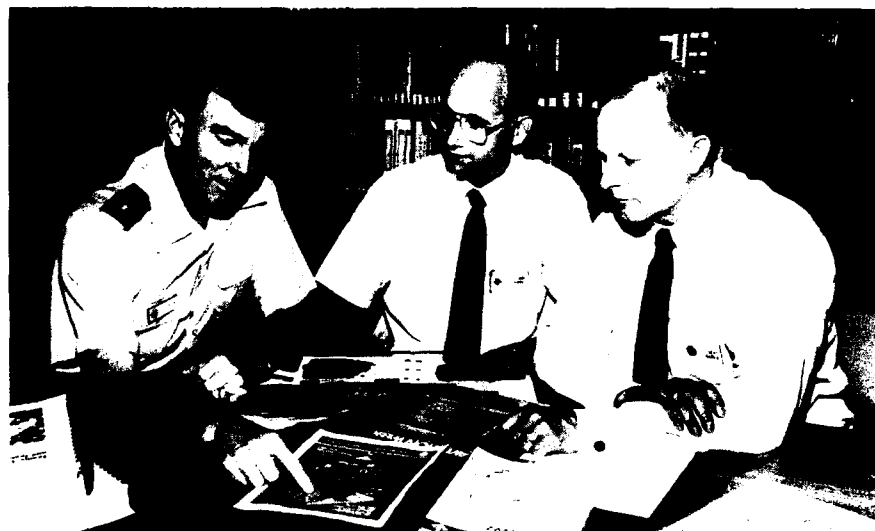
As members of the military research fellowship program at the Defense Systems Management College, Colonel Nelson P. Johnson, Jr., USA, Colonel (Sel) Robert P. Gocke, Jr., USAF, and Lieutenant Colonel (P) Albert B. Garcia, USA, authored this publication.

Colonel Johnson is now Program Manager, Night Vision and Electro-optics, Fort Belvoir, Va.; Colonel (Sel) Gocke is a Professor at the Air Force Institute of Technology, Wright-Patterson AFB, Ohio; and Lieutenant Colonel (P) Garcia is Project Manager, Electronic Campus, Defense Systems Management College, and has been selected for acquisition command.

Virtual Prototyping breaks new ground by examining this aspect of virtual reality applications. Govern-



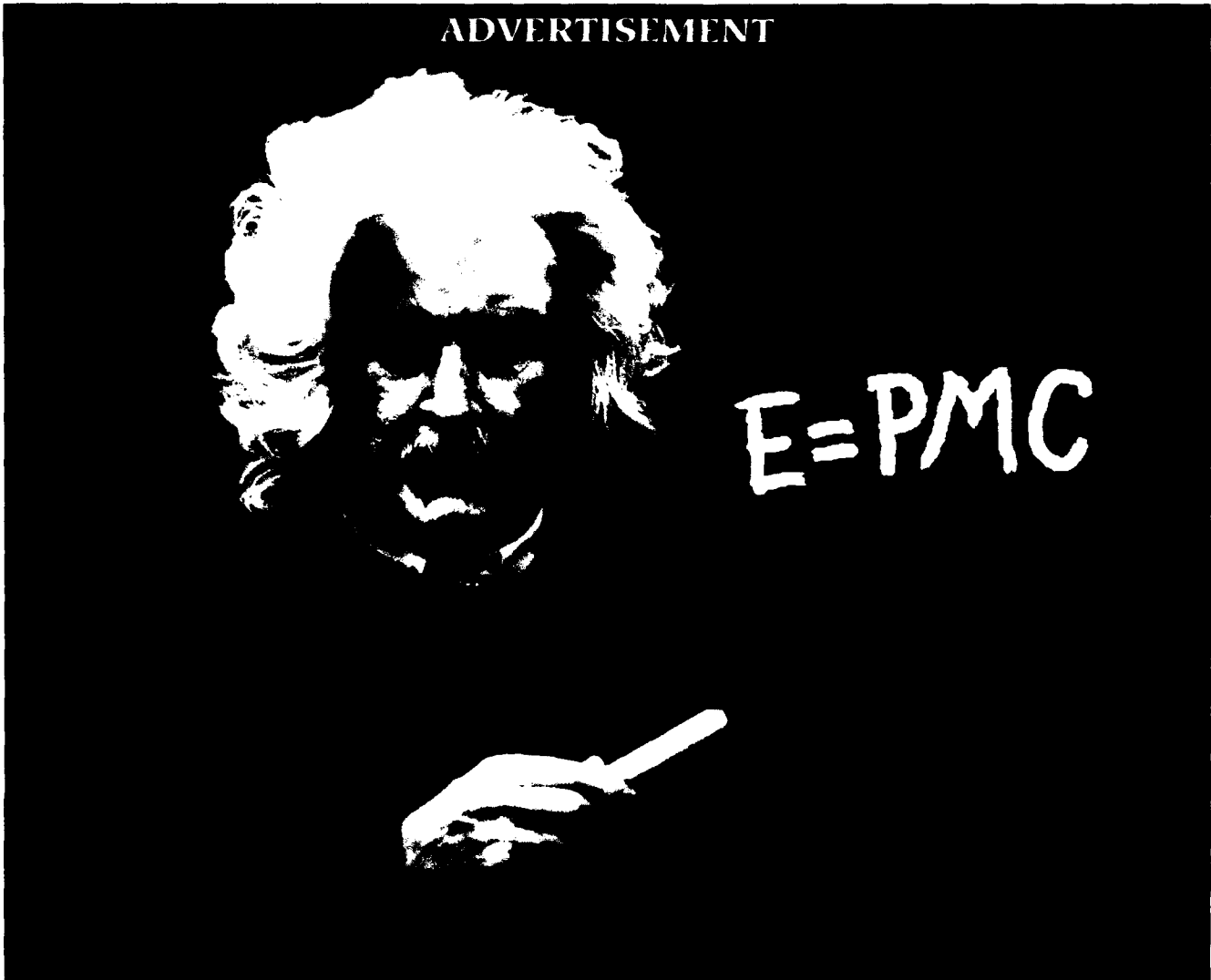
ment personnel may obtain this publication by writing or faxing a request to: DEFENSE SYST MGMT COLG, ATTN OS-PR, 9820 BELVOIR ROAD, SUITE G38, FT BELVOIR VA 22060-5565; Fax: (703) 805-3856. It is available to nongovernment personnel from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402; Stock #008-020-01328-5 for \$11.00.



From left: Colonel Nelson P. Johnson, Jr., USA; Colonel (Sel) Robert P. Gocke, Jr., USAF; and Lieutenant Colonel (P) Albert B. Garcia, USA.

Photo by Richard Mattox

ADVERTISEMENT



Albert Einstein portrayed by faculty member Jack McGovern

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A good education in systems management should include the DSMC premier 20-week Program Management Course (PMC). Relatively speaking, as Einstein would say, we offer the *only* comprehensive course that teaches this difficult business with Department of Defense policies, rules, regulations and techniques in mind. Our faculty are experts in their fields with years of education and practical experience.

Whether you're military, civilian or private industry, we hope to hear from you. We're always looking for industry students to attend, tuition free. Keep in mind, we often have cancellations up to the last minute for PMC and many of our short courses. Get on our waiting list now. For information or a copy of the latest schedule and course catalog, call the DSMC Registrar at (703) 805-2227.

KEEPING PACE WITH CHANGE

"DSMC 95" and the Acquisition Environment

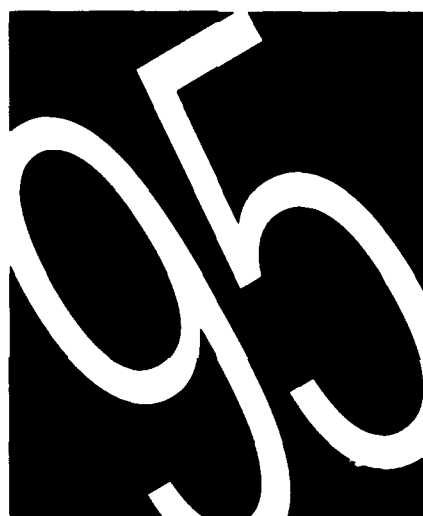
William W. Bahnmaier

If we had to use one word to characterize the acquisition environment during the past several years, the word would be "change." In the late 1980s, we saw the streamlining effect of the Defense Management Report (DMR) on acquisition organizations. We witnessed the start of the end of the Cold War to a status sometimes referred to as the "Cool War." In turn, this warming trend has had a major impact on acquisition by lowering defense budgets, shrinking the defense industrial base, and reducing the acquisition workforce.

In another major change to acquisition, Congress in 1990 passed the Defense Acquisition Workforce Improvement Act (DAWIA) which provided structure to the acquisition workforce by creating the concept of an acquisition corps, and establishing minimum training and education requirements for program executive officers (PEOs), program managers (PMs) and deputy program managers (DPMs). Implementation directives and manuals followed, such as DoD 5000.52-M, "Career Development Program For Acquisition Personnel." These provided detailed training requirements for the acquisition workforce.

Mr. Bahnmaier is the Project Manager of "DSMC 95" and Professor of Systems Acquisition Management, Principles of Program Management Department, at the College.

D S M C



NINETY-FIVE

A third area of change which has gained momentum in late 1993 and early 1994 is the Acquisition Reform Initiative of Secretary of Defense William J. Perry. Along with concepts such as simplifying the solicitation process, raising the threshold of the simplified acquisition threshold to \$100,000, and use of commercial products and services, this initiative places great emphasis on a highly trained and effective acquisition workforce.

One of the significant fallouts from this initiative has been the decision

by Mrs. Colleen A. Preston, Deputy Under Secretary of Defense (Acquisition Reform), to separate the current 20-week Program Management Course (PMC) into two parts. Part I is aimed at *program management* and is targeted "for 12, not to exceed 14, weeks in length unless the Acquisition Management Functional Board approves a longer course." Part II is approximately four weeks in length and is aimed at PMs; i.e., senior civilian and military officers selected to major system PM and DPM positions. Together, these two courses satisfy the same DAWIA requirements as the current PMC. However, they should be looked upon as two separate (but integrated) courses rather than two parts of one course.

The effect of the first set of changes has been to start causing a reduction in student thruput requirements for the Defense Systems Management College (DSMC). However, the second and third sets have done the opposite. They have resulted in a significant increase in student thruput requirements as the Department of Defense (DoD) implements a leaner, but more professional workforce.

Because of the uncertainty associated with these events, Brig Gen (Sel) Claude M. Bolton, Jr., USAF, DSMC Commandant, chartered Project "DSMC 95" in August 1993, to examine the impact of the environment on how the College provides its educational, research, consulting and information products. The thrust of the charter is to ensure the College oper-

ates more efficiently as resources are reduced in the 1990s.

The Charter

The following tasks were defined in the charter:

- Identify student thruput requirements as the defense establishment downsizes.

- Obtain Levels I, II and III workforce competencies from the career path functional boards.

- Define core courses that DSMC should sponsor. This includes the courses horizontally in each career field, and vertically across or common to several career fields.

- Determine the optimum curriculum design and presentation mediums that best support the defined core courses.

- After synthesizing data provided by the environment, core course analysis, and curriculum design teams, provide recommendations for adjustments in the DSMC organization and staffing to best meet future customer educational needs.

- Develop processes for continuous updating of competencies in coordination with the functional boards.

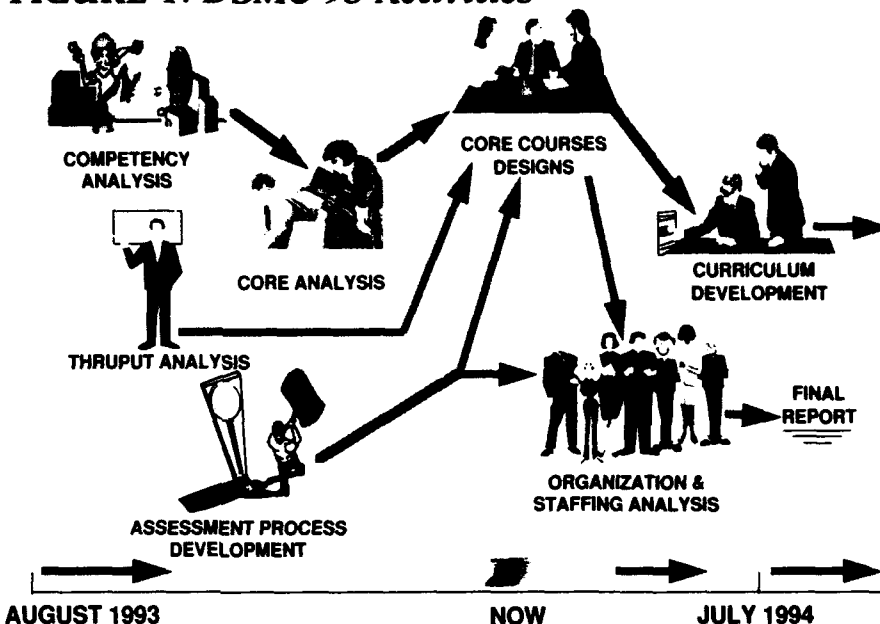
- Develop processes for institutionalizing customer assessments; i.e., how well are we meeting customer needs?

Early Activities

One of the first activities of any project is to determine the product of the project and, working backwards, lay out a viable program structure. In this case, the product is a report to the Commandant, giving options for his decision regarding the taskings shown above.

The next activity was to define the acquisition environment, develop an organization to accomplish the

FIGURE 1. DSMC 95 Activities



project, and form a plan with project activities. Of course, no DoD project has ever been started without a logo, so the one shown at the beginning of this article was agreed upon. However, the project manager insisted we would not have coffee cups imprinted with the logo!

To keep things simple, the basic charter would contain, among other guidance, tabs depicting the project organization and initial plan, and the tabs would be updated, as needed, during the project execution. As a project management scheduling tool, the project team selected a commercially available software package based on the Program Evaluation Review Technique (PERT). This package keeps the baseline schedule visible, but allows updates to the schedule being executed. At the press of a computer key, it also translates the PERT network chart into an easy-to-read milestone chart. Project personnel also came up with a top level activities chart (Figure 1) referred to as "animated PERT."

The project was organized by integrated product teams (IPTs). Each IPT was assigned a specific product for the overall project. These products lined up with the taskings above, much

as in a work-breakdown structure. For example, one team is responsible for determining the optimum organization and staffing for academic year 1995 and the near-term following years.

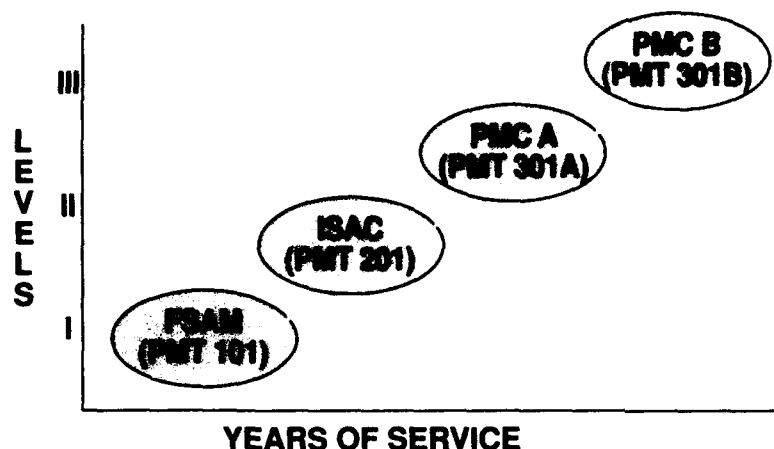
The project does not have full-time personnel, but is supported from the DSMC-matrixed, functional faculty and staff, who continue to perform their primary education, research, consulting and information roles while working on the project. This organizational approach has some obvious drawbacks; e.g., faculty members not always available for DSMC 95 activities. However, its strong point is that it keeps team members close to the educational process, reinforcing their judgment and ability to make sound recommendations.

The project organization as of 15 April involves about 100 faculty and staff in various subprojects. Because this is one out of four people on campus, project momentum and synergism has been building as the project progresses.

Execution to Date

The project manager's report for the Commandant is scheduled for August 1994. To date, the following activities have been accomplished:

FIGURE 2. The Education Continuum



— Career path competencies have been identified and scrubbed against the material in DSMC courses. Common core competencies which cross career paths have been provided by the Defense Acquisition University (DAU) Core Curriculum Working Group. These competencies have been scrubbed against courses that are intended to be mandatory for several career fields. The competencies are the most significant part of the “requirement”; i.e., what we teach.

— Based on the competency scrub, deficiencies have been identified and are being filled as curricula is developed.

— The horizontal (within career fields) and vertical (across career fields) courses that DSMC either teaches, or will teach, have been identified in the FY 1995 academic calendar. An example of the integrated PM career field courses and their corresponding workforce levels is shown in Figure 2. The courses shown in the figure are sometimes referred to as the DSMC core courses since they represent the core business/products of DSMC. For the first time at DSMC, these four courses are being designed as integrated courses where each builds on the material of the course before it. Reading from left to right, the courses are: Fundamentals of System Acquisition (FSAM)/Program Management Training (PMT) 101;

Intermediate Systems Acquisition Course/PMT 201; Program Management Course A (PMC A)/PMT 301A; and Program Management Course B (PMC B)/PMT 301B.

The acronym PMT is a DAU designation shown in the DAU course catalog. Based on late-breaking information, the revised PMT 101 and 201 will be redesignated as Acquisition (ACQ) 101 and 201, respectively, because they will be DAU Core courses; i.e., mandatory for several career fields. Also, in the future, PMC A will be known as the Advanced Program Management Course (APMC) or PMT 302; and PMC B will be known as the Executive Program Manager's Course (EPMC), or PMT 303.

— A thruput model has been developed by the Office of the President, DAU. The model needs further refinement, but for now it indicates that the current DAWIA “bow wave” may start receding about 1996. Thruput is one half of the “requirement” (the other being competencies), and it will impact heavily on determining future workload and staffing levels.

— In February, work began on curricula design. Based on the competencies, lesson topics/lesson blocks were developed along with lesson objectives, desired learning outcomes (DLOs), Lesson Assignment Sheets (LASs) and schedules for PMT 101

and 201. Approaches for PMT 301A and 301B also were agreed upon. The concepts for all four integrated DSMC PM career field courses were briefed and approved by the Acquisition Management (AM) Functional Board. The PMT 101 is targeted for nine vice the current five days; PMT 201 is targeted for four weeks which is the same as the current course. The revised PMT 101 and 201 are also planned to fulfill fundamental and intermediate course requirements, respectively, of several other career fields.

— Some basic decisions made to date are:

— Eight hundred forty students per year in PMT 301A (at least in FY 1995)

— Two PMT 301A offerings per year in the beginning

— Nominal 30 students per section in all courses (some exceptions, such as PMT 301B)

— The two DAU core courses (PMT 101, PMT 201) will be prerequisites for PMT 301A

— Two out of 14 sections will pilot PMT 301A in PMC 95-1

— Upgraded PMT 101 starts pilot in late August 1994; upgraded PMT 201 starts pilot in October 1994; PMT 301A starts pilot in March 1995; and PMT 301B starts pilot in July 1994.

— As part of the development of the revised PMT 101 and 201 courses, DSMC is conducting close liaison with other DAU Consortium schools which will be teaching those courses, in order to have the best available material and teaching methods for each course. In fact, in some cases, other Consortium schools are responsible for specific lesson development. For courses sponsored by other Consortium schools, but taught by DSMC, this process works in reverse.

— Some initial work has been done on designing and staffing an organization to support DSMC education, consulting, research and information products. But that work is low priority as DSMC works on developing the products — particularly educational products. The key here is that the educational products will be the key driver in any organizational and staffing concept. In any event, the DSMC organization and staffing will change as little as possible during the transition to the new courses. Changes, if required, will follow the transition to the new products — probably some-

time around mid-1995. The rationale is that there will be enough turmoil without trying to implement organizational changes along with new/revised courses.

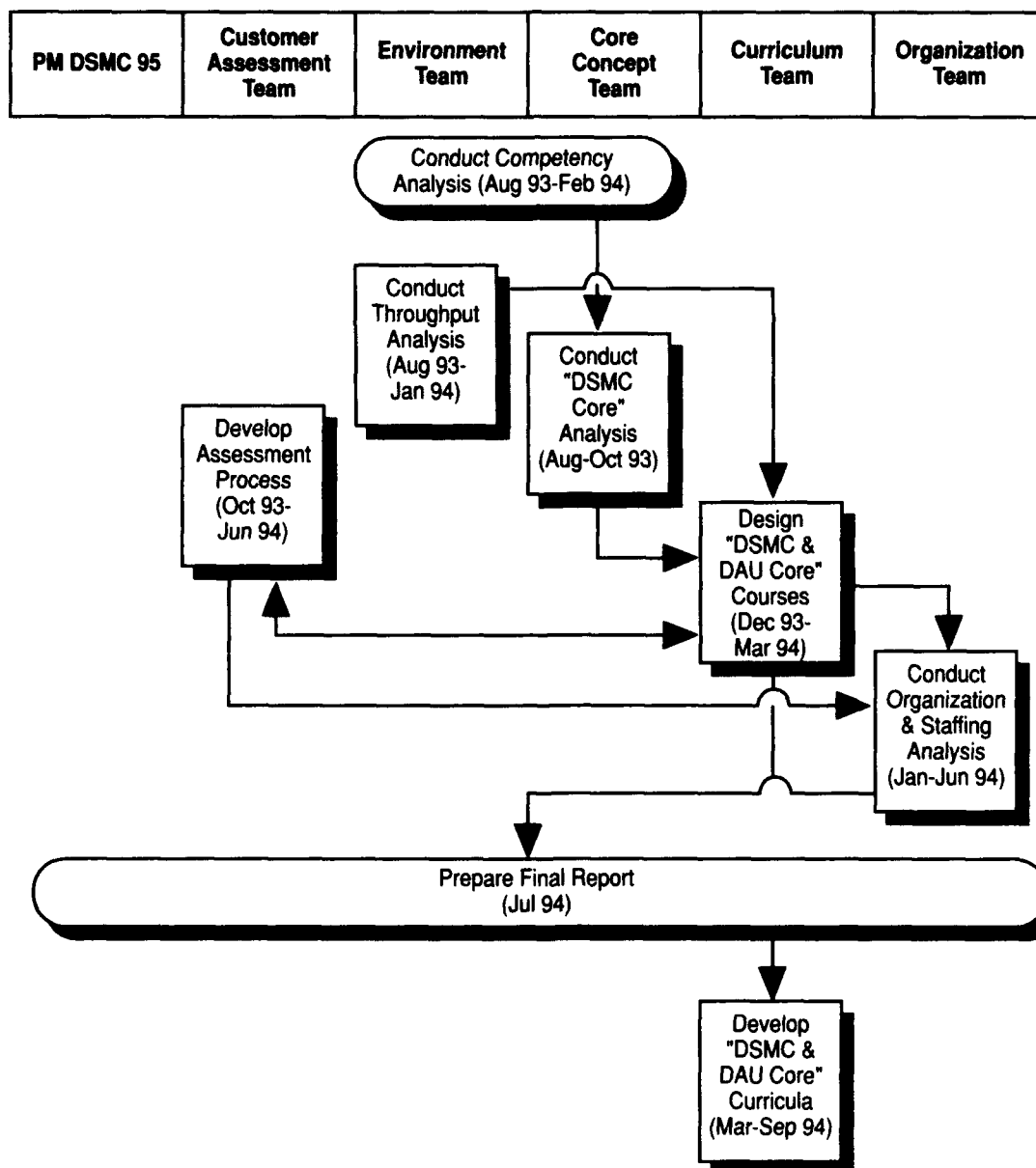
The Future

The hard work is ahead. During the next 10 months, the faculty must write detailed lesson plans and lesson assignment material, and then the teaching faculty must be brought up to speed on the new material. Some courses will be implemented sooner than the others. For example, the first pilot offering of PMT 301B will be

given to a group of 10-15 prospective PMs in July-August 1994. The PMT 301A will not be piloted until March-June 1995.

The DSMC is coping with change by overhauling the education, consulting, research and information status quo. The DSMC 95 model shown in the deployment flow chart in Figure 3, captures that process. It can be repeated in the future as we keep pace with change.

FIGURE 3. DSMC 95 Activities



INTERNATIONAL DEFENSE EDUCATIONAL ARRANGEMENT

Passing a Major Milestone

Recently, the International Defense Educational Arrangement (IDEA) passed a major milestone in maturity when it held its fifth, successful seminar in Europe.

The IDEA is an arrangement among equivalent acquisition education institutions in the United States (represented by the Defense Systems Management College (DSMC)), the United Kingdom, Germany and France. The purpose of IDEA is to improve the economy, efficiency and effectiveness of international training and education for acquisition/procurement management by active cooperation among national defense educational institutions with similar goals.

IDEA Beginnings

The IDEA formed in November 1989 when the administrative arrangement was signed by the DSMC Commandant, the Commandant of the Royal Military of Science in the United Kingdom, and the President of the Federal Academy of Defence Administration and Technology in Germany. The French accession letter was signed in July 1991 by their equivalent of the Under Secretary of Defense (Acquisition and Technology). They are represented by the Directeur, Centre d'Enseignement et de Formation d'Arcueil (CEFA) in Paris.

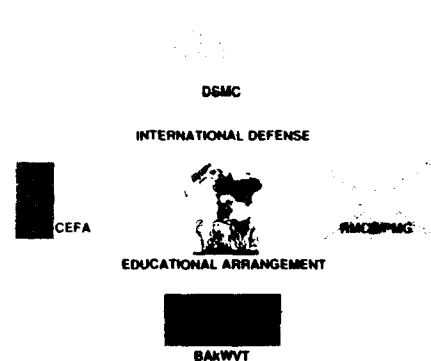
IDEA Customers

The principal IDEA product is the annual seminar and proceedings. At this time, the U.S. acquisition personnel in Europe (and Europeans, as well) have the unique opportunity to

be updated on the international acquisition policies of the participating nations, and to work together with the allies on relevant international acquisition problems in an academic environment. The primary customers are the international acquisition course directors and their institutions, and the seminar participants and their sponsoring organizations. Copies of the annual proceedings are provided to the Office of the Secretary of Defense and Services' international acquisition offices. New products are planned. An international acquisition guidebook will be produced in 1994 using DSMC research in international comparative acquisition practices as the foundation. The European comparisons will become an annual part of the IDEA Seminar, with national updates as a new product which will have broad appeal to international program offices and oversight staff.

Past, Present, Future Seminars

Seminars have been held in the European capitals of London, Bonn, Brussels and Paris. In 1993, the IDEA Board of Directors decided to hold the annual seminar at the participating defense educational institutions. Therefore, the fifth seminar was held at the Federal Academy of Defence Administration and Technology, Mannheim, Germany. In July 1994, the seminar will be held at the Centre d'Enseignement et de Formation d'Arcueil (CEFA), Paris, France. In July 1995, for the first time, the IDEA seminar will be held in the United States at the Defense Systems Man-



The IDEA logo is a symbol of the cooperation among the equivalent defense acquisition educational institutions in the United States, the United Kingdom, Germany and France.

agement College. In 1996, the seminar will return to Europe, as the Royal Military College of Science in the United Kingdom will be the host.

Who May Attend

The seminars are by invitation to all European Offices of Defense Cooperation, certain Defense Attaches, Army Standardization Groups, Air Force R&D Liaison Offices, the Navy European Office of Naval Research, as well as the U.S. Mission to NATO, SHAPE Technical Center and the U.S. European Command. This is the only opportunity for all U.S. representatives to meet with their European counterparts in an academic setting. The IDEA seminars bring great notoriety and prestige to DSMC.

IDEA Inquiries

For more information on IDEA, contact Professor Richard Kwatnoski, Director of International Courses, DSMC: (703) 805-3063 or Fax (703) 805-3187.

FROM OUR READERS

LETTER TO THE EDITOR

(Subject: "Navy Strategic Systems Programs Office," Ibrahim A. Ashie, pp. 33-35, January-February 1994)

As a member of the original core alumni group at Westinghouse during the Chrysler Jupiter liquid fueled FBM and then the Lockheed/Aerojet Polaris FBM programs, I found the article interesting. However, it lacked understanding of what made this program a success and thoroughness in researching other historical sources. Mr. Ashie is pursuing the right track, but seems to have overlooked several factors which may prevent "re-inventing" the success of the original government, military, contractor, FFRDC, and academic Polaris team that evolved between 1955 and 1962. Also, the author should examine how this Navy office changed from the Jupiter to solid propellant program. National security and other factors mitigated the urgency of the program. There can be doubt that this program was one of the most successful weapon systems developed and deployed in the US in a very short time. Its daily internal story is not well known nor documented comprehensively.

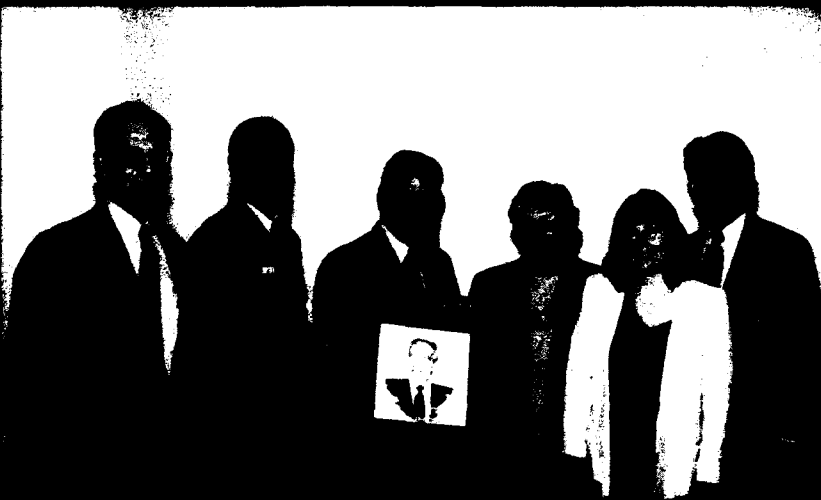
Those of us who were at the underwater tests off San Clemente, the first test launches, in the shipyards, watching the hulls of the SBN 598 and 599 being cut in half to make way for missile compartment, or sweating in non-air conditioned buildings in Washington, DC or at sites, remember that the reason for success was the extraordinary people that made up this team. Organization charts prepared after the fact do not tell the story of people who were the reason that the boxes existed. Engineers were

kings on this program and given full authority to do what was necessary to make it success. There were very few bureaucrats, administrators, so-called "systems engineers", and MBAs. Acquisition regulations were few and sole source contracts many. Contractor and government teams were small in number of people and provided a close working environment and unique esprit de corps.

The government and contractors literally ate and slept together on this program. Ethics and professionalism were very high and mutual respect the rule. There were few violations of these unwritten rules and those that did were banished. There was a zero tolerance level for lack of performance and incompetence. The quality of this system and program is a result of a team of talented, motivated, and dedicated people, not procedures, organization charts, politically correct terms, and other non-essential mechanics.

It is doubtful that lightning will strike twice in the same place. The members of the Polaris Team are vanishing and re-inventing it cannot be easily be accomplished without its most critical ingredient, the people who made it all happen.

Lawrence J. Reeves
President
Systems Research Associates
Los Angeles, California



DSMC Commandant, Brig Gen (Sel) Claude M. Bolton, Jr., USAF, presents a framed likeness to Acting Under Secretary of Defense (Acquisition and Technology) R. Noel Longuemare, as it appeared on the cover of the March-April issue of Program Manager. DSMC faculty and staff attending the presentation were (from left) Wilbur D. Jones, Jr., Associate Dean of Information and Director, DSMC Press; Esther M. Farria, Managing Editor, Program Manager; Paula L. Croisetiere, Typography and Design, Visual Arts Department; and Gregory T. Caruth, Director, Visual Arts Department.

DEPSECDEF AUTHORIZES USING INTERNATIONAL QUALITY STANDARDS

ISO 9000 Adopted for New Programs Contracts

John P. McGovern

Deputy Secretary of Defense (DEPSECDEF) John M. Deutch, in his letter of February 14, 1994, on "Use of Commercial Quality System Standards in the Department of Defense (DoD)," established the use of the ISO 9000 international quality standards. "Program offices are authorized to use ANSI/ASQC Q90 and the ISO 9000 series standards in contracts for new programs." [ISO is not an acronym; the Greek prefix *iso* means equal or identical.]

Deutch continued: "They may also allow these standards for follow-on efforts for existing programs instead of MIL-Q-9858A, Quality Program Requirements and MIL-I-45208A, Inspection System Requirements. Application of ISO 9000, ANSI/ASQC Q90 series standards on current contracts may be considered on a case-by-case basis." He further stated, "Third party certification or registration of a supplier's quality program shall not be required nor is it a substitute for Government quality surveillance, at the present time."

Mr. McGovern is a Professor of Engineering Management in the Manufacturing Management Department, Defense Systems Management College.

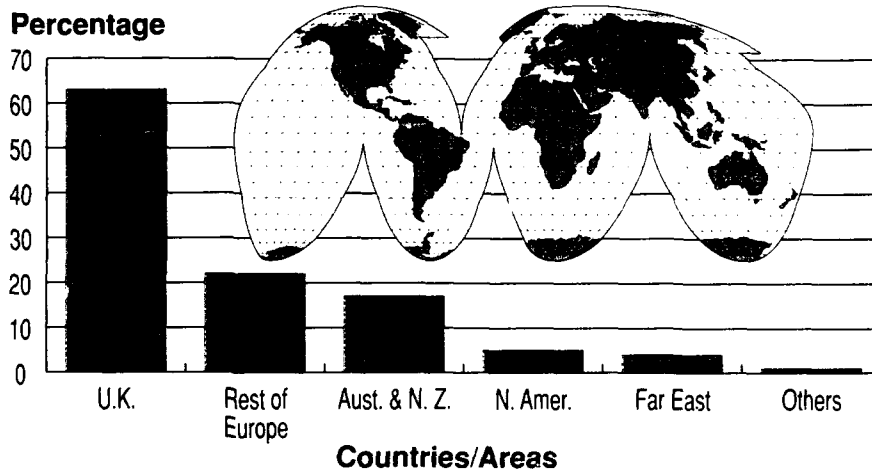
The ISO 9000 is being recognized globally at a time when the world is attuned to the competitive value of product quality and services.

Joining the DEPSECDEF in advocating use of ISO 9000 for DoD acquisition are Lt Gen James A. Fain, Jr., USAF, Commander, Aeronautical Systems Center, and VADM W.C. Bowes, USN, Commander, Naval Air Systems Command. The National Aeronautical and Space Administration (NASA) also has stated they plan to adopt the international quality standards.

The Foundation

Three and a half years ago, I attended the European Organization for Quality (EOQ) 36th Annual Con-

FIGURE 1. ISO 9000 CERTIFICATION World Share



Taken from the February 1994 ISO 9000 news

ference in Dublin, Ireland. The major theme was training and certification of quality engineers, quality auditors and quality lead-auditors. It was this group of specialists who were to prepare Europe for 1992 and the European Community (EC). The EOQ priorities were as follows:

— Harmonizing the 19 different quality standards of the EC countries into the single ISO 9000 series of quality standards.

— Educating and training quality specialists (quality engineers and auditors were first priority).

— Certifying* industry and business quality systems to ISO 9000.

Moving quickly since the EOQ Conference, more than 55 countries have adopted the international quality standards and more than 45,000 certificates of registration have been issued to companies throughout the world. Figure 1 illustrates the global distribution of registrations.

The ISO 9000 series of standards are designed to be contractual obligations between customers and suppliers. The suppliers are obligated to conduct internal or first-party audits. Second-party audits are conducted by customers, or their representatives, with the supplier. The third-party audit is one conducted by an organization that has been accredited by a worldwide recognized body to audit for compliance to ISO 9000 international quality standards. If the supplier complies, with or without additional corrective actions, registration is granted. In this country, the American Society for Quality Control (ASQC) is the Registration Accredita-

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tion Board (RAB) that grants accreditation to conduct third-party certifications. The United States has approximately 27 accredited bodies.

The International Standards were published in 1987 and the U.S. version, which is technically equivalent, is ANSI/ASQC Q90. The standards development is interesting, as MIL-Q-9858A was quite influential in their development. This military specification has been used since 1959 to define the quality system that DoD contractors should formulate. The MIL-Q-9858A was used as a model for the British Quality Standard BSI 5750; in turn, BSI 5750 was a guide for ISO 9000 international quality standards.

The ISO 9000 refers to a series of five international quality standards published by the International Organization for Standardization. Although ISO 9000-1 and 9004 offer guidance,

9001, 9002 and 9003 are quality system models. The series are:

1. ISO 9000-1. Quality management and quality-assurance standard — guidelines for selection and use.
2. ISO 9001. Model for quality assurance in design, development, production, installation and servicing.
3. ISO 9002. Model for quality assurance in production, installation and servicing.
4. ISO 9003. Model for quality assurance in final inspection and test.
5. ISO 9004-1. Quality management and quality system-elements guidelines.

As can be seen by the title, ISO 9001 has the broadest coverage of the five standards. It addresses management responsibility regarding quality policy, assignment of management and authority, and resources for quality. It also mandates a quality system that comprises quality policy, quality manual and procedures. The ISO 9001 calls for contract review, design review, documentation and control, subcontractor evaluation, inspection and test, calibration and internal audits. Along with some elements not mentioned here, this document establishes the necessary activities and the interactions for an acceptable quality assurance organization.

What's Ahead?

Although the prime contractual vehicle DoD has used for more than 35 years, MIL-Q-9858A has many of the elements of the ISO 9000 International Quality Standards — specifically, ISO 9001 — it has not been used effectively. Most often, it is interpreted as a military specification that requires contractor and government inspections and periodic scrap and rework reports, and not a document that requires a contractor to implement an effective, quality-assurance system.

* More appropriately, this should say "Registering." When either term is used it should be prefaced by "Quality System." For compliance with ISO 9000, this process involves periodic audits of a supplier's quality system by a third party — a registrar.

The ISO 9000 is being recognized globally at a time when the world is attuned to the competitive value of product quality and services. This fact, along with the TQM focus by DoD for the last five years, will result in a truer, more complete interpretation of the ISO Quality Standards. This interpretation, therefore, will foster contractor implementation of all elements of a quality system with mandated internal audits and second-party audit by the customer (the government).

The DoD now has an opportunity to streamline further the quality-assurance activities with their contractors. With Defense Contracting Management Command's (DCMC's) emphasis on cooperation, process management, and utilization of contractor quality data, ISO 9000 will be a powerful tool for furtherance of these concepts. If DCMC continues to transition to this mode, the following actions must be taken at all levels:

- Training on ISO International Quality Standards and associated documents

- Training in conducting quality assurance (QA) system audits

- Recognizing that a contractor with a compliant ISO Quality System goes a long way toward ensuring product quality and service

- Future recognition of a supplier's third-party registration, if conducted by an accredited body.

This is not to say that a compliant quality systems guarantees a good product, only that this is a minimum requirement for ensuring product quality. We know the other elements of quality in design and manufacturing must be practiced to achieve world-class quality.

If the steps above are implemented, DCMC will become primarily a QA system assessment agency not an inspection agency.

*Using
commercial and
international
standards and
specifications to
procure some
elements of our
weapon systems
is the direction
of the
future.*

In January 1994, a set of guidelines for implementing ISO 9000, "Guidance on the Application of ISO9000/ASQC Q90 Series Quality Systems Standards," was published in MIL-HDBK-9000, NASA-HDBK-9000. Without proper education and training on the concepts and philosophies of the elements and responsibilities indicated in ISO 9000 quality system, it is possible that many program managers and contract administrators will utilize all the supplements afforded in this guidance document and we will revert to "the government must inspect" mentality practiced with MIL-Q-9858A.

Certainly, some products and programs may require military specification supplements; but, there are many more programs where a compliant QA system will ensure product quality.

The real challenge is to distinguish between programs that can be managed by assessment of the ISO 9000 quality system and those that require additional military specifications and oversight. The DoD must be able to know the difference.

DoD Goes Commercial and International

The other DoD challenge is the major thrust to use Non-Developmental Items (NDIs) for our weapon systems. In his remarks to the National Contract Management Association, November 18, 1993, Dr. William J. Perry, now Secretary of Defense, mentioned the United States cannot afford two industrial bases — one for defense and the other for commercial. He also pointed out that advances in technology and productivity in the past 20 years in the commercial sector are too important to ignore.

Dr. Perry has been "beating the drum" for months, recommending DoD use of commercial specifications wherever possible. The ISO 9000 international quality standard used for DoD acquisition is a major step in this direction.

Recently, I have seen three RFPs for electronic equipment where military standards and specifications were listed along with a statement allowing for the use of commercial off-the-shelf components, as long as performance requirements are met. The electronics industry is one where commercial technology and reliability are conducive for many military applications. Some commercial plastic encapsulated circuits exhibit reliability measures equal to some military hermetically-sealed circuits.

Using commercial and international standards and specifications to procure some elements of our weapon systems is the direction of the future. Again, this must be done with knowledge and with the user in mind. Doing away with the 16-page specification for a ballpoint pen is long overdue. But, let us not move so quickly that we eliminate some military specifications and standards that have become industry standards. Let us continue to deal more with quality systems and cost-effective commercial products whenever performance and reliability is not compromised.

WHY DoD SHOULD MOVE TOWARD COMMERCIAL PRACTICES

A Disparate View

Dr. Walter B. LaBerge

Most people miss the central point of why Department of Defense (DoD) acquisition must move toward a more commercial-like environment. Our present focus is to achieve those one-time, 10-15 percent savings which might accrue if we can achieve legislative reform (the 800 Panel Recommendations) allowing DoD to design and build hardware to commercial standards. However, this is not the best of reasons to move toward commercial standards. What we really should focus on is buying into the commercial competitive process where continuous aggressive competition drives down initial product sales prices and provides stimulus for continued product improvement and cost-performance benefit.

The DoD has an opportunity to get in on the same environment that brought the prices of cellular phones down and their performance up. We in DoD need to benefit from the way of conducting business that has improved CAMCORDER performance while halving their price. We need to use the system that in just a few years has made home computers affordable and indispensable.

Dr. LaBerge is a Visiting Professor at the University of Texas at Austin, and the Defense Systems Management College.

Photo, and permission for use, from Maytag Company, Division of Maytag Corporation.



The new constrained fiscal environment in which DoD finds itself will require new ways of acquiring equipment. Most will delay or defer capabilities the Services would prefer to acquire more quickly. Decisions will have to be made as to whether a number of different capabilities should

be simultaneously introduced into only portions of the force as opposed to our current intent to fully outfit all combat elements. This direction, plus an added emphasis on broad retrofit of forces vice new platform procurement, will completely change the nature of DoD procurement.

Though it offers difficult challenges, this new environment also may offer new opportunities. In changing from a needed rapid response to Soviet capabilities not influenced by budget constraints to a long-term, budget-constrained modernization program, we may be mimicking the business world of U.S. high-technology industry more closely than ever. The latent advantage in adopting a strategy more closely to the commercial world is being better able to adopt the business methods which have so strikingly reduced their product cost and increased their product capability.

...we wish to force ourselves and our suppliers into the equivalent of Maytag's environment. Maytag convinces the public it has a competitively priced product; its competitive performance improves constantly; and its products never need repair because reliability is their greatest concern.

It is not the 10-15 percent cost-performance improvement from specification changes that we should seek. Rather, our objective should be to get the larger incremental cost-performance improvements typical of the competitive, high-technology, commercial world. We should strive to

achieve a stranglehold on our military marketplace with low-cost, high-performance products — like the Japanese did to us in the consumer electronics field and we have done recently to strike back in the semiconductor microprocessor arena.

These consumer product advances have come not at the expense of the supplier industries; rather, they have expanded and strengthened them. Continuing competition in the marketplace is what has made it happen, not bending the rules on how to build things. If we want to build a strong DoD industrial base, we should emulate competitive industry practice.

The real DoD issue, in my opinion, should be where procurements are required to be more like the forms of competition seen in the commercial marketplace, rather than limited to promoting a DoD "specification-free environment" to what will be, in an era of reduced new systems, a less-and-less competitive industry.

This different type of focus has not been discussed greatly. Perhaps this is because such a marketplace may not be to the advantage of those who give advice on the defense industrial base — namely, those who are in it now and might benefit from a change. The industry now possessed by DoD admittedly has performed well in the past as seen by the results of Desert Storm. However, it has been good at what we have asked it to do during the past decades — because of Soviet pressure, to emphasize performance and not necessarily economy. As a result, being scrupulously cost conscious is not something we would, in our wildest dreams, attribute to our current defense industry.

In the following, I hope to develop the rationale that there should be a substantial shift in emphasis in what we are trying to accomplish by acquisition reform, one skewed more heavily toward increased competition at all levels.

Key Issue

In my view, the real reason DoD should move to commercial standards is to be better able to permit continuing commercial-like production competition throughout the lifetime of its military products. The threat of continuing commercial price competition is what drives commercial suppliers to use their best people on design for low cost in the first place, and then to continue putting as first priority further reduction of cost and increased performance downstream. The same should be a DoD objective.

Suppliers in commercial industry know they cannot sit on their hands once they introduce a product. They know if they are successful in introducing a new, "hot" sales item, it will be reengineered quickly by their competition, which is anxious to take over that market. We should facilitate that continuous commercial-like competition.

However, as things stand, that is not how we motivate our contractors. The best of our contractor designers — the ones responsible for cost/performance optimization — having once helped their companies win a contract, now shift immediately to new competitions yet to be won. One can hardly blame these contractors; that is where their greatest rewards lie.

Conversely, government efforts to support commercial practice should not be oriented principally toward helping selected contractors shave small percentages of cost from products no longer subject to continuing competition. That is not where the biggest savings are to be found.

If we are to break our pick on a tough rock, it ought to be a rock that has real gold in it.

Raison d'Etre

Numbers taken from an Office of Technology Assessment report in process of publication show the differ-

ences. With their permission, I include them in Figure 1.

Today, almost everyone quibbles over whether savings by specification and other relief can be as high as 10 or 15 percent. However, the bombshell of momentous proportions contained in the referenced chart is that the differences in costs for equivalent military and commercial items actually purchased in the marketplace can range from 500-900 percent. Unusual about all this is that it isn't very surprising to anyone who sees the numbers.

Clearly, not all cost differences are due to competition. Some differences are connected with different volumes; some, perhaps, to lesser environmental requirements, although there is a bulk of Navy experience that shows commercial equipment can be repackaged easily to work in the military environment of ships and aircraft.

Further, I believe this concept of continuing competition in military goods can be achieved straightforwardly and, in fact, is aided by our current budget woes. Also, I suspect these ideas will experience far less difficulty than will an assault on the eaches of 800 Panel Acquisition Reform. Subsequent paragraphs illustrate how to accomplish the proposed continuing competition. Lastly, along with the cost reduction continued competition brings, can come a level of reliability and performance betterment not otherwise achievable.

The Environment We Wish to Create

In my mind, this proposal is the "Maytag repairman" argument in military clothing. In its simplest form, we wish to force ourselves and our suppliers into the equivalent of the Maytag environment. Maytag sells its products by convincing the public that they have a competitively priced product; its competitive performance improves constantly; and its products never need repair because reliability is their greatest concern. To make

that claim "stick" through the years with department store customers, Maytag has tremendous incentive to invest its profits and use its best people to improve its product continuously. There is no equivalent "life-or-death" reason for DoD program managers or their military contractors to make the same consequential effort. Neither is the gain to do so high, nor is the peril of not doing it consequential. That being the case, any contractor, military or commercial, can be expected to put his best product design talent into completely different product development because that is where their money would lie.

Why Address this Issue?

The issue of affordable military products is more important today than ever before. Surprisingly, it may be easier to implement now than earlier. These conditions are true because:

- Force structure demands, driven by multiple war scenarios and smaller budgets, inevitably are going to make acquisition accounts smaller and smaller, thus emphasizing even more the need for reduced product costs.

- Products introduced in the next decade will be used far longer than previously. Product improvement in the long term will be the order of the decade rather than new platform introduction. It is plausible to believe building factory improvements is more economical (even without arguments based on competition) than having them installed in the field by retrofit.

- Mobilization potential becomes more important, because we will not

maintain, for budget reasons, a force that can ride out all foreseeable crises. Therefore, we will be obliged to



U.S. Army photos released by DoD unless otherwise noted.

design for rapid increase equipage of our force, not knowing when it will be needed. To meet that need, our only option appears to be an active warm base from which to accelerate.

- That, in turn, will drive us inevitably to build our new products at a low rate so we can keep our lines hot. We cannot allow the kinds of problems we have now (Abrams tank line, which will soon be dead) where many of our material items now out of

production have start-up times not within the envelope of anticipated crisis warning times. These longer build-out times will be permitted by the threat of the next decade; whereas, the threat we had formerly would not. Critical to remember is that times have changed. In the old days of Soviet confrontation when they introduced a new capability, we needed immedi-

FIGURE 1. MIL-SPEC vs. Commercial Comparisons (for similar quantities)

MIL-SPEC to Commerical Ratio

ITEM	COST	ACQ TIME	RELIABILITY	SIZE
Sony Color Monitor	8X	—	Similar	Same
Data Processor (classified)	9X	3X	Worse	1/6
Guardrail V/IV	2X	2X	Similar	Same
Secure Phone	5X	4.5X	—	6X
STU II / STU III				
STU III	4X	1.5X	Similar	Larger
Computer PDP 11/44	8X	—	Worse(11X)	1/8
Remote Sensor	4.5X	—	Similar	1/4
Inertial Navigator	1.7X	—	Worse(5X)	
Carousel/ASN 132				

Source: U.S. Department of Defense, 1987.

ate, full response. Now, the threats are of lesser numbers and probably can be satisfied by a more drawn-out modernization program.

— Through this more drawn-out procurement cycle we need to maintain technological superiority, not allowing a protracted period of constant capability product. In DoD, we need the same incremental improve-

ment that is typically going on in the commercial marketplace every day. With that improved performance, we also would need the decreased costs seen in any evolving commercial marketplace. The best examples of what we wish for the military is what is going on today in the high-technology commercial electronics businesses. Television, CD, computer, long-haul communications and cellular car phone businesses all give spectacularly better value as each year goes by. To give added hope that we can gain for the military what the civilian buyer already has, those products just discussed are almost exact overlays of what the military will buy in the next decade.

Furthermore, I see no reason why we cannot give the military buyer the same bargains we have available in our home electronics products, as long as we can achieve continuing production competition throughout the lifetime of military production runs.

Technique for Achieving Continuous (Commercial-like) Competition

To achieve the continuous competition typical of the commercial marketplace, several characteristics of that marketplace must be satisfied.

Contractor photo released by DoD



D.

Photo courtesy of McDonnell Douglas



E.

A. Soldier holding a Stinger scans the horizon.

B&C. A sequence of photographs showing a GBU-15 bomb on target and on impact during a weapons demonstration, December 12, 1978, at White Sands Missile Range, New Mexico.

D. A pair of U.S. Marines accurately determine their location during desert training exercises using the Position Location Reporting System (PLRS). The Hughes system allows Marines in the field to communicate with commanders by using a digital manpack radio that provides location, navigation and short messages through a hand-held readout device.

E. Air-to-air view of an F/A-18 Hornet strike fighter aircraft from Marine Fighter/Attack Squadron 314 (VMFA-314) firing an AIM-9 Sidewinder air-to-air missile during an operational test.

1. Reasonably long procurement cycles for our products, in order to make plausible competitor investment in reengineering and tooling for late market entry. (Predicted by this article to be the way the military procurement will have to respond, for reasons other than cost, to the new budget environment.)

2. Freedom to change detailed design and to change any parts as long as the completed product can demonstrate form-fit and function compliance with the initial design, and pass companion environmental and lot sample tests. (An existence theorem has proved that such a process can work. We already allow in-production changes for the advantage of the government, subject to similar qualifying tests. Also, on a complete product basis, it was already tested successfully by the Army in its Gulf War GPS receiver procurement.)

3. Willingness to accept vendors accounting systems and plant procedures. (Again, already successfully tested by the GPS experiment. Also probably easily accepted as long as these competitions include several commercial contestants and recompetitions are frequent.)

4. Willingness to no longer depend on military maintenance for these kinds of procurements. Rather, there must be agreement to follow today's commercial pattern of return to vendor for replacement or repair (albeit the commercial vendor may also be in the field, if necessary). (Partially being done now for many products we buy. Clearly acceptable for most consumables ordnance like Stinger, Sidewinder, GBU bomb kits and the like, for training systems, for logistic support equipment, and for most complicated electronics not normally in immediate contact with the enemy.)

5. Agreement through contractual instruments that the designs paid for by the government, when produced,

belong to the government and that these designs can be revealed to prospective bidders at the time of recompetition. (The way many commercial subcontractors now work. Equivalent to the common commercial practice of buying a competitor's product and seeing what's in it and how it works.) Now practiced by the government in second-source procurements.

6. Further, agreement that nothing unspecified as company proprietary at the time of original contract award can be claimed later as company proprietary without agreement by the government. (A requirement not dissimilar from standard, long-accepted military second-sourcing procedures, and now frequently used in second- and third-tier contracts by primes.)

7. Products intended for long production runs (e.g., at least six years or more) during the competitive production period subsequent to initial production, will be considered to meet the statute requirements of Non-Developmental Item (NDI) legislation. (What is proposed already may be an allowable interpretation of current statutes, though probably this application will need congressional affirmation. Such affirmation may be agreeable to the special interests supporting existing regulations because of its comparatively limited application compared to blanket 800 Panel approvals.)

Summary

The DoD should try to emulate commercial characteristics which foster continuous commercial-like competition over the lifetime of its future procurements. Threat of such continuous procurement competition, when occasionally exercised, can force intense supplier effort on cost-performance in their initial designs, in order to make more difficult later market entry by a competitor. Continued vigorous cost/performance emphasis also can be expected for the

same reason — the desire to prevent competitor market entry at anytime in the extended product production cycle. The whole idea is for the government to prevent noncompetitive equipment being built anytime during the production span of its programs. From examining commercial high-technology parallels, I believe that is where the biggest potential for savings exists for the buyer.

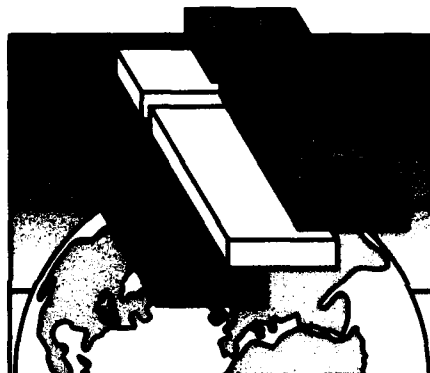
A program to easily achieve these incentives is proposed in this article. Work to relieve government procurement restrictions as proposed by the 800 Panel should also be pressed with vigor, since not all DoD products can meet the criteria for continuing competition as outlined above. However, our acquisition community must understand it is continuing commercial-like competition, not specification change, that holds the greatest opportunity for significant DoD savings.

In sum, as a way to look at things, it is our Maytag problem we wish to solve. Would we rather have the repairman come out (at \$XX per hour and charge retail parts costs) or would we rather have the improvements built in at the factory at a fraction of the cost and, when we can buy a new one, give the old one to the kids (in the DoD case, to war reserves)? If you don't like the Maytag equivalence, try the comparable Motorola large-screen television parallel. In this instance, you probably do not want a planned product improvement program involving your local repairman implementing it in your living room, but may prefer to buy a new version when the price comes down a bit and new performance becomes irresistible, at which time you put the old one in the guest house (training base).

The issues in this article are potentially extremely important. They are sufficiently different from popular thought to merit major vetting and consideration. I hope the article stimulates investigation and concern.

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THE CULTURAL IMPLICATIONS OF CHANGE

Achieving the Proper Blend

Henry C. Alberts

Emphasis on total quality management (TQM) has been interpreted by some as a crusade against the status quo. However, the idea was to seek out beneficial changes which would improve products and services and use them to revive what some saw as moribund industrial and service sectors.

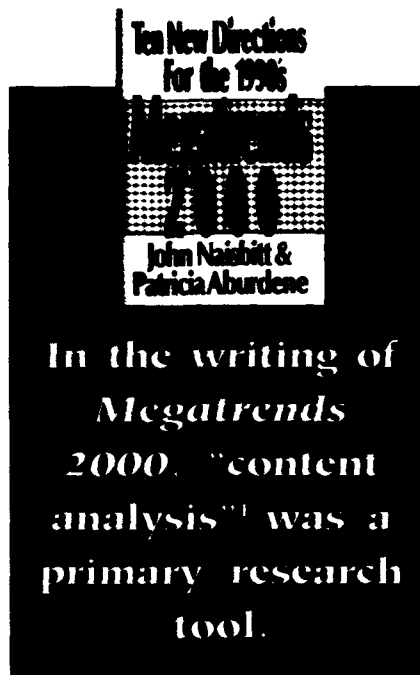
Retrospectively, it appears that more was expected from that effort than was achieved. Some research has indicated that many problems in implementing TQM originated from human beings' resistance to change. This article examines the effects of cultural considerations on attempts to implement change.

Up-Front Observations

In the writing of *Megatrends 2000*, "content analysis"¹ was a primary research tool. If one were to use content analysis as a tool to measure popular beliefs and concepts within the U.S. culture,² one might conclude that in the last 20 or more years our culture has demonstrated several major characteristics related to difficulty in implementing change:

— The tendency to deny that an idea or a plan has gone awry. Almost

Mr. Alberts is a Professor of Acquisition Management in the Systems Engineering Management Department, Defense Systems Management College.



any other course seems preferable. It is almost as if one commits heresy by admitting some plan, made years before, has produced an effect other than that for which it was envisioned.

— It would seem a preferred response to failed programs is to say, "The plan was OK, but we didn't spend enough to make it work as advertised." Spending more money to rescue the situation seems to have become "the solution of choice" to problems of a plan having been overtaken by events.

— Failure or error is "intolerable." Being wrong is stigmatized to the de-

gree that individuals cannot (do not want to) admit to anything other than perfect behavior which produced exactly the expected results. Even more important, we recently have begun enacting legislation which "criminalizes" error: An "honest mistake" is interpreted *prima facie* as having had criminal motivation!

More rational behavior might be to view the process of learning as continuous, and to understand that when exploring new territory, error is part of learning. If we have not been there before, and no one else has either, then it may be we can't find out what "there" is like without making errors. Do babies ever know enough *a priori* to walk without ever having developed a personalized knowledge of balance and falling that can come only from "erroneous" attempts.

In its most fundamental context, learning is discovering what is true! The definitions of the word imply the opportunity for failure.³ To learn what is true, do we not learn also what is false? The way to understanding is littered with "supposes" that, on rigorous examination, are simply wrong assumptions. Admitting failure is an important part of progress.

The wider the acceptance a paradigm has (the more acceptable a paradigm is), the more difficult it is to declare it flawed and to recognize, therefore, that change is necessary.

No paradigm created by humans, or which includes them as fundamental elements, can be "correct" for all time. There is ample evidence of once useful cultures overtaken by events, situations where failure to change has led to conquest by those with different but, perhaps, more temporally suitable paradigms.

Based on the observations above, it might be argued that: If error is intolerable, it cannot be admitted! Therefore, the possibility of error becomes undiscussable!

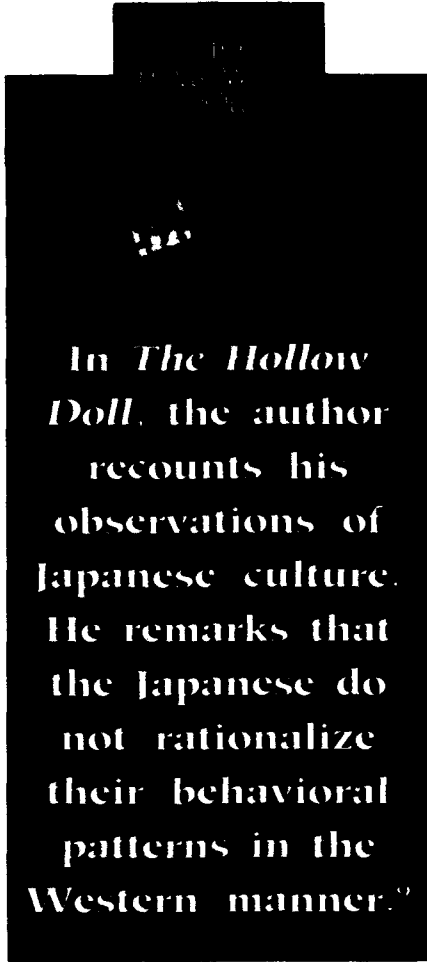
For what reasons does a culture stigmatize making wrong assumptions to test hypotheses, gain knowledge and, perhaps, to survive? Why has the United States developed what might be called "the paranoia for perfection?"

Why Is Change So Difficult to Effect?

To the extent that a need for change implies the existence or the possibility of error, it can be perceived as something to be avoided. But, that is only one partial explanation of what might lead to unwillingness to change a cultural paradigm. There may possibly be other considerations.

"Change"⁴ can describe doing "more of the same" (e.g., adding funding to a program to achieve a result left unachieved at the original funding level) or "cancelling a program and replacing it with another," which, though untested, purports to be capable of achieving results not achieved by prior efforts.

My observations⁵ lead me to believe that change involving "more of the same" is much easier to effect. In a sense, such change might correspond to a business increasing its sales of a product already being sold. Most of what is necessary to accommodate to that kind of change involves increasing production (perhaps staff and machinery) capability. Only minor changes in procedures, proto-



In The Hollow Doll, the author recounts his observations of Japanese culture. He remarks that the Japanese do not rationalize their behavioral patterns in the Western manner."

cols or production mechanisms may exist; and change to production "culture" is not required.

Change involving product replacement might involve change in the way people perform their tasks; and, that kind of change is more difficult to attain. One reason might be that such kinds of change involve rethinking whole sets of personal interrelationships; and that has fundamental effects on involved individuals.

In a study made for the Department of Defense, Gervaise Bushe, Associate Professor, Simon Fraser University, found that in traditionally organized production organizations, it was extremely difficult to achieve management role transformation: from "authoritarian supervision" to "work facilitation." Almost everyone could understand paying management considerably more to solve prob-

lems, but they could not grasp the value of paying management to prevent problems from happening. In fact, in one facility where TQM had taken hold, a frequent question concerned the value of paying such people when there are no problems to prevent. Similarly, it was found more difficult to change from "inspecting the quality in" to "establishing a system which facilitates quality."

The keys to understanding the problem of accommodating change may lie in two words: Custom, "a usual practice or habitual way of behaving...";⁶ and Usage, "long continued or established practice, habitual or customary use of way of acting: custom: habit."⁷

When people (any group of individuals) join to provide improved existence (e.g., a family, or a founder and an original small group of individuals intimately involved in establishing a business) they begin to develop a set of customs (responses to stimuli) which enables them to consolidate their individual capacities into a gestalt.⁸ It is the concept of gestalt in the sense of "the whole being greater than the sum of its parts" which differentiates the concept of cultural change from that of adding more staff. There may be no greater entity created simply by increasing the numbers of people who work continuously at fixed tasks and are replaceable by others of similar attributes. But, it is likely that embracing additional people with differing skills and attributes within a cooperative group will add to the dimension of a culture.

Groups of individuals who coexist in situations of closeness necessarily work out relationships among themselves. As the group undertakes expanded tasks and as it adds new members, the numbers of interrelative relationships expand. At some point of aggregation (i.e., as group size and diversity increase, as common, agreed-upon objectives are expanded), unless there is a set of "understood"

responses and relationships, some customs and usages known to and respected by everyone involved, the group will fail to perform as required.

In *The Hollow Doll*, the author recounts his observations of Japanese culture. He remarks that the Japanese do not rationalize their behavioral patterns in the Western manner.⁹ Rather, he says, they react to stimuli in patterned, stylized and predictable ways. He further observes that, historically, when a society's stylized behavior patterns become subject to question (for whatever reason), that society becomes turbulent, with unpredictable outcomes in terms of cultural change.

The logical end point of such reasoning might lead to the observation that if cultural change is required, then:

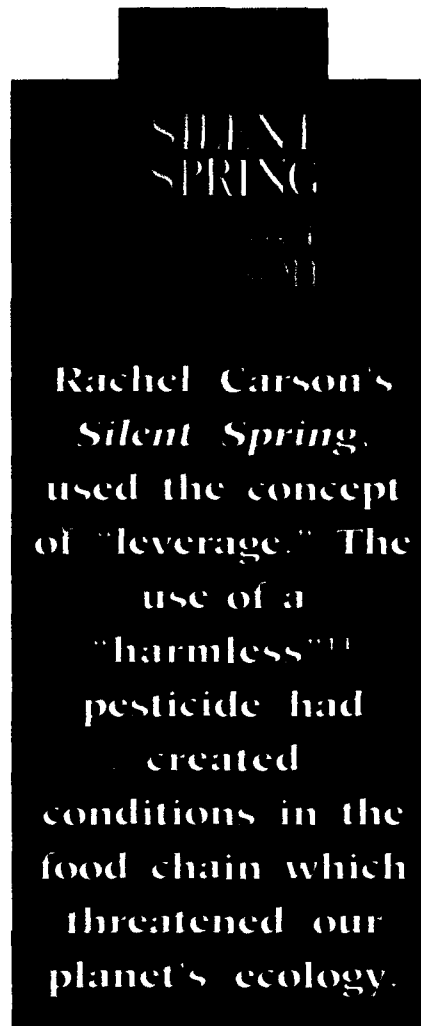
- Reasons for that change must first be understood to be of primary importance to group survival

- Changes required in custom and usage are within the capability of group response; i.e., responding will not fracture group cohesion.

It may be that attempts to introduce TQM practices were not fully understood as being necessary to industrial survival. Also, it might be that in recognizing the need to change or die, there was an unconscious decision that the kinds of change required were almost as unacceptable as death.

Put more succinctly: When necessary cultural change is perceived as destructive to the custom and usage of a culture, the option of possible "future destruction" from outside forces may be preferred over "more immediate destruction" resulting from change initiated from within.

In engineering terms: extant cultures are systems in equilibrium. When changes to the environment within which the systems operate



make change necessary for them, they can do so only within the limits of their own elasticity. Change beyond those limits may be destructive.

An additional concept which appears to be involved is the validity, component customs and usages of a culture.¹⁰ When custom and usage appear to be valid, it may well be difficult for arguments which aim at effecting change to prevail, regardless of how rational they may be.

Underlying problems with arguments contradicting custom and usage might concern the ideas of leverage and rate of change required:

- LEVERAGE: As processes become more complex, as organizations increase in size, as cultures expand to encompass more diverse populations,

the interrelationships between members of the group become more integrated. Thus, even small changes to a minor part of the complex of relationships can force major shifts in other parts.

Rachel Carson's *Silent Spring*, used the concept of "leverage." The use of a "harmless"¹¹ pesticide had created conditions in the food chain which threatened our planet's ecology.

Similarly, Marshall McLuhan's *The Medium is the Message* correctly predicted that changing means of generating, transferring and presenting information would change the entire culture. Once, carrier pigeons took days to transmit limited amounts of information; today we can watch people being killed on battlefields anywhere in the world.

- RATE OF CHANGE: Because so many elements are interacting, change in any one of them (perhaps occurring as a single, "small," exogenous event) can create a situation in which everything must change to accommodate that event. The likelihood of continuing stability in all interconnected portions of a complex entity is unrealistic at best.

When things are stable until the next time something happens; when large numbers of interconnected regimes exist within which events can occur, even when steady stage conditions are achieved, that state is likely to be temporally short...change is occurring somewhere all the time.

The point of this discussion is: once a culture is established, it will resist most attempts to make change for a number of reasons, all valid from the culture survival point of view. It may be that "cultural change" can happen only when all individuals within the culture accept the postulate that new customs and usages are "necessary to individual survival," and when the changes necessary are within the limits of "cultural elasticity."

Thoughts on the Culture of Design

Over the past four years, the Defense Systems Management College has conducted 32 workshops which examined various portions of the defense acquisition process. During these workshops, program managers — civilian and military, government and contractor — shared problems they had experienced with the process. They proposed numerous solutions to those problems. The problems and their proposed solutions were formed into a single database.

We then convened four workshops whose purpose was to design a system based on performance of "functions"¹² involved in moving from ideas to fully supported operational weapon systems.

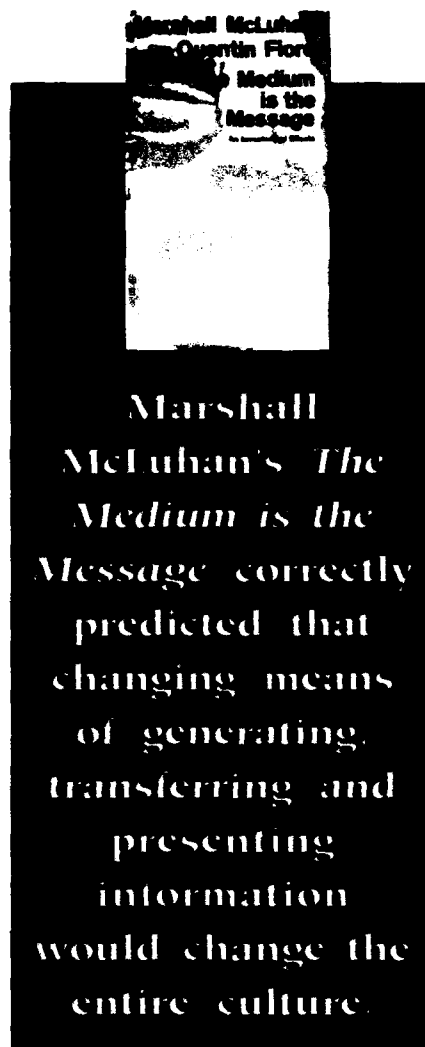
When we had achieved a functionally complete system design, we convened another workshop to answer whether, if implemented, the functionally designed system would create a climate in which the problems previously experienced would be precluded from occurring.

We found that of 198 problems, 66 of them would not be precluded if the functionally derived acquisition process were installed.

When we sought reasons why the problems would not be precluded or solved, we found that those problems had to do with interactions between the process and the environment within which the acquisition process operated.

An analysis of why the design process we had followed did not treat the cultural issues yielded some interesting insights about the particular design process we had used, and about the culture of design, in general.

A technical design is one driven by application of technically sound science. For this discussion, an item which uses sound technology and



packages the product as technology indicates is defined as a technically sound item.

To be successful in the marketplace, a technically sound product design may need modification in order to meet customer preferences that care nothing about technical soundness.

When customer preferences are not well integrated into perfect technical designs, the products may be perceived as "bad."

The ability to combine customer preferences with correct technology is the precious attribute of a great designer. That is, designers must understand not only technology, but also how to determine customer preferences and blend them into the prod-

uct. Often the technological understanding is the easier knowledge to gain.

Incorrectly assigning customer preferences, or surveying them with flawed instruments, can lead to designs that are unsuccessful in the marketplace.

Great designers have a perception of balance that transcends the zeitgeist.¹³ They arrive at some fundamental core of validity of human needs combined with technology in a product that may even evoke universal response of "goodness of product": a condition which may be commonly described by the phrase, "I don't know if it's ART, but I like it."

The combination of technical expertise, "market feel,"¹⁴ and the capacity to blend complexity into a singular whole is the essence of good design practice. I perceive that particular gestalt as the culture of design.

In our own case, we provided the functionally correct design without considering externally created difficulties. A series of forthcoming workshops will attempt to deal with those culturally generated problems, and use that understanding to shape an acquisition process which will apply successfully the culture of design.

A Word of Caution

While we have expectations of being able to achieve the proper blend of technical correctness and product packaging in our final version of a redesigned acquisition process, we recognize that the design process takes time. We understand that installing that process will take additional time. We understand that the organization of specialized acquisition interests within and outside of the Department will seek to keep change within acceptable limits.¹⁵ It may be that for certain kinds of complex system designs, achieving a balanced design is beyond the capabilities of today's analytical and management processes.

MANAGEMENT DELIBERATION CENTER OPENS AT DSMC

Brig Gen (Sel) Claude M. Bolton, Jr., USAF, DSMC Commandant, officiated at a ribbon-cutting ceremony on 1 June 1994, opening the new Management Deliberation Center (MDC). It occupies renovated space originally designated as the Abilene Room, after the "Abilene Paradox," a term coined by Dr. Jerry Harvey to explain how people and organizations may act counter to their own goals when implementing a decision no one may have actually favored. The Commandant stressed that the principal purpose of the room is still avoidance of bad decisions and "trips to Abilene."

The MDC has been operating since 1990 in a portable mode with its "groupware" system, which uses networked computers to share information, brainstorm problems, evaluate alternatives, develop and review plans, conduct various forms of voting, and develop group consensus.

Features of the facility include video and computer projection with two rear-screen projectors so normal room lighting can be maintained; a carpeted raised floor throughout, with wiring hidden under the floor; and extensive roll-out whiteboards on two sides of the room.

Custom-designed modular furniture is planned in the near future to hide the technology when not in use. The room is distinctive in that the furniture can be reconfigured to meet the needs of different groups and various facilitation requirements. Possible room configurations will include: 8- and 12-person conference tables, 16-person U-shaped classroom, multiple 6-person workgroups, and a V-shaped negotiation arrangement.

That caveat has been a consistent theme of some of my other papers and lectures. It may be that achieving balanced designs of great complexity will necessarily await development of different kinds of mathematical constructs and different kinds of management concepts. If that is the case, it behooves us all to hasten those developments so we can get on with the task of creating the systems of the future.

Endnotes

1. The term "content analysis" began to appear after World War II in books which dealt with the intelligence community. It refers to the practice of reading media articles and observing the frequency of items which deal with some underlying subject matter. John Naisbitt refers to content analysis as one of his primary research tools for the book, *Megatrends 2000*.

2. "Culture," as used here, is defined in *Webster's New World Dictionary*, Third College Edition, as: "a) the ideas, customs, skills, arts, etc., of a people or group that are transferred, communicated, or passed along to succeeding generations...b) such ideas, customs, etc., of a particular people or group in a particular period; civilization... c) the particular people or group having such ideas, customs, etc."; p. 336.

3. *Webster's*, LEARN - "1) to get knowledge of (a subject), or skill in (an art, trade, etc.) by study, experience, instruction, etc.... 2) to come to know...3) to come to know how..."; p. 769.

4. *Webster's*, CHANGE: "1) to put or take (a thing) in place of something else; substitute for, replace with..."; p. 234.

5. A personal kind of "content analysis."

6. *Webster's*, p. 341.

7. *Webster's*, p. 1469.

8. *Webster's*, GESTALT: "...integrated structures or patterns that make up all experiences and have specific

properties which can neither be derived from the elements of the whole nor considered simply as the sum of these elements," p. 567.

9. That is, they do not reason responses to stimuli in terms of Aristotelian cause and effect.

10. *Webster's* From the word VALID: "...well grounded in principles or evidence; able to withstand criticism or objection, as in argument; sound," p. 1473.

11. DDT was found to be harmless to humans before it was permitted in widespread use. Since the concern was for humans, no one thought to determine its effect on other, noninsect life forms.

12. *Webster's*, FUNCTION: "1) The normal or characteristic action of anything; esp., any of the natural specialized actions...2) A special duty or performance required in the course of work or activity...."

13. Literally translated from the German as "Ghost of the Times."

14. The term attempts to describe a special sense of market requirements.

15. See my other papers, which define Catch 23, Catch 24, Catch 25 and Catch 26.

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Catch 23 et seq; Henry C. Alberts, Presented to the Military Operations Research Society, West Point, N.Y. October 1991.

POTENTIAL SUBSCRIBERS TO

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The Spring 1994 issue, of the Defense Acquisition University (DAU) journal, *Acquisition Review Quarterly* (ARQ), is now available. It was mailed automatically to all *Program Manager* subscribers and some 13,000 senior members of the Acquisition Corps whose names and addresses were provided by the Military Services. The Summer issue also will be mailed to both lists.

The Defense Systems Management College Press publishes the ARQ for the DAU.

Sending unsolicited subscriptions (complimentary copies) cannot continue indefinitely, as the ARQ and *Program Manager* ultimately must maintain separate circulations (subscribers).

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PLEASE NOTE

INSPECTORS GENERAL AUDITOR TRAINING INSTITUTE

Paul F. Caron

The Inspectors General Auditor Training Institute was created to implement recommendations made in two studies (1987 and 1990) conducted by the President's Council on Integrity and Efficiency (PCIE). The studies called for an independently administered auditor training center. The Institute provides Offices of Inspector General (OIG) employees from all segments of the federal government the audit skills and knowledge essential to meet professional auditing standards and to perform effectively in the federal environment.

All OIGs can participate, and the PCIE's Audit Committee serves as the Institute's Board of Directors. This Board oversees program development, instructors, facilities and administrative costs.

The Institute, located at Fort Belvoir, Va., is administratively under the Department of Treasury/OIG. Students benefit from its campus-like learning environment. It conducted its first class in July 1991. Through September 1993, 1,175 individuals from 51 departments/agencies have attended.

Purpose of the Institute

The Institute was created to combine the best efforts of the members of

Mr. Caron is Deputy Director of the Inspectors General Auditor Training Institute, Fort Belvoir, Va. He is a PMC 74-1 graduate.



**Leadership is
like a piece of
string. Pull it
and it will
follow wherever
you wish. Push
it and it will go
nowhere at all**

**—PRESIDENT DWIGHT D.
EISENHOWER**

the PCIE and the Executive Council on Integrity and Efficiency (ECIE) to more effectively and economically:

— Meet the statutory requirements of the Inspector General Act

— Meet the provisions of executive orders wherein the PCIE "Shall develop policies that will aid in estab-

lishment and highly skilled Office of Inspector General staff members"

— Fulfill the continuing professional education requirements as published in the Comptroller General's Government Auditing Standards as they relate to the performance or review of federal programs or operations audit

— Provide training that serves the basic needs of the federal OIG audit community and facilitates professional development, quality and consistency among PCIE members.

Mission and Philosophy

The mission and philosophy of the Institute is:

— To provide training that will enhance the skills, abilities and knowledge of Federal Office of Inspectors General auditors.

— Embodied in and underlying all actions at the Inspectors General Auditor Training Institute are the following basic beliefs:

— We know that federal OIG auditors improve government operations.

— We care that our students learn.

— We protect the quality of our instruction.

— We are proud to be the best we can be.

-- We are always trying to improve.

Fiscal 1994 Offerings/Length

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Continuing Professional Education (CPE)

The Institute has been approved as a start-up sponsor on the National Registry of CPE Sponsors. Registration is effective through January 31, 1995, sponsorship number is 93-00433-95. This sponsor has been granted probationary status by the National Association of State Boards of Accountancy as a start-up sponsor of continuing professional education. Upon successful completion of the course monitoring program and review by the CPE Sponsor Registry

Committee, the sponsor will be granted full acceptance on the National Registry of CPE Sponsors. State boards have final authority on the acceptance of individual programs.

Registration

Participants must preregister to attend the individual programs. Individuals in the Department of Defense may attend the Institute by contacting the Registrar at (703) 805-4501.

MEANINGFUL CHARACTERISTICS

YOUR AUDITOR'S PERFORMANCE

Does Your Leadership Style Maximize It?

What makes us accept or reject our leaders? What characteristics do we perceive as good, bad, acceptable, rejectable? Are interpersonal relationship characteristics more or less important than professional qualifications? Are management techniques more or less important than personal qualities?

During the past 2 years, 382 senior/lead auditors attending the Inspectors General Auditor Training Institute ranked the five characteristics they believe are the most meaningful for leadership acceptance or rejection. All auditors attending our first 18 sessions of the Intermediate Auditing program were given two questionnaires to complete. Respondents were auditors representing 30 different federal departments or agencies.

Five characteristics selected for why we accept our leaders were:

— Supports subordinates (213 or 55.7 percent)

— Accepts responsibility (202 or 52.8 percent)

— Knowledge of subject (163 or 42.6 percent)

— Respect and feeling for others, and extremely effective planner (133 or 34.8 percent)

— Fair (132 or 34.5 percent).

Five characteristics selected for why we reject our leaders were:

— Does not support subordinates (182 or 47.6 percent)

— Does not communicate well with subordinates, peers or superiors (157 or 41 percent)

— Unable to give guidance or constructive criticism (136 or 35.6 percent)

— Indecisive (118 or 30.8 percent)

— Unprofessional and disorganized (120 or 31.4 percent).

From the overall results of the questionnaires, I categorized the lists of characteristics provided by these senior/lead auditors and came to these general conclusions: (1) the interpersonal relationship and personal qualities of their audit leaders appear to be overwhelming reasons for rejecting them; (2) leaders seem to be accepted more readily when they appear to strike a balance between interpersonal qualities, and management techniques.

My philosophy is we should treat others as we want to be treated.

FROM GLOBALISM TO REGIONALISM—

New Perspectives on U.S. Foreign And Defense Policies

Edited by Patrick M. Cronin
Published by NDU Press,
Washington, D.C., 1993.

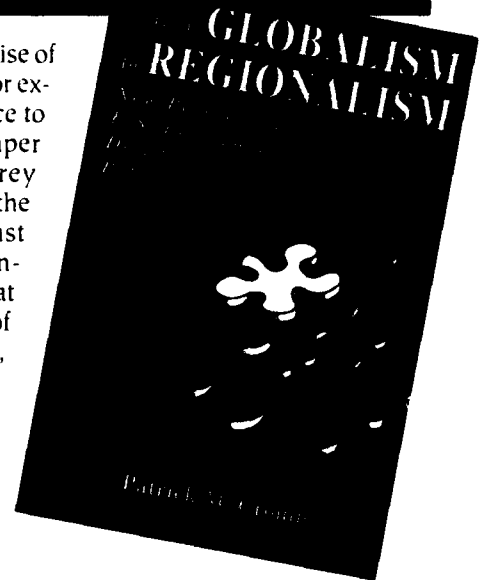
The subject of this book was taken from the source of its content — a Topical Symposium at the National Defense University (NDU) in 1991. Its content consists primarily of a number of papers presented at the symposium along with a keynote address by General Colin L. Powell, USA (now retired). In a few cases where symposium papers did not cover the entire subject area, additional papers were developed later to complete the coverage.

The focus of the book is the changing worldwide political, economic and military situation and environment caused by the recent dissolution of the former Soviet Union. The general consensus of the writers is that this change is causing the most profound shift in U.S. strategy in this half of the 20th century. The changed situation is treated from two different perspectives — regional and international and transnational.

Addressing symposium attendees, General Powell emphasized that: (1) while the United States must expend more effort to address domestic challenges, it will retain a critical position of global leadership; (2) world history has not come to an abrupt halt with the demise of the Soviet Union but, rather, the trends of the moment will shift again in the future, and we should not dismiss Russia's present residual military capability or its future military potential; and (3) the world is still a troubled and dangerous place with many regional crises. He cautioned that a stable military "base force" (a sufficient military capability) is needed to undergird U.S. strategy, and it would be detrimental to the readiness and quality of the U.S. armed forces if they were subjected to constant fine tuning in response to daily or weekly news reports of international events.

Papers on regional perspectives cover the Persian Gulf, Middle East, Northeast Asia, Southeast Asia, South Asia, Latin America and Africa. Each region is described (some from an historical perspective) and its political, economic and military situations are discussed, with emphasis on the interaction dynamics of the nation-states comprising the particular region. Most of the papers treat long-standing border, religious and/or ethnic disputes, and provide comments on possible future events related to those issues. The papers also provide some insights into how the United States might regard, or interact with, those regions in the future

considering the demise of the Soviet Union. For example, with reference to Latin America, paper presenter, Jeffrey Herbst, says that the United States must relegitimize its involvement now that the global threat of communism is nil, and that concerns with narcotics trafficking, nuclear proliferation, and the environment are taking the spotlight.



From the international and transnational perspective, the papers also focus on the challenge to the United States in moving from a policy of global confrontation with communism to a policy of protecting its vital national interests in the various regions of the world. Interestingly, the same forces (primarily economic and ideological) that caused the breakup of the Soviet Union are active and creating crises in other nation-states and regions of the world. These forces, in most cases, transcend regional boundaries. In addressing these forces, the writers discuss the strategic implications of populations change, the environment, resources and security, including the United Nation's peacekeeping role. The increasing population, especially in the less-developed countries, growing competition among nations for economic resources, and increasing environmental concerns, is expected to heighten the need for regional as well as global security. The United States can pursue one, or a combination, of several alternatives in responding to the changing situation. Some of these alternatives include isolationism, unipolar internationalism, multilateral internationalism, and regional internationalism.

The book is easy to read and provides thought-provoking information on a timely and critical subject. History and world current events indicate that the United States cannot pursue a course of long-term isolationism. Also, economic reality indicates that the United States cannot unilaterally police the world over an extended period of time. Therefore, it is likely that the United States security strategy will evolve as some form of multilateral internationalism or regional internationalism. Recent U.S. international activities point to a combination of the two.

I highly recommend the book to those interested in international relations, U.S. foreign policy, national security, and history.

Professor Norman A. McDaniel
Principles of Management Department
Defense Systems Management College

FROM THE COMMANDANT

Several months ago, I mentioned that at DSMC we would begin a process to review and improve the Program Management Course (PMC). Begun by my predecessor, RADM Bill Vincent, the process is entitled "DSMC 95." During the past year, we defined the process and Mr. Bill Bahnmaier is its owner. He will provide an in-depth discussion of the process and accomplishments in *Program Manager*. I'll not steal his thunder, but I want to tell you, briefly, where we are today.

First, let me describe how this process works. To start, we went to the acquisition field commanders, discussed what we provide their people in terms of course material content, and asked what they, the field commanders, want. We visited important stakeholders like the USD(A&T), DUSD(AR), DACMs, and DAE&T. These discussions, along with student surveys, constituted the requirements upon which to base PMC improvements. The requirements became inputs to the PMC course development stage of the process. Currently, we are in this stage and have progressed to detailed lesson-planning aspects. We will then pilot the courses and offer them in full production in the summer of 1995.

As part of the overall process, we will evaluate how well the DSMC organization supports the improved curricula and make organizational changes, as required. That evaluation has already begun and the entire organization is being encouraged to participate. In addition, the Commandant (in this case, me) will visit the field commanders and stakeholders every six months to status this process and solicit improvements and new or changed requirements. This will be done to improve not only the course material and relevance, but the process as well.

That is a "quick and dirty" on the basic process and Bill Bahnmaier certainly will give you more detail. Let me say that, relative to the PMC, it will be an improved and shortened course. The new PMC (PMT 301A) will be 14 weeks long vice the current 20 weeks. One way in which we are able to achieve this is by requiring prerequisites. In order to attend

PMT 301A, you must have completed PMT 201 (soon to be ACQ 201). Currently, we have students in PMC with no previous acquisition experience or education along with students with upwards of 30-35 years of acquisition experience and education. This has always caused difficulties in course design and execution. Having a prerequisite will aid us greatly in designing and offering a better-focused, more-effective, shorter PMC. The prerequisite course PMT 201 and the basic course PMT 101 are part of the DSMC 95 process and also are being redesigned as part of an integrated package of program management education and training.

Before I leave this topic, I should mention a new course, also part of the DSMC 95 process, to be piloted this summer. It will be called PMT 301B. It is a four-week course designed primarily for ACAT I program managers, deputy program managers and PEOs. Ideally, we would like a person to go through this course en route to one of the mentioned positions. The course presents a common set of topics needed by all to be effective in the current environment. In addition, a large portion of the class would be tailored to the individual student in terms of his/her program, contractor, issues, staff concerns, politics, budget, etc. These items would be discussed and analyzed, and the expertise of the College brought to bear to provide the student with the most effective strategies for use on the job. Essentially, we will do in four weeks what many individuals in these positions do on the job over a six-month period, but without benefit of outside consultation. More on PMT 301B and its progress in future *Program Manager* articles.

As always, I am out of space. These are exciting times for us at DSMC. As we understand our customers better and their requirements, we see more opportunities to improve what we are doing for the acquisition workforce. Let us hear from you. Until the next time....

— Claude M. Bolton, Jr.,
Brig Gen (Sel), USAF

Defense Systems Management College
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