

Foundation FORUM

Reengineering the Industrial Base

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About AFA and AEF...

Air Force Association

The Air Force Association (AFA) is an independent veterans' organization whose objective is to promote greater understanding of aerospace and national defense issues. Among the ways AFA disseminates information are publication of AIR FORCE Magazine, sponsorship of a series of national symposia, and through educational outreach programs of its affiliate, the Aerospace Education Foundation. AFA is a grass-roots organization. Total membership is nearly 200,000 of whom more than 38,000 are Life Members. There are 328 AFA chapters in the United States and 23 overseas. The Association has 226 Industrial Associates, and its chapters have established ties locally with more than 2,400 businesses in the Community Partner program. The Air Force Association was incorporated in the District of Columbia on February 6, 1946.

The Aerospace Education Foundation

On May 1, 1956, the Air Force Association established the Aerospace Education Foundation (AEF). As a nonprofit organization, the Foundation formulates and administers AFA's educational outreach programs. Supported through tax-deductible contributions, AEF educates AFA members and the public about the critical role aerospace development plays in the contemporary world. In its first year, AEF presented three awards to two civilians and an officer of the Air Research and Development Command by General Doolittle. In 1957, the first AEF scholarships were established for children of deceased Air Force test pilots. By 1958, AEF sponsored its first national symposium, "The Space Age in Perspective." The history of the Aerospace Education Foundation is a dynamic story of a foundation that identified the needs of the Air Force and the broader needs of the nation's aerospace community, and acted to meet those needs.

Aerospace Education...leading America into the 21st Century

- Provide aerospace education opportunities to America's youth
 - Appreciate role of aviation and space to our future
 - Develop technical literacy to understand aerospace issues
 - Develop educational background required to pursue aerospace careers
 - Award scholarships promoting aerospace heritage and science and engineering education
- Support, assist and strengthen the aerospace education programs operated by AFA Chapters
- Communicate to the American people about the importance of a strong aerospace base to our future economic health and national security
 - Sponsor symposia, roundtables, workshops, and other programs to promote aerospace education and foster the exchange of scientific, technical and national security information
- Support the Air Force's educational needs
- Recognize outstanding contributions in aerospace education
- Receive gifts and grants and disburse them to accomplish the AEF educational mission

National Symposium: Reengineering the Defense Industrial Base

1

Mr. James M. McCoy
President, AFA

Thank you Monroe [Monroe W. Hatch, Jr., Executive Director, AFA/AEF] and good morning ladies and gentlemen. Welcome to our AFA National Symposium in Dayton. We are delighted to be here and have an important topic to discuss today and tomorrow.

When we met last year, a new administration had recently been elected on a platform that promised change. Well, we're here today to talk about another type of change, reengineering the defense industrial base. Everyone in our audience and all of our speakers know about change. Everyone knows about tough choices in the fight to survive, whether it's on the military or economic battlefield.

Whether we try to shape or channel it, change is always upon us. A business will go broke if it doesn't learn from its past, project from its present and adapt in the future. The change process is constant. No matter how good things may look at any time, you have to look ahead.

In the business world, change requires us to constantly answer these questions: "What does my customer want? How is my customer doing business? What is my competition doing? Where is the technology going? How do I need to respond to change in order to continue my success in the future?"

Military people also face change. The warrior deals with constant adaptation on the battlefield. The warrior is always trying to get inside the enemy's decision loop and adapt more quickly to changing circumstances than the enemy can.

Those in the acquisition world have continuously grappled with change. Acquisition reform is an issue that has been around for decades. That should not surprise us. It would be amazing if one set of guidelines continu-

ously fit all complex permutations of technology, budgets and international and domestic politics.

In response to these evolving conditions, the Air Force reshaped its management structure by merging Systems Command and Logistics Command. The reengineered Materiel Command is focusing on new ways of doing business, seeking cooperative development of dual use technology, and breaking down functional stovepipe manager systems. It is replacing the functional approach with an integrated single manager system and establishing a philosophy of teamwork between operators, developers, maintainers and industry.

Depots have been downsized. MILSPECs are being reexamined. Buying commercial off-the-shelf products is getting a lot of attention.

Our speakers will address each of these issues. They have unique perspectives and are highly qualified to tell us where we will be going in the future. We encourage you to take advantage of this occasion — ask questions. Symposia such as this one are a great opportunity, and the Air Force Association is pleased to be the catalyst for these discussions.

Thank you again for joining us.

GENERAL HATCH: *Thank you, Jim. Assisting me as moderator is Brian Green, our Chief of Legislative Research and Analysis.*

Now, it's an honor and pleasure to proceed to our keynote speaker, a good friend of the Air Force Association, an outstanding Air Force leader who is responsible for more than 125,000 men and women, and 18 centers. Please help me welcome the Commander, Air Force Materiel Command, General Ronald W. Yates.

2 **Reengineering the Industrial Base**

Reengineering the Defense Industrial Base

3

General Ronald W. Yates
Commander, AFMC

Thank you, Monroe. Well, I'm happy that you're all here in Dayton with us today. Let me thank the Air Force Association for once again helping us provide a very valuable forum to discuss some very important issues that are confronting all of us who are members of the defense industrial base.

Our goal for this second annual national-level symposium is to help both the Air Force and industry better understand where we're going and allow us to share our perspectives and concerns on acquisition and logistics issues.

Last year, marketing and sales expert John Graham predicted that, "When the year 2000 rolls around, the nation's corporate landscape will have changed more in the previous seven years than it did in the 93 years prior to that."

Perhaps no other segment of corporate America is going to prove that more than our segment, the defense industrial base. And that's why we're focusing on "Reengineering the Defense Industrial Base" in this symposium.

The term reengineering is described as a drastic step and something that no organization should undertake lightly. I recently heard about a neurosurgeon who was having problems with his sink, so he called in a plumber. The plumber took apart the trap, and he ran his snake through the pipe and he got the sink working again. He worked on this about two hours, and when he finished, he gave this neurosurgeon a bill for \$400. The neurosurgeon looked at the bill and said, "\$400! For two hours? That's \$200 an hour. I'm a neurosurgeon and I only get about \$150 an hour." The plumber said, "Yeah, \$150 an hour, that's about what I got when I was a neurosurgeon too."

Now, there is a guy who reengineered his career. We're talking about that level of pain in reengineering our companies.

That's to say by 1996 or 1997, we may be looking at a defense market about one-third of what it was 10 years ago.

I'm not going to give you all these statistics about what's happened to our industry. You know those as well as I do. This is the 9th straight year the defense budget has declined. But, I think Secretary Perry [Dr. William J. Perry, Secretary of Defense] said something recently that really puts it in perspective for us. He made the point that the procurement budget is down about 50 percent since 1986. And, he said "We estimate it will go down by as much as a total of 65 percent by the mid-1990s. That's to say, by 1996 or 1997, we may be looking at a defense market about one-third of what it was 10 years ago."

If we just look at aircraft, in 1985 all the services combined were buying about 900 combat aircraft. This year, the Department of Defense is budgeting for 127 combat aircraft, and almost half of those are utility helicopters. So if we look strictly at fixed wing combat aircraft buys, and divide them by the number of prime contractors, that equates to us buying less than 10 aircraft per year, per prime contractor.

In recent congressional testimony, Secretary Perry reaffirmed DoD's policy of letting the marketplace work in downsizing defense. And, there are studies that show that up to 80 of the top 100 defense companies could

conceivably disappear by the end of this decade. As a result, it is possible that we may be left with only two or three producers of military aircraft by the turn of the century. Already, the aerospace segment of the defense industry has lost, depending on how you count them, almost half a million jobs.

Reengineering is defined as 'process innovation and core process redesign....the search for and implementation of radical changes in business procedures to achieve breakthrough results.'

Norm Augustine [CEO, Martin Marietta] recently wrote: "Today the aerospace industry is about two-thirds over capacity in terms of facilities. It also appears likely that we'll need to lose another 30 to 40 percent of the current employment base in the industry. Hence, the choice is between taking difficult steps today to preserve a core company in the future or simply riding along today and seeing the entire organization become non-competitive and non-survivable a few years downstream."

Changes of the magnitude that we're talking about remind me of what Winston Churchill said when he got voted out of office in 1945.

His wife was trying to console him and she said, "Well, this could really be a blessing in disguise." And he said, "At this time, madam, I'm more conscious of the disguise than the blessing."

We're wearing the disguise right now. Our blessing may be that reengineering offers us the opportunity to reshape the defense industrial base to a more vital and competitive industry in the next century. But this is not a quick fix, it is strong medicine. It is not about tweaking old procedures; it is not about tweaking business enhancement, business improvement or business modification. Nor is it a euphemism for downsizing or reorganizing. It is not designed to replace other initiatives

such as Total Quality. In fact, I contend that you can't reengineer without the Total Quality environment of empowerment because that empowerment is where we generate truly creative ideas. You must have an organizational willingness to change. That again comes from a TQ environment as well as plenty of practice at changing before you can step up to this reengineering effort.

Reengineering is defined as "process innovation and core process redesign....the search for and implementation of radical changes in business procedures to achieve breakthrough results."

The concept of radical breakthrough, in my view, is further complemented by the Total Quality philosophies of measurement and continuous improvement. Because if you do a radical breakthrough change in your company or your organization, you aren't going to get it right the first time. You are going to have to track it with metrics and you're going to have to continuously improve in order to make it work.

Reengineering is really nothing short of reinventing our organizations. And it is not something that should be undertaken lightly. As Thomas Stewart, who was writing in Fortune magazine, said recently, "It ain't easy and it ain't cheap. It's almost always accompanied by pain and the most important lesson from business with reengineering is don't do it if you don't have to."

Reengineering means starting over from scratch. It means figuring out why we do what we do and why we do it the way we do it. It means asking ourselves, "if we were a new company, what business would we be in and how would we do business?"

But, considering the choices that the defense industrial base faces, there can be little question that this is something that we have to do. According to the experts, the prime can-

didates for reengineering are organizations faced with a dramatically altered competitive landscape, particularly those facing the alternative of changing how they do business or closing their doors and going out of business. That's a very apt description of our industry.

Reengineering means starting over from scratch. It means figuring out why we do what we do and why we do it the way we do it. It means asking ourselves: "If we were a new company, what business would we be in and how would we do business?" For the aerospace world in particular, many of the old rules no longer apply. After all, if we ask ourselves these tough questions, how many aerospace companies today would go out and design their organizations for a Cold War defense buildup? How many would organize themselves to be prime manufacturers of fighter aircraft? Some would, I hope, but not as many as we had.

We need to discard the old rules and fundamental business assumptions that no longer apply. Unless we change those rules and assumptions, any superficial reorganization will be no more effective than dusting the furniture at Pompeii.

The most fundamental factor in reengineering is focusing on our customers. Focusing on our customers determines our product, followed by devising processes to best deliver the product our customers want. The drastic geopolitical changes that resulted from the end of the Cold War combined with severe budget cutbacks forced us to reengineer how we do Air Force acquisition and logistics. Jim [McCoy] was just referring to that in the introduction.

In forming Air Force Materiel Command, we basically reengineered the old Air Force Systems Command and Air Force Logistics Command into a new command. We didn't just reorganize it, we reengineered it. In doing this we were guided by what our primary customers, the warfighters, wanted. What do they want today? What they want today is dramatically lower costs. That is one of the fundamental changes that is sweeping through the defense world today.

During the Cold War, we almost always wanted to deliver performance and schedule. Now the single most important driving factor

is efficiency. Gary Denman, who's now head of the Defense Advanced Research Project Agency, said recently: "The affordability of military systems will ultimately be one of the defining factors that determines the future force structure. A few years ago our focus was almost exclusively on advanced capability. Today, our focus is heavily on affordability."

Science and technology are our forte. We have always used them for great performance. We need to turn that talent toward producing lower cost systems. We've got to learn to produce at lower rates. We've been talking about this for years. My observation on the way we've always done business is that we must be brilliant because when we decide on the initial production rate it is absolutely the "perfect rate." Absolutely perfect, and I can prove that it is perfect. Because if you increase the rate, it is more expensive. If you decrease the rate, it is more expensive. So whatever we decided to begin with had to be the "perfect rate." We've got to start picking "perfect rates" that are a lot lower than any of us have dealt with before.

And we really can't lower our costs without a radically different relationship between our primes and subs. We need to establish long term relationships that will encourage the stability necessary for low rate production.

In addition, we have to invent a way to deal with fluctuating budgets. This is an often-cursed affliction. But as much as any other phenomenon, it is a fundamental characteristic of the defense business. If you sat down and tried to describe the business world we are in, you would have to write down fluctuating budgets. And, I don't see any of that changing. In fact, I not only don't see it changing, I don't see it getting any better.

So somehow we must figure out how to do this. We need to reengineer with a focus on dealing with budget fluctuations efficiently. Those people who do that have a chance of being profitable in the future. This means that many companies will have to take a hard look at their processes and determine what adds the most value, and overhaul those that aren't as efficient.

But, overhauling processes often dictates a change in organizational structure. Many

traditional organizations are structured along functional lines. We have talked about that here in AFMC at a conference in Dayton. The traditional focus was on tasks, jobs, people or structures, but not on processes. One of the best ways of focusing on processes is by using cross-functional, multi-disciplinary teams in an integrated product development.

It is a cornerstone of the way we do business in Air Force Materiel Command. You are a vital part of what we do. In some cases, we are contractually directing you to form yourself into integrated process teams. It is the wave of the future. The faster you can move yourself and your company in that direction, the better off we will all be.

The traditional focus was on tasks, jobs, people or structures, but not on processes. One of the best ways of focusing on processes is by using cross-functional, multi-disciplinary teams in an integrated product development. It is a cornerstone of the way we do business in Air Force Materiel Command.

Lawrence Bossidy of Allied Signal said, "We used to manage by means of hierarchical, vertical layers. Now, we are solving problems and revamping processes through horizontal, cross-functional teams composed of employees from different disciplines and reporting relationships."

Northrop's B-2 division has organized into integrated product teams, particularly in manufacturing, assembly and test, and has added considerably to their efficiency at the Palmdale facility.

The F-119 Engine Program at United Technologies' Pratt-Whitney Plant in West Palm Beach has fully aligned into IPTs which they formed as part of their initial management approach in bidding for and winning the F-22.

Independent consultants have found that

90 percent of our process improvements have been achieved by having contractors convert from strong, functional alignments to strong IPTs. However, even though Air Force people are important parts of these teams, simple manning constraints keep us from populating the contractor's IPTs with sufficient numbers of people for a continuous presence.

We don't conceive of being able to do that. However, we know how to implement IPTs. Our view of integrated master plans, integrated master schedules and technical performance measures, means that we sign up to the program process at the accountable level. Everyone has a piece of the program.

We don't have to see each other every day. Video conferencing has proven to be a very productive process for keeping us glued together.

Let me mention another factor that's been on our minds a lot in terms of reengineering and keeping the industrial base strong — prime contractors looking to mod and repair work to help make up for business lost to cuts in our procurement budgets. You've heard me talk about this before. I'm not going to belabor the point, but most prime contractors aren't organized to be competitive in the mod and repair business. The fact that I am not going to compete in that business does not change that equation. They're still not organized to be competitive with other mod and repair companies in the commercial industrial base.

So, if the primes are going to be competitive, they are going to have to reengineer and become more like mod and repair houses. The primes will never be competitive carrying the overhead of design teams or technical services and labs.

The same principle holds true across the whole spectrum of our business. It is conceivable that a corporation could be competitive at all phases of the aerospace market, including design teams, mod and repair, engineering and technical services, but to do this would require reengineering and segmentation into mod companies, technical support companies, and a core, full service design company with the ability to draw on all segments if you have a new corporate objective or a new major program.

That is something that some companies have already started, but that all are going to have to face. Whatever strategy corporations pursue to meet the challenges affecting their business, we in the Air Force have an interest in the outcome.

Even though the defense market has changed drastically, one thing remains constant — we will always need healthy, viable and competitive partners in industry to maintain the overall health of our defense industrial base. That's why reengineering is so important.

I recently heard about three baseball umpires who were comparing notes on their profession. The first one said, "There are balls and there are strikes. And we call them

as they are." The second one disagreed slightly. He said, "There are balls and there are strikes and we call them as we see them." The third umpire said, "Hey, you're both wrong. There are balls and there are strikes, but they ain't nothing until we call them."

If we're going to call our future in the defense industrial base, we're going to have to face reengineering, and for sure, we're going to have to cooperate together. Working together we can successfully make the transition so we can continue providing the aerospace power our nation needs to meet the challenges of an uncertain world.

Thank you very much and I'm looking forward to your questions.

Question and Answer Session

9

General Ronald W. Yates

GENERAL HATCH: *Thank you General Yates. The first question addresses your comments about low rate production and affordability. There has been a great deal of discussion this year about the bomber industrial base. How would you set up a program for the B-2 if the system was fully funded?*

GENERAL YATES: If you're going to produce efficiently at low rates, you have to take that on from the beginning. When we set up the program, we always set it up optimistically. There are many things that drive the optimistic approach. Many people say if you realistically present the program, you can't get it approved. That mind-set has got to change, too.

I'm convinced that with the application of the right technology and with reengineering, we can set up a program for low rates of production. I am convinced of that. However, it is not something that we know how to do. So we are going to have to do things differently, and it is not beyond our capability.

The B-2 program has gotten a lot more efficient as it has faced the reality of current production rates. We didn't set the B-2 program to produce at the rate of 20 planes per year or one air plane every few months. We set up the program for a much more aggressive schedule. In fact, we've learned a lot in that particular program, but now we have to take the next step.

Let me make a generic observation. The aerospace industry as a whole is absolutely magnificent. I've spent most of my life working with you, and you have always been able to meet a technical challenge. Maybe there are technical challenges that we won't meet, but in my career, you've met every technical challenge we have asked. Now, we are posing another technical challenge. How do you

produce efficiently at very low rates?

It is also a management challenge, and you and I have not done as well on management challenges as we've done on technical challenges. But, it is not beyond our grasp. You can't start half way through a program such as the B-2. You have to start at the beginning.

GENERAL HATCH: *Thank you, General Yates. The F-16 remains an integral part of the USAF force structure. What do you hope to accomplish in the upcoming F-16 summit?*

GENERAL YATES: An insider planted that question as we haven't decided to have an F-16 summit. But, it is not a bad question because we are talking about it. In the first place, F-16s are going to be the core of the force structure in the Air Force for a number of years to come. We have talked before about F-16 roadmaps, but we need to reexamine our current roadmap in light of a force structure that is much smaller than when we last looked at it. We also need to decide what we will need for F-16s in the future Air Force, and how that might play in the FMS [Foreign Military Sales] market.

We need to couple our intentions with what might be marketable worldwide. Along this line, there are lots of capabilities to consider. For instance, we might put an internal LANTIRN [navigation/attack system] on the airplane. That might be a lot cheaper and might not only benefit the U.S. Air Force, but also might be a saleable item internationally. Those are the fundamental questions we'd wrestle with.

GENERAL HATCH: *There is a follow-up question. You mentioned foreign military sales. How solid is Administration support for foreign military sales of front-*

line U.S. equipment?

GENERAL YATES: I don't know the answer to that. There is no single answer as the capabilities of the systems must be considered, one by one. There is a lot of discussion about taking used airplanes and selling them overseas, and using the proceeds to buy further U.S. airplanes. This is a good idea if it will work. People have spoken very enthusiastically about the idea. However, in the past, we haven't had a lot of success selling used airplanes overseas. We've sold some, but not very many.

Overseas customers want a version of the latest U.S. Air Force system. Typically, they are going to keep the airplanes for many, many years; a lot longer than we keep them. It is problematic for them to buy an airplane which is already 20 years old and then expect support to maintain that airplane for 30 more years. They typically want a version of our new aircraft.

I think the concept is a good idea. I hope it is successful. Past experience has not shown it to be very successful; maybe it will be in the future. There will be a market out there and we can look at our airplanes, particularly the F-16, to make them more competitive in that market.

GENERAL HATCH: *Thank you, Ron. There are three or four questions on depot versus private competition. This one reads: "Now that John Deutch [Deputy Secretary of Defense] has spoken out on depot versus private competition, how quickly will you see your depots reengineering themselves?"*

GENERAL YATES: In my view, we involved everybody in this debate, both within DoD and industry. It turned out that the Air Force was on one side and the rest of the world was on the other side. In the past, I've made my feelings known, but the period of public debate is over. A decision has been made. I enthusiastically support Mr. Deutch's decision. There is no foot dragging on our part. We got Mr. Deutch's letter on the fourth of the month, and on the fifth, we terminated all the competitions. We have shown that we are four-square behind the decision.

There is a broader question: "What about reengineering the depots?" In truth, we were espousing a competition program that

was in fact a reengineering effort. Don't forget that the competition came from the depot; they are the source of the work that we were all bidding on. Now, what has to happen? In order to make changes, the 60-40 split in the law has to be repealed. If the 60-40 split is not repealed, then by not competing, we just freeze everything in place.

There also have been some definitional problems in the past between the three services. In defining where we stand on 60-40, the services never knew how to deal with interim contractor support [ICS] and contractor logistics support [CLS]. As a matter of fact, in our own inimicable style, the three services decided that there would be three ways of counting the support. The Navy counted both CLS and ICS in determining their 60-40 split. The Army counted ICS but not CLS, and the Air Force didn't count either one. We have decided that the Navy was right. We should have been counting it like the Navy did all along. So our actual split, using that definition, is 57-43 percent.

In addition, the depots clearly have excess depot capacity within DoD. The Air Force debate has never been that we didn't have excess capacity. The debate has always been over how should we downsize it? Should we downsize across the department, or should we downsize it service by service? That was the point of Mr. Deutch's letter. We agreed with DoD over core versus service core. For the issue of interservice, Mr. Deutch has subsequently directed the service secretaries to come back to him with a plan for interservicing.

In other words, we don't have to wait to stop competition. It has already been done. But, the issue on reengineering depots has to wait until we determine what we want to do about interservicing, and it needs to wait on how we're going to approach base realignment and closure.

GENERAL HATCH: *General Yates, with that good answer, you've taken care of three or four other questions. This next question continues on the interservicing issue. I know, for example, that we do F-18 work for the Navy at Hill Air Force Base [Utah]. Without awaiting this plan, is there still a potential that interservicing work could be done?*

GENERAL YATES: Phrasing the question that way, I'd have to say yes, there is a potential. I am a member of the Defense Depot Maintenance Council, and for the past two and a half years, we have not been effective in doing any added interservicing. But, let me tell you what we have done on interservicing over the past two and a half years: we haven't undone any interservicing. If there existed interservicing such as the Navy's engine work on our TF34 engines, that hasn't been undone. Recently I agreed with Admiral Bowes [Vice Admiral W. C. Bowes, Naval Air Systems Command] that we would do the Navy TF56 engines and he agreed to continue with our TF34s. I believe that's the only new interservicing agreement that we have reached in the last two and a half years.

There has been some interservicing that has been directed by the BRAC [Base Re-

alignment and Closure Commission] and by the last Administration. That was directed, but on our own we had not agreed to do any new interservicing.

So when you say, "Is interservicing possible," the answer is, "It is possible." Is it probable without some other forcing function? I think not. But I think that is the wisdom of Mr. Deutch's letter to the service secretaries. I view that he's really saying: "you guys get on with interservicing." I hope a lot of that comes to pass.

GENERAL HATCH: *Thank you very much, General Yates, for being with us today. The success we achieve here today is due in large part to Air Force Materiel Command, that wonderful team you have working for you, and to your leadership. Thank you.*

The Dangers of De-Engineering the Defense Industrial Base

Mr. C. Michael Armstrong
Chairman of the Board, CEO
Hughes Aircraft Company

As you might imagine, when I received the invitation to join you, it included the fact that General Yates and I would be on the podium and that we would have the opportunity to debate the depot issue. So I've written a two-part speech here: One on the subject of reengineering, using our company as an example, and the second on the depot issue. While Ron was talking, I have significantly changed the depot content given that I just learned about the Deutch letter. However, I am very familiar with the depot caucus in Congress and so if you permit, I will share a few comments because I think that while the battle on that particular issue has been at least concluded by the Deputy Secretary, I don't think the war is yet over.

The topic of this conference, "Reengineering the Defense Industrial Base," may sound a little esoteric to the man on the street, but it is absolutely integral to our national security. I can think of no other challenge with such practical and profound consequences for the men and women of our Armed Forces and our defense industrial base.

The discussion this afternoon joins a debate already in progress on the shape and substance of our post-Cold War defense structure. On the depot issue in particular, there is a degree of agreement on the diagnosis now, but potentially a sharp difference on the proper prescription or reengineering. The medical metaphor may be the right one, because it is entirely possible that while the doctors are redefining and squabbling, the patient, the defense industrial base, may pass away on the operating table.

I view this particular session as a chance to try to find a consensus beneath some of these views that surround the issue. And by no means do I believe candor is an obstacle to

consensus. In fact, it is indispensable.

Now with that said, let me begin by putting the scope of this challenge in some perspective — because if our prescriptions differ, the challenge at least is common to us all. It's important to remember that the present period of re-thinking and re-organizing is in fact the result of our victory — of our success in the 40 year struggle that we called the Cold War.

The Cold War pitted our country in a contest that, for the sake of freedom and democracy, we had to win, with consequences that reverberated throughout every corner of our economy and into every one of our families.

But, if we shrink our forces; if we shrink our bases; if we shrink our budgets; and if we shrink our industry, it stands to reason we must strengthen the technology that gives us a comparative advantage.

As we move from wartime to peacetime, it's natural that we scale back on defense spending. In fact, it is a transition that we've made before. But the sad fact is, our history isn't a very happy one. In some ways, the United States does a better job at winning wars than managing the peace that follows.

After World War II, we saw a demobilization of the military every bit as rapid as the defense industry surge that propelled the allies to victory. From 1946 on, national defense spending went into a nosedive, a plunge that did not stop until the Korean War.

A generation later, after Vietnam, we again allowed our investment in national defense to lag, this time, even lower than the pre-Korean level. Today, we are below that pre-Korean level — below the post-Vietnam level — and by 1999, defense spending as a percentage of gross domestic product will be lower than at any point since Pearl Harbor.

The real issue here, I believe, is preparedness. In the audience this afternoon are many of the planners who are measuring our strength against the win-win scenario that could develop in the future. The questions they ask are questions of interest to all of us: Will our strategy be in balance with our support? Can we really win two concurrent regional conflicts at half the historic peacetime level of defense spending?

And, the short answer is, we'll have to — because we all know defense spending is not going to increase anytime soon. Not long ago, I heard an industry talk about the defense industry being decimated. I looked up that word, and it comes from an old Roman practice of punishing a group by putting to death every tenth man. Interpreted into modern times, decimating the industry would be about a 10 percent cut. I could only conclude that I would welcome only being decimated.

In fact, between 1986 and 1997, defense spending after inflation, in real dollar terms as Ron indicated, will decline over 50 percent. Now, when half your budget disappears, you are going to have to learn how to spend smarter, how to stretch every defense dollar. However, this kind of defense climate really doesn't appeal to our strengths.

How can we ward off a "hollow industry?" One way is diversification: developing dual use technologies that span defense and commercial markets.

When the next threat arises, I expect it will come with little warning and require quick reaction time. As a country, we won't have the luxury of preparing and repairing defenses we've ignored. We'll be confronted

with a "come as you are" conflict. Then we will learn whether the defense decisions we are making when dangers seem distant, will see us through when danger is at hand. While we cannot predict how we'll pass that test, we do know that history will judge us harshly if we short change our country and the men and women who defend it.

But, if we shrink our forces; if we shrink our bases; if we shrink our budgets; and if we shrink our industry, it stands to reason we must strengthen the technology that gives us a comparative advantage. At a minimum, we must sustain the modernization of our forces, albeit at a slower, but steady pace. And this will give us a base to build upon — a responsible deployment to surge from — when mobilization becomes necessary.

In the years after Vietnam, we used to hear warnings about trusting our fate to a "hollow Army" — forces without the resources and the readiness to perform their missions. Today, I think we need to add a new danger to our list of worries. Now that conflict has become increasingly high tech, we run the risk that the deep defense cuts will leave us with a "hollow industry" — too weak to respond with the technology and the production that defines our advantages.

How can we ward off a "hollow industry?" One way is diversification: developing dual use technologies that span defense and commercial markets. It is not a question of scrapping our defense technologies and beating swords into safety razors. It is really more of building out and building to common application, using our technological strength to extend, not leap, into commercial markets. In turn, we can use these commercial technologies to come back and satisfy low cost defense needs. Satellites that serve commercial market needs can also serve many defense applications. Radar that is redesigned for automotive collision detection and avoidance needs can also be applied to low cost defense requirements. IR imaging not only gives us appropriate battlefield visibility, but can be redesigned to give police cars appropriate highway visibility. Guidance and seeking technology not only enables precision missiles at minimal collateral damage, but also can apply to character recognition that gives

the Post Office affordable and economic throughput. My point is simply that for diversification to succeed in the commercial market, it takes investing in the extension of what you know how to do, what you are really strong at and what you are doing well.

But for diversification to work in the defense market, it is going to take a change in the acquisition system. Changes that enable commercial technology to participate at the cost level of the market system — and not the cost level of the defense procurement process.

Diversifying into commercial markets will help us sustain the engineering base we need, not just for global competitiveness, but for national security as well.

I believe that if we do it right, our defense work and our commercial work will both be the better for it. We'll gain in synergy and cost a large part of what we've lost as the defense budget has shrunk. In a very real sense, we are evolving toward one national industrial base with applications — and implications — for both our national economy and our national security.

Government studies have found that of the two dozen core technologies of this country, 75 percent were driven farther and faster by defense development. So, diversifying into commercial markets will help us sustain the engineering base we need, not just for global competitiveness, but for national security as well.

That's the positive side of today's transition. The difficult side is surviving the shake out. We all think the other guy is going to be in the 80 percent. Like others in the defense industry, Hughes has found the choice is downsize and stay afloat or capsize and go under. To stay afloat, to stay competitive, in fact to just stay around, we have had to reengineer our company. In the last two years, we've recommitted and reeducated to CMI, continuous measurable improvement, and in fact have made it a fundamental part of

our management bonus system.

We redesigned our process with the IPT [Integrated Product Team] as our bible. We set up independent process teams, because often the owners of those processes are still around and they still think they are serving us well. We maintained our investment in our R&D and our capital spending structure because we know that without this spending, we cannot downsize and restructure to a successful low cost operation. We also had to downsize by over 15,000 people in 18 months. We took out two layers of management and delegated much more authority and accountability to where the problems really are. We eliminated 25 percent of our corporate vice presidents. We consolidated operations and moved out of over 100 facilities, which added up to about 7 million square feet of space. We cut our costs by 30 percent. And, we're far from done.

It was and it is a very painful process. It is tough to manage and it is tough on people. But there is no alternative. In the aerospace industry alone since the beginning of 1990, we've lost 420,000 jobs — and across the defense industry we're going to see jobs continue to disappear at about the rate of 10,000 plus a month for the rest of the decade.

If the defense industry is going to consolidate to 50 or potentially even 30 percent of its former critical mass, then work to modify and upgrade the systems that remain is a matter of survival. It's key to the critical mass we need so that the upward surge from capability has a foundation.

While we are downsizing and cutting and restructuring, I do believe the only sustainable way to drive up quality and drive down cost is to drive our resources to much more teaming and our processes to much more integration and much higher value added time.

While it is critical that the industry downsize and diversify, to me it is also fundamental that the country retain an adequate defense industrial base. It is fundamental to support our force structures and that's why I'm on the soap box for sharing the depot work.

What I'm getting at is simple. If the defense industry is going to consolidate to 50 or potentially even 30 percent of its former critical mass, then work to modify and upgrade the systems that remain is a matter of survival. It's key to the critical mass we need so that the upward surge from capability has a foundation.

At present, the services perform about \$15 billion in annual maintenance work and \$9 billion more in upgrades. And, I think that the depots have about a 40 percent surplus capacity. They are naturally hungry for work. From 1990 to 1993 according to the Defense Science Board, the service depot slice of the pie went up from 67 to 71 percent.

One of the benefits of coming to this conference is that Ron Yates and I had about an hour's opportunity to discuss this before coming to this meeting. We've found that when I'm talking to the Air Force, there's one set of numbers and when talking to the Navy there's another set of numbers and when talking to the Army there's another set of numbers and to OSD another set of numbers. And, you go to the AIA [Aerospace Industries Association] there's another set of numbers. General Yates and I have agreed we're going to do the homework to get a common base so that when we reengineer this process, we're working from reality. I think it will serve us both very well.

I'm very hopeful the Deutch letter can bring us a consensus solution. I think that the Defense Science Board report that the Secretary endorsed is in fact a platform for balanced reform. The real issue to the industry is getting a division of labor that will preserve the core capabilities the services need, and to rely on industry for the modernization and

upgrade work.

End of life service and mission-critical work would still be done by the services. This approach reflects the conscious decisions we must make in the deployment of budget and resources between force structure and industrial structure. There are so many differences between how we go about our life. Public governance and market governance are different. Public institutions receive the taxes and private institutions pay them — that's the way we set it up. Public work is accountable to public laws and rules and market work is accountable to return on investments of shareholders. Public purpose is to serve a broad need defined by society. Market purpose is to serve customers as defined by competition. Public accountability and penalty for performance can lead to the turnover of elected officials or management turnover. For industry, it is company turnover. We just can't have a level playing field.

The real issue to the industry is getting a division of labor that will preserve the core capabilities the services need, and to rely on industry for the modernization and upgrade work.

So what do I think we need to do at this point? I think we need to get on with defining, as General Yates and I discussed earlier, what is the true base that we're dealing with, what division of labor makes sense for the country, not just for one district or even one company, and get on with reengineering that process.

This effort to strike a balance will ultimately be the best way, perhaps the only way, to ensure a defense capability adequate to protect our country's interests, to promote our ideals. Thank you for your attention.

Question and Answer Session

17

The Dangers of De-Engineering the Defense Industrial Base

Mr. C. Michael Armstrong

GENERAL HATCH: *Thank you very much, Mike, those are excellent remarks and give us a good perspective on your point of view. You mentioned sharing depot work and modifications and upgrade, and the first question asks: "What potential do you see for prime contractors to use design teams to propose redevelopment of existing platforms, using the F-16 as an example, to sustain design teams and at the same time planning new modifications for new missions?"*

MR. ARMSTRONG: We have a great hope, whether we are the platform provider or the subcontractor, particularly in the electronics arena, that the upgrade opportunity on the existing platforms is going to be a prime way this country will keep the most competitive force structure deployed. We think it is a fundamental premise that you will be deploying dollars for that purpose and we're trying to protect those teams so that we can be doing that work with you. It's becoming more difficult, however. Not too many years ago if you didn't get a program, whether you lost it in competition or something happened to the program or you had a stretch out, there were other programs where you could redeploy those kinds of resources. There aren't anymore. For example, as many of you know the FEWS [Follow-on Early Warning System] program was canceled. Now, 20 to 30-year-old technology in the DSP program is going to be deployed ad infinitum, and de facto is the technology this country is going to end up with. I was just up in Washington to share with anyone who would listen to me that not only was that wrong for the country, because it didn't have to be that way, but second, if that's what the country decided to do, we had about 800 people who were going to be laid off and dispersed. Then those people in that

level of technology wouldn't be around to reassemble in five or ten years when we thought theater surveillance was interesting and important. So the answer to that question is "yes." I think very highly of that force making a difference to our competitiveness. And, from an industry standpoint we've got to get on with the programs that will deploy those design teams so I can keep them employed.

GENERAL HATCH: *Thank you, Mike. Next, we've seen a few highly visible mergers at the top level of the defense industrial base. What do you see happening in the future and what about the second, third and lower tiers?*

MR. ARMSTRONG: There's a lot of consolidation and merger and acquisition still ahead of the industry. It has just begun. Earlier, Ron was speaking of it in terms of high tech versus low cost. I think people might accuse Hughes of being more focused on breakthroughs in technology versus breakthroughs in costs. We have gotten the message that if we don't do both we're not going to win. In fact, we used to talk about getting ourselves into a first quartile performance in those arenas. We've stopped doing that because that's silly. We were just in a competition where they rate competitors. We only came in third. As they only picked two, what difference does it make that you're in the first quartile or close to it? You've got to be the best.

If the defense market is going to be cut in half, and there probably was excess capacity even before that started, then there must be consolidation in order to get the costs down. There must be good management as well. If I may, I will use the example of our investment in the General Dynamics missile business to accomplish that. We were down to only three long term platforms, TOW, Maver-

ick, hopeful for some Stinger work, and AMRAAM. We had about 1,800 of the finest engineers and scientists in guidance and missile systems. That was not enough program mass to afford that level overhead and stay competitive. When we looked at General Dynamics, they had the same problem. Here are two outfits operating at these cost levels. So we invested \$450 million and basically bought their business and consolidated 17 locations into five locations and consolidated six manufacturing locations into just one located in Tucson. We moved all our engineers to be next to the manufacturing guys in Tucson and we've driven up the utilization rate of Tucson from 35 to 85 percent. Those of you who have seen some of our contract bids recently see what we've done to our competitiveness.

That's got to take place, not just in missiles, but across our businesses and across this industry. The Bottom-up Review — the numbers they shared with us — said that half of us in the defense industrial base would be gone. That is very optimistic. I think many more of us will be gone. Both because of our critical mass and the business of electronics that we're in, we think that we're going to be a survivor. We happen to have the financial resources to accomplish that. Over the next three to four years, we're going to see much more consolidation at all tiers of the industry.

GENERAL HATCH: *The next question regards diversification. In your remarks, you talked about satellites that can do commercial work as well as military work. I'm personally familiar with your high powered television satellite and small receptor dish. How's that one coming and what else do you have on the drawing boards?*

MR. ARMSTRONG: In fact, we have given a proposal to the Navy and we would like to figure out how to do more with the Air Force to provide what we call DirecTV. We have placed a satellite in geosynchronous orbit — a very high-powered satellite that has a perfect orbital slot to cover the continental United States and 85 percent of the population of Canada — on which we will be broadcasting one hundred and fifty channels of digital television — video and sound. The test marketing for that begins this month in six south-

eastern cities. If we have it all perfect, we will be rolling it out on the shelves of Sears and Circuit City and TV retail outlets in the 4th Quarter of this year.

Our business plan is to become the largest programming provider in the United States by the year 2000. We will earn that share through the quality of video and sound and service that we offer and through the choices offered by 150 channels of programming. Because you will pay for only what you want to watch, it is unlike some of the packaging that goes on in the cable industry where you get all these channels you never watch, but you get to pay for them. So our theme will be quality and choice. With the Navy, we're proposing to test just how far this beam will go at sea or in port so the services can enjoy that entertainment.

GENERAL HATCH: *Thank you, Mike. The next question sounds like a feeler for a contract. If GM-Hughes saw a great commercial promise in dual use technology, would GM-Hughes be willing to cost share 50-50 and would the Hughes and government split on dollar investment to simultaneously commercialize this technology while meeting the DoD weapons system needs?*

MR. ARMSTRONG: If I understand the question, the government would help fund development and production capital requirements that had an output, half commercial and half defense, and would we be open to that? The answer is yes, but only if we did not impose the defense processes on that production. I know of no way today, even with all the rhetoric, to have a dual use production line. That's just folly. There are so many inspections and specifications and audits and test points and oversights and visits and unbelievable delays in getting through the defense process that the output is just not competitive in the commercial market. If we have stuff that we can take and put into both markets, we have two lines and two different structures in order to get that done. So, I'm a fan for dual use, but if we don't change and reform the defense process, we'll never get the benefit out of dual use. We'll just make what costs less in the commercial market, cost more in the application for the defense market.

GENERAL HATCH: *Mike thanks very much for being with us today. The AFA is proud to have you join us.*

**The Dangers of
De-Engineering the
Defense Industrial
Base**

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Dual Use Technology

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Panel:

Brig. Gen. Richard R. Paul

Director, Science & Technology, AFMC

Maj. Gen. John F. Phillips

Commander, Sacramento ALC

GENERAL HATCH: *A major thrust in the science and technology arena and the industrial base area is dual use technologies that can be used in both the military and the civilian economy and which can be useful for controlling costs in industry and the Air Force. Today, we're pleased to have with us two Air Force leaders to discuss dual use, Brigadier General Dick Paul, who is Director of Science and Technology for Air Force Materiel Command, and Major General John Phillips, the Commander of our Sacramento Air Logistics Center. We will have slide presentations from each speaker followed by a question and answer session. General Paul will go first, and after the presentations, we will direct your questions to our panelists. Dick, you have the floor.*

BRIG. GEN. PAUL: Thank you, General Hatch. Good afternoon. It is a pleasure to be here to talk about dual use technology in the Air Force.

Certainly one of the keynote phrases now in our business is dealing with change, particularly dealing with rapid change.

Let me talk a bit about what we are doing in the Air Force on dual use technology. Before I do that, I want to give you the bottom-line of this briefing: technology transfer is now part of our mainstream mission, not only in the labs but in all of AFMC. Mainstream should be underlined because we have been involved in technology transfer in the past, but it was a secondary duty. Now, it is a mainstream duty right up front with everything else we do. We take that mission seriously, and that's what I hope to convey to you.

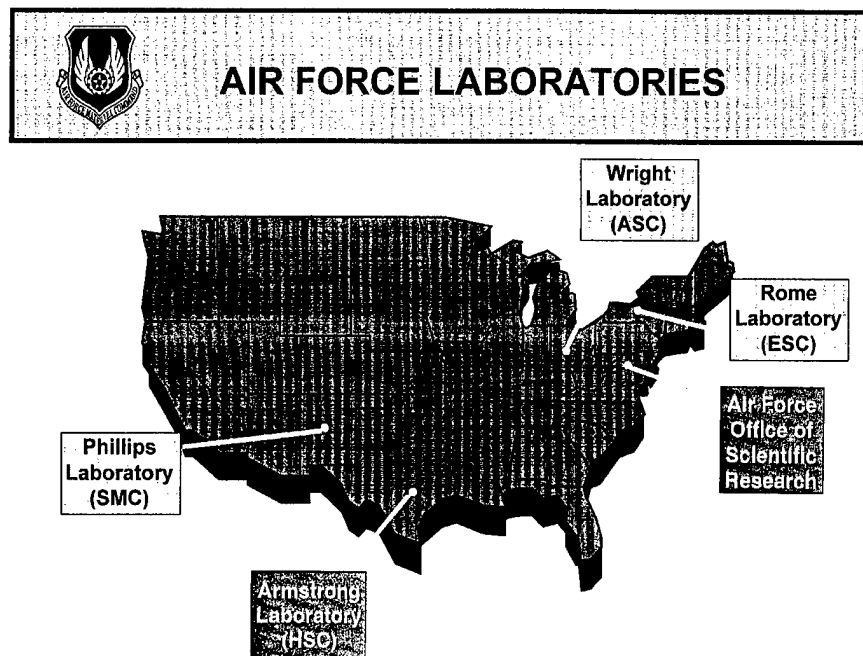


- Technology Transfer is part of our mainstream mission in AFMC

- We take that mission seriously

When you think about technology in our organization, you probably think first about our laboratories. I'd like to spend a few minutes to show how we have organized the technology program at the laboratories in AFMC. You are probably familiar with our lab structure. The four labs are organized along product lines or aeronautical technology. Wright Lab is associated with Aeronautical Systems Center, headquartered at Wright-Patterson [AFB, Ohio]. There is the Rome Lab [N.Y.], our C³I technology lab; Armstrong [Brooks AFB, Texas], our Human Systems Technology Lab; and Phillips [Kirtland AFB, N.M.], our Space and Missile Technology Lab.

We work technologies in 12 areas. There is a lead laboratory in each area. When the dual use movement began in earnest a couple of years ago, there was a tendency for some of us to pick which of the technology areas really had the lion's share of dual use. There was a tendency to look at materials or C³I and say those are the natural technologies that we ought to look at for dual use. But we found



that many technologies play in the dual use arena — even areas such as conventional armament and advanced weapons that on the surface might appear to be 100 percent military use. I'll illustrate that later in the briefing.

TECHNOLOGY AREA PLAN RESPONSIBILITIES

AREAS	RESPONSIBLE ORGANIZATION
Aero Propulsion & Power Air Vehicles Avionics Materials Conventional Armament	Wright Laboratory
Advanced Weapons Geophysics Space & Missiles	Phillips Laboratory
C3I	Rome Laboratory
Human Systems Civil Engr & Env Qual	Armstrong Laboratory
Research Sciences	AF Office of Scientific Research

In terms of resources, our laboratories execute a budget of over \$2 billion. Over half of that comes from the Air Force. It is our organic Air Force investment in technology. Then we do work for other agencies, such as BMDO [Ballistic Missile Defense Office] and ARPA [Advanced Research Projects Agency]. At the beginning of the fiscal year, we had an organization with over 7,000 people. Our dual use efforts spring from this technology base, and as I hope to point out graphically later in the briefing, all of these technologies are viable candidates for dual use.

The way we distribute our resources is a very important message for industry. If you look at our \$2.4 billion budget, you can see that 75 percent goes to extramural research. It goes to industry and academia. The rest pays the salaries of our civilian personnel and operates our on-site operations. S&T is an "out-source" intensive operation in the Air Force.

Even part of our on-site operations is contracted out, usually to local support contractors. If you look at how one of our average engineers spends his or her time, a third of the time is spent on in-house research, another

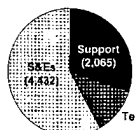
S&T RESOURCES

FY94 Dollars*
(in billions)



\$2.193 Billion

Authorized Manpower

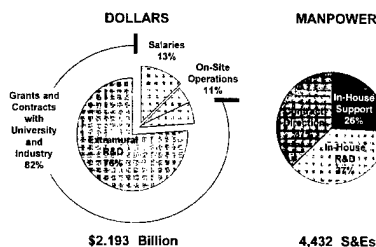


Technicians
(828)
7,325 Positions

* Organic S&T includes 6.1, 6.2, and 6.3A
External sources include BMD, ARPA, reimbursables, etc.

third or so is spent on the technical direction of the contracts used to sponsor this extramural research, and about a third of the time is for in-house support to program offices for technical problems or source selections. I want to convey to you that we are already, in our Air Force laboratory structure, directly out-sourcing 75 percent of our budget. Of our technical people, over a third of our man years are associated with contracting out. That's not necessarily the case with the other service laboratories. We're happy with that balance, but to go any higher on extramural would be dangerous for both industry and ourselves.

S&T RESOURCE DISTRIBUTION (FY94)

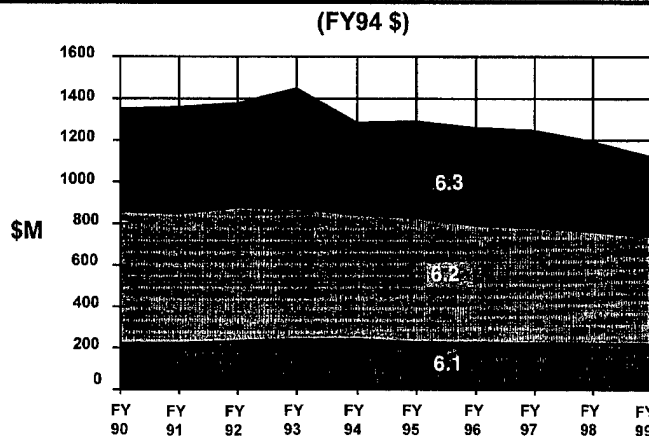


Even though it is always subject to change, our forecast in the Defense Planning Guidance calls for zero percent real growth in the services' S&T budgets. Based on FY94 dollars, our '94 appropriation — about \$1.3 billion for the Air Force — shows that we are close to a zero percent real growth. We tail-off a bit in the out years and hope to fix that in the POM [Program Objective Memorandum]. Competition for resources is very intense right now, but thus far, we have been able to uphold the Administration's desire to keep our tech-

nology base at a constant level. That too bears on dual use technology and technology transfer.

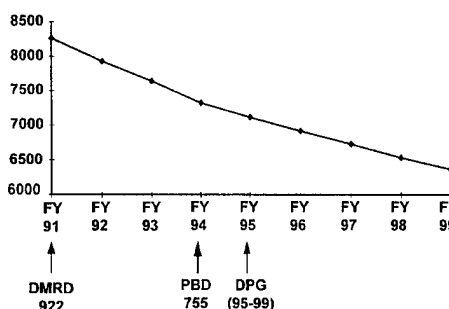
Dual Use Technology 23

AF S&T BUDGET



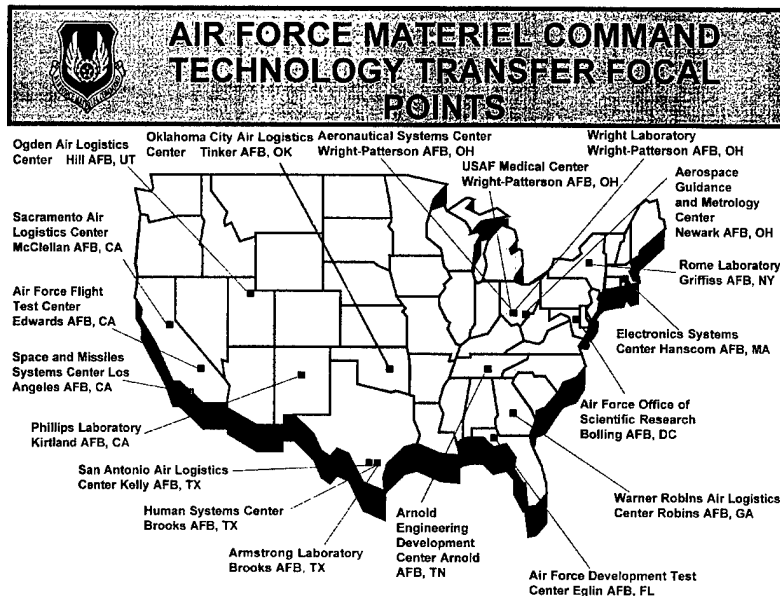
While our dollars are holding constant, we are continuing to experience manpower reductions just as in the rest of the Air Force. This glide slope could get steeper in the future, depending upon external events being contemplated right now. This concerns me in the tech transfer area because technology transfer is a very person-intensive operation. It is sometimes called a body contact sport. Technology transfer depends upon finding the connections between our technologies and where they may have commercial as well as military application — and that takes people.

AF S&T MANPOWER



Reengineering the Industrial Base

If you look at our tech transfer focal points in the command, it is not just at the four laboratories. It is at all of the centers in the command — our Product Centers, our Test Centers, and our Logistics Centers. The entire command is participating in tech transfer and dual use technology. In some cases, our Logistics Centers and Test Centers offer one of a kind facilities in the world — unique places where commercial research can be done. The technical expertise in our Logistics Centers, Test Centers and Product Centers is unparalleled. Every organization in our command is involved in tech transfer. It is no accident that the next speaker is not from a laboratory, but is from one of our Air Logistics Centers.



Even though tech transfer was always a part of our mission, about a year and a half ago, two events turned things around 180 degrees. These two events took this work from a secondary activity to a mainstream activity. The events are the Defense Conversion Act of 1992 and the President's 1993 Technology Initiative. Let me discuss those very briefly with you. The Defense Conversion Act is probably best characterized by the Technology Reinvestment Project, with which this audience is very familiar. The focus of the Project was to look for opportunities to develop dual use technologies. Con-



- Defense Conversion, Reinvestment, and Transition Assistance Act of 1992
- President's Technology Initiative (Feb 93)

gress was very serious about the issue, and they appropriated almost \$500 million in 1993 to be used for the development of dual use technology. There was additional money over and above this amount for training programs and deployment of existing technologies.



- Major aspect of this Congressional initiative is the Technology Reinvestment Project (TRP)
- Promote dual-use technologies with focus on technology application
 - \$472M in FY93 directly applicable to defense technology and industry programs
 - \$474M Appropriated/\$624M Authorized in FY94
- ARPA is implementing agent
 - USAF labs are participating
- FY93 Results:
 - 2850 proposals received; 212 proposals selected
 - \$472M (FY93) and \$133M (FY94)

In Fiscal Year 1994, almost as much was appropriated and over \$600 million was authorized. ARPA is the implementing agent for this particular project. Again, the thrust is for industry to form teams or consortiums, then to bring proposals to ARPA as the administrative agent for this project. It is a cost-sharing program where industry's team puts up half the money, and if a proposal is accepted, that money is matched by ARPA. The money comes out of Congressional appropriations. It is a very popular program. In FY93, ARPA received almost 3,000 proposals with a face value of \$8.5 billion. With only \$500 million available, only 200 of those 3,000 proposals were selected. ARPA is now gearing up for the next round, and it promises to be just as competitive and intensive.

The Air Force labs have been involved by teaming up with industry or state government teams. Our four labs are participating in a number of winning projects. To illustrate the nature of the projects, let me point out one

at Armstrong. It is called the East-West Consortium. It is a team led by Apple Computer in California and has seven members on it, including our Armstrong Lab people. It is an 18 month effort for about \$6 million. The thrust of this effort is to develop computer-assisted authoring tools so that people who do not have computer expertise can still develop computer-assisted training programs. The goal is to develop training programs in one-tenth the time that it takes today. Obviously, this project is of great interest to us because we develop computer-assisted training tools in the Air Force.



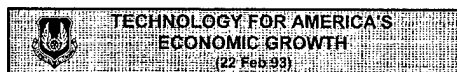
- Armstrong Lab
 - Rapid Optical Screening Tool
 - East/West Consortium: Next Generation Authoring Tools and Instructional Applications
 - Work Force Retraining in Manufacturing Science and Engineering of Cost-Effective Electronics
- Phillips Lab
 - Hybrid Technology Option Project
 - New Mexico Manufacturing Extension Program
 - Apprenticeship-Oriented Education and Extension Training for Semiconductors/Electronics Manufacturing
 - Semiconductors/Electronics Manufacturing Experts in the Classroom
 - Dual-Use Hydrostatic Bearing Program

Our other two laboratories, Rome [Griffis AFB, N.Y.] and Wright [Wright-Patterson AFB, Ohio], also have winning proposals. Again, these laboratories do not receive matching ARPA dollars because they are federal agencies, but they are members of the applicable industry teams. They participate by putting the proposal together, and we are interested in leveraging the work we are already doing for military use through participation in these consortiums or teams.



- Rome Lab
 - Dual-Use Sensor Technology for Air Transportation System Capacity and Safety
 - Beam-Agile Active Transmit Phased Array System
- Wright Lab
 - Electric Actuation and Control System
 - Eco-Scan - A Tunable IR Laser Remote Sensing System
 - Gulf Coast Alliance Technical Access Service
 - Passive Millimeter Wave Camera
 - Autonomous Landing Guidance
 - Millenium 21st Century Broadband Digital Telecommunications Technology
 - Defense Enterprise Empowerment Project

Let me mention one other project in which Wright Lab is a member of the winning team: the Defense Enterprise and Paramount Project. This consortium is not led by industry but by a state agency in Ohio, the Edison Material Technology Center. It has 17 members on the team and is a \$1.3 million initiative. They are working on defense conversion projects for 18,000 small businesses in Ohio, Kentucky and Indiana. This gives you an idea of the variety of these winning proposals.



Specific Proposals

- Shift more R&D from defense to commercial activity
 - 1993: 60/40 ratio (defense/commercial)
 - 1998: 50/50 ratio (\$9B swing)
- Encourage federal labs to devote 10-20% of their budgets to R&D partnerships with industry
- Require agencies to:
 - Remove obstacles to cooperative agreements
 - Facilitate industry-lab cooperation

The second initiative, the President's Technology Initiative, was announced by President Clinton in Baltimore back in February last year. It calls for a shift in federal research & development dollars away from defense and more toward commercial technologies. The goal is a shift from a 60-40 ratio to a 50-50 split. It may not sound like much, but over five years, that represents a swing of \$9 billion. The \$9 billion doesn't have to leave the Department of Defense and go to the Department of Commerce or the Department of Transportation or to a non-DoD agency. It does say that DoD can compete for some of that \$9 billion if we work hard on dual use, defense conversion and tech transfer. And, that's exactly what we want to do.

It also encourages our labs to devote part of their budget to partnerships with industry. I think of these partnerships as co-development of a technology that has both a military and a potential commercial application. Once it reaches a maturity point, the military would spend its money on the military application, and industry would do the same for the commercial application. We are not talking about contracted research. It is actually bringing money together, pooling it and working to-

gether as partners to co-develop technology that can apply to either the military or the commercial side.

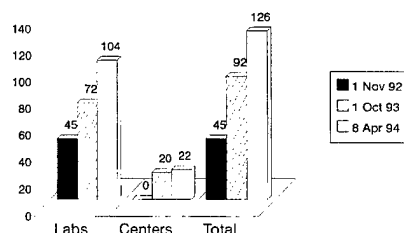
It has been recognized that to do this we have to use tools outside normal contracts. So, there have been a number of assistance instruments, such as cooperative agreements, put in place for us to use. Probably the most familiar of these instruments are called Cooperative Research and Development Agreements, CRDAs.



- A CRDA is a written agreement between a federal and a non-federal partner
- Allows each partner to provide personnel, services, facilities or equipment towards a joint R&D project benefiting both parties
- Allows non-federal partner to provide funding
- Documents negotiation of licensing agreements

We have a number of active CRDAs today. This is an indication of how we have tried to step up our intensity level. As of November 1992, there were 45 active CRDAs throughout the command. Today, we have 126, and it is still on the rise. We have many more in the works right now. These are assistance instruments which allow a non-federal partner and a federal partner to come together and collaborate on a dual use technology.

CRDAs in AFMC



Before November of 1992, only the laboratories were involved. Today, our centers are actively involved as well — primarily our Test Centers, Logistics Centers and Product Centers. They are finding ways to hook up with non-federal partners and make their facilities and expertise available.

We've worked very hard to make the CRDA process as easy as possible. About a year ago, we delegated the authority for approving CRDAs from me down to the field level. We've done that for all of our lab commanders and our center commanders. CRDAs do not have to go higher than our local organizations for approval. And, the comfort level is on the rise.



- Approval authority delegated by AFMC/ST to Center and Laboratory Commanders
- "Comfort level" with CRDAs is on the rise

There are other assistance instruments that Congress has made available to us. For the last several years, we have used grants for basic research. They are primarily oriented toward academic or non-profit institutions. They are used when we want an agency to do research and allow us to stand back, let them do their thing and then come back to us without our intervention. On the other end of the extreme, there are the cooperative agreements where we anticipate significant government participation or involvement. These give wider latitude to the CRDAs, which by nature limit the government to only bringing facilities and people to the table, but not money. Cooperative agreements allow us to bring money as well so we have more flexibility and can enter into a wider expanse of collaborative efforts.



- Grants: no significant government involvement
- Cooperative Agreements: significant government involvement
- "Other Transactions":
 - Undefined legal instrument
 - Restricted use
 - Tool of last resort
 - Each use reported to Congress

Finally, there is something called "other transactions" which covers anything else. It is largely an undefined instrument. Provided under Title X, U.S. Code, it's restricted primarily to defense conversion activities. It is really a tool of last resort and it is for those cases where other instruments can't be used. For instance, there may be cases where there are some very complex intellectual property rights that other tools cannot handle. This tool can be tailored to address these situations. We must report their use to Congress.

I want to leave you with this bottom-line: we have the instruments available. Lack of instruments should not be a stumbling block to our full and active participation in defense conversion and tech transfer.

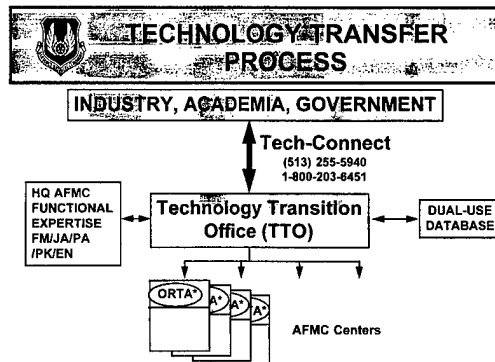
We are also working to push down the approval authority level for these instruments. In fact, Secretary Widnall [Sheila E. Widnall, Secretary of the Air Force] delegated approval of these instruments to General Yates in January. He in turn delegated that authority to our contracting shop and Brig. Gen. (select) Tim Malishenko. Tim's shop is working to develop the training, tools and guidance necessary to get these instruments into the field. By this summer, we intend to have the approval authority down to our laboratory PK shops [Contracting] so that we can cut the turn-around time and can use these tools as rapidly as possible. For the time being, we'll retain approval authority at AFMC Headquarters for the "other transactions" because of their rare usage.

APPROVAL AUTHORITY FOR ASSISTANCE INSTRUMENTS

- SECAF delegated to AFMC/CC: Jan 94
- AFMC/CC delegated to AFMC/PK: Feb 94
- Next Steps:
 - Develop tools, guidance, and training
 - Delegate authority for grants and cooperative agreements to lab PKs
 - Retain authority for "Other Transactions" at AFMC/PK
 - Case-by-case approval

As we've tried to step out on this in a unified and focused way, we have created something called the Tech Transition Office, the TTO. This is the single focal point within our command for dual use tech transfer activi-

ties. It really has two primary purposes. The first is to provide a single point of contact for the outside world, whether it is government, industry or academia. All they need to know is one phone number, the Tech Connect phone number. That will get them the TTO, and the TTO will pick up the burden from there.



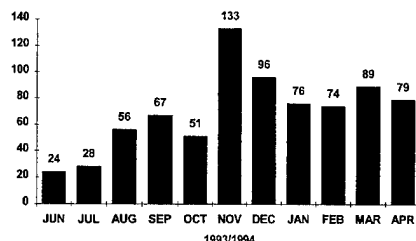
* ORTA: Office of Research and Technology Applications

The other activity is to orchestrate how we tool up to perform the tech transfer mission within all of our centers. While recognizing that the labs have been using this approach for a while, the centers have not. We don't want every center in every organization to reinvent the wheel on understanding CRDAs. So the Tech Transition Office has a charter to assist our field organizations with lessons-learned and help us get up to speed very quickly. They provide functional expertise through our financial folks, our legal folks, our contracting folks or our public affairs folks. Also, marketing is becoming more and more a part of what we do. Marketing used to be a dirty word, but now it is appropriate in our community.

We have our own 1-800 number, "Tech Connect." When ARPA first put together their TRP project, they had a 1-800-"Dual Use" number, which sounded like a good idea, except a lot of people dialed DUEL instead of DUAL. When you dial DUEL you get a barbershop in Cleveland, which has since changed its phone number. We decided not to use a catchy phone number.

We cut the ribbon for this operation back in June of last year. After an initial, steady, positive glide-slope, we've received 75 to 85 calls each month over the last four or five months. We had a peak in November due to

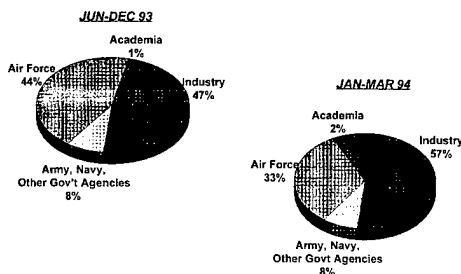
TECH CONNECT REQUESTS



a special edition of *Aviation Week* that devoted its entire issue to technology transfer. We put a three-page ad with the Tech Connect number in the magazine and the phone lines lit up. It is another indicator that marketing pays.

We've been tracking the demographics on who is using the phone line. Initially, it was split 50-50 between industry and other government agencies. As industry learns more about the availability of this service, there has been a gradual shift so that we are up to almost 60 percent with industry. We still want government agencies to use the service, and the Air Force is using this service a third of the time.

TECH CONNECT CUSTOMER DEMOGRAPHICS



I will use six success stories from Tech Connect to illustrate the variety of requests we've received. Again, I urge you to use this tool. Our San Antonio Air Logistics Center was looking for a replacement for cadmium and called the Tech Connect line. The Tech Connect folks found some people working on this issue within the Air Force and also found people working on it in the Army. So far, they had not found a solution. We verified that

there was still a technology need; we verified no one had the solution and determined that we needed to press on with the technology program in our laboratories to solve this problem.

TECH CONNECT SUCCESSSES

- SA-ALC Technology Needed
 - Submitted tech need for non-EPA 17 drop-in replacement for Cadmium; Needed research of related efforts
 - ⇒ CONNECTION: Army POC for related effort; 3 AF POCs for Cadmium
- Hallmark Cards
 - Wanted high speed paper cutting technology
 - ⇒ CONNECTION: SA-ALC Waterjet Technology; Lawrence Livermore Lab, Institute of Paper Science & Technology

In another case, Hallmark Cards called the Air Force looking for paper cutting technology. They heard about our water jet technology. This time we called the San Antonio Depot and found information on water jet technology which had been tested for cutting metal. It was just getting geared up to cut paper.

A Hallmark laser-cutting process was leaving burned edges, and so now they are working with our San Antonio people as well as others on this water jet technology.

Here is another success story. Teledyne Ryan was having an aluminum extrusion problem and called Tech Connect. We connected them with an engineer in Wright Laboratory who solved their problem in just 10 minutes on the phone. In this case there was no MOU [memorandum of understanding], nor CRDA, nor money — a 10-minute phone call solved their problem.

In another case, the National Fire Fighters Protection Agency is trying to develop a helmet with a hearing device that can withstand very high temperatures. Now, they are working with our fire fighting technology folks at Tyndall [AFB, Fla.], an operating location of Wright Lab, who are working the same problem for our Air Force fire fighters.

Here's an interesting case. Cable Dynamics which consists of one person — the president, CEO and janitor are all the same person. This person was looking for compact backpack, recreational generators and air compressors to blow up air mattresses, etc. We

found people with this knowledge in the Army as they work the "21st Century Land-Warrior Program." The Army is providing a production unit to this one-person operation for use in experiments.

TECH CONNECT SUCCESSIONS

- Cable Dynamics - Recreational Equipment Manufacturer
 - Wanted portable generator and air compressor (for backpack)
 - ⇒ CONNECTION: Army POC for 21st Century Land Warrior; Army to provide generator production unit for modification
- Austin Science Assoc, Inc. - MFRS Nuclear Instrumentation
 - Losing Company - Wants related technology for new line of work
 - ⇒ CONNECTION: RTTC working with them to diversify in medical or environmental; AF ORTA Assistance

Last, let me describe Austin Science Association, another small outfit with just 12 people. This group was working on nuclear spectroscopy technology for NDI, nondestructive inspection techniques, but that work for DoD and military applications was declining so our Tech Connect folks hooked them up with one of NASA's regional technology transfer centers, which is also in Austin. They visited Austin Science, helped them put together a TRP proposal, and now it looks like Austin Science will turn the corner.

Why are we interested in doing that? Because, we want to keep companies such as Austin Science as viable sources for future DoD projects. This is a networking operation and the idea is to help whenever and wherever we can.

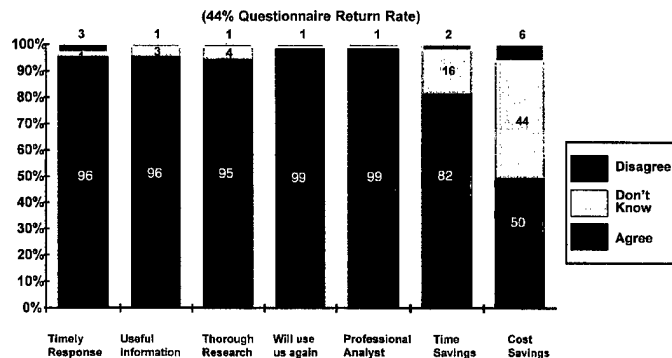
We also follow-up to see if we are serving our customers well. Some customers desire very general information such as a phone directory, but for specific requests — about 50 percent of the cases — we send a follow-up letter within 10 days. We have a 40 percent return rate for our survey.

CUSTOMER SURVEY/FEEDBACK PROCESS

- CLOSE-OUT LETTER SENT UPON COMPLETION OF REQUEST
- APPROXIMATELY 50% ARE SENT A FOLLOW-UP LETTER WITH SURVEY 10 DAYS LATER
 - NO SURVEYS SENT TO REQUESTS FOR GENERAL INFORMATION
 - SURVEYS ALWAYS SENT WHEN POC IDENTIFIED OR FOR SIGNIFICANT ANALYST RESEARCH
- OVER 40% SURVEY RETURN RATE

Forty percent likes the service. We receive high marks for "timely response," "thorough research," "will use you again," and "analysts were professional." Eighty percent said we unquestionably saved the organization time, and 50 percent can document cost savings as well. Again, I want to let you know that this service is available and encourage you to use it.

TECH CONNECT CUSTOMER SATISFACTION JUN 93-DEC 93



We have discovered that in the laboratory we are not good marketers. But, we have professionals in our command who are good marketers, our public affairs offices. To market our services, we have a program called AFSTAR, Air Force Science and Technology Report. Its purpose and focus is the marketing of Air Force technology to a wide array of customers — internal customers, Congress, the public, and industry. Our customer base has grown with the dual use and tech transfer movement.

One marketing tool is our displays. I hope you've stopped by to see our display in the exhibition hall. We have shown our wares to twenty thousand people at the Paris Air Show and on the Mall in Washington, D.C. during National Public Service Recognition Week. Secretary Perry visited our display and was delighted to see that our focus was on dual use and tech transfer.

On March 2 in the Dirksen Senate Office Building, Senator Pressler from South Dakota sponsored a symposium and we were invited to display dual use and tech transfer services. The Air Force display was visited by congressmen, staffers and many others. The

amount of dollars appropriated for projects like TRP reflects Congressional interest in the subject.

I'd like to close by giving four examples of dual use. There are hundreds of examples and most people think about economic pay off. Instead, I would like to show you ones that impact public education, health and safety.

DUAL-USE TECHNOLOGY EXAMPLES

- Education
- Health
- Safety
- Economic

The first one is in education, and involves a set of computer assisted technologies to help train people like satellite ground controllers or aircraft maintenance personnel. The instrument uses artificial intelligence and a particular knowledge base system to monitor how the student interacts with the system. It can adapt to the learning level of the student, instead of just following the same rote sequence no matter what that student's learning level.

About two years ago our folks at the Armstrong Lab, took this same training module and adapted it for junior high school algebra word problems -- you know those dreaded problems that say if train A leaves the station at 10:00 and train B leaves at 10:30, what time does train A meet Train B? The module has been placed in nine public schools around the country. Our experience shows that students who use the learning lab for one hour a week have raised their ability to solve word problems in algebra by one letter grade. This is compared to a control group who took the same tests and did not have this tool available. This has the potential to revolutionize public school systems. This is now being licensed and so we can make it available through the commercial market. We've received dozens of requests and have been unable to help because we don't have the manpower to go out and set up the training. This

summer, we will have this available for the commercial market.

General Yates has already received unsolicited letters from schools who after only a few weeks -- far too early to see improvement in students' learning ability -- report how the students are excited about the module; discipline problems have gone down and pride in the classroom has gone up. It has had a positive effect that none of us really anticipated. It also puts students in an environment where they don't have to raise their hands to ask embarrassing questions. They can interact with the computer. The computer tracks each student and gives the teacher a print-out on the student's learning ability. This allows the teacher to know exactly where to focus time for that particular student.

In the health area, we are working a technology with our conventional armament people at Eglin [AFB, Fla.]. We have developed image enhancement algorithms for automatic target recognition in smart weapons. The military application takes miniaturized components and provides very high processing and high speed algorithms for image processing. Who would have thought that conventional armament technology would be a prime candidate for dual use? I certainly didn't think so ahead of time.

But, we're finding that same image enhancement algorithm is very valuable in mammography. When compared to a standard x-ray mammogram, the enhancement algorithm digitizes the data and shows greater detail to spot the location of a potential tumor. The star-like arms in the images give very valuable diagnostic information for medics and doctors.

We believe the technology is very exciting and the National Cancer Institute agrees. They are very interested in using this system not only to help detect cancer earlier, particularly in younger women where breast tissue is denser and you need this image enhancement, but also because you can read one of these images in 10 minutes compared to 45 or 50 minutes required for a normal x-ray. It offers tremendous potential.

We found another dual use technology for the safety area. This one is sponsored by our Wright Laboratory, our avionics director-

ate. In developing transmit-receive modules for solid-state phased radar for the F-22, they are working with gallium-arsenide circuits. It takes about 2,000 of the modules to populate the F-22 radar.

As a safety application, instead of 2,000 modules, they put two of those modules on a school bus, one on the front, and one on the side. The modules are activated when the driver extends the protective "stop arm" of the school bus. If a student walks into one of those areas which is out of the sight of the driver, it provides an audible and a visual indication. Even with mirrors, it is often difficult to see a student next to the bus. It is already credited with saving one life in Indiana. A student dropped some lunch money under the bus and crawled under it. When the driver put out the "stop arm," he got an indication of the potential danger.

The last example I will share with you is called a "smart dip-stick." It is an oil probe connected to a computer. The idea is to measure remaining useful oil life. It was valuable during Desert Storm because there was concern about the harsh environment and the fine sand degrading the A-10s. We found a way to measure the depletion rate of antioxidants in the oil to see if we were changing oil often enough on the A-10s. You can guess at a couple of quick applications — car lube shops to measure oil life.

However, we found another dual use application in the fast food industry. Cooking oils are very expensive to replace, particularly all-vegetable oils. The fast food industry has shown considerable interest in using this technology to determine when to change cooking oil rather than doing it every "x-many" hours. This technology for the smart dip-stick was sponsored by Wright Laboratory and developed by the University of Dayton Research Institute. GEMSET Engineering is commercializing this technology.

SUMMARY

- All AFMC organizations are involved in technology transfer
 - Processes, facilities, people (expertise)
- TTO proving to be effective focal point
 - Tech-Connect
 - Process assistance
- Assistance instruments available
 - Approval authority delegated to field
- Marketing on the rise
- Dual-use is everywhere!
 - Preconceptions are usually conservative

If I could summarize, these are the points I hope I've made. First of all, our entire command is participating in dual use and technology transfer. Technology is not only processes; it is facilities and it is people who have expertise. We want to take full advantage of all these resources across our command.

Secondly, we think the TTO is an effective tool through the use of Tech Connect. The assistance instruments we need, we have. They may be new to us, but we're learning about them, and we're cutting our teeth on them. We're anxious to get involved in even more. Also, "marketing" is no longer a dirty word.

Lastly, those who have a preconceived view of dual use technology will probably be conservative. It is hard to tell what the applications are. The best thing we can do is get the person who understands the technology for a military application hooked with a potential customer outside the military. When we can make the right connection, magic happens.

BOTTOM LINE

- Technology Transfer is part of our mainstream mission in AFMC
- We take that mission seriously

I've leave you with my bottom-line. This is part of our mainstream mission. It is not a secondary duty and we're very serious about that mission. Thank you and I look forward to your questions.

MAJ. GEN. PHILLIPS: Thank you very much. I'm going to talk to you about initiatives that support what General Paul just briefed. We are approaching dual use from an operational environment. We are one of the major consumers of what the labs produce in terms of technology and its application to an operational environment.

We've taken things a step further at the Sacramento Air Logistics Center. We've moved from direct support of operational weapon systems to the retrofit process and to the exporting of a lot of that technology.



Outline

- About McClellan AFB
- Our mission
- A new reality
- The future
- Depot dual use
- Dual use highlights
- Conclusions

Today, I'll discuss: a bit about McClellan Air Force Base to give you an idea of the magnitude of the industrial complex that we have at Sacramento; the new world realities which are forcing us to change; and then the meat of the briefing, several examples of how we are taking operational technology and putting it through the incubation process to generate new industries to use the technology.

McClellan AFB

Sacramento Air Logistics Center

• Land	3,763 Acres
• Industrial Plant Value	\$1.07 Billion
• Building Area	12 Million Sq Ft
• People	14,400
	(over 75% civilian)
• Skilled Workforce	Blue and White collar

First, Sacramento is fairly sizable. Our industrial plant value is a little over \$1 billion. We employ more than 14,000 folks, and that's down from 20,000 people five or six years ago. Ours is a very high skilled workforce. We are the Air Force technology center for

microelectronics, composites, and neutron radiography.



McClellan AFB

Sacramento Air Logistics Center

- Largest industrial employer in the northern California



- Annual payroll of \$583 Million
- Local economic impact of \$2.2 Billion
- Could make Fortune 500 list

We are the largest employer in northern California. Our payroll is a little under \$600 million. Needless to say when we began to draw down the forces, people became very concerned. That should come as no surprise to you, however, General Yates has made it very clear that our efforts will not be spent on saving the depots, but rather on saving the technology and the industrial base. Whether we are doing required tasks at Wright-Patterson [AFB, Ohio], at McClellan, or it is being done by private industry, the work must go on and somehow we have to maintain that support capability.



The Mission

- \$425 million/year depot-level maintenance

• Aircraft: Fighters, Close Air Support, Tankers

• Navigational aids

• Radar

• Space systems

• Command-Control-Communication and Computers

• Intelligence systems and components

- System management
- Commodity group management
- Technology application
 - From Air Force Labs and industry

We have a very broad mission. Roughly \$425 million a year is spent on depot-level maintenance for a broad spectrum of aircraft and equipment. We provide primary depot support to the F-111, A-10, F-117 and secondary support to the tanker fleet. Oklahoma City [ALC] is the depot charged with primary support of the tanker fleet. We also heavily support command, control, communications

and computer systems. Many of the aircraft which we support are approaching the geriatric phase of the reliability curve. Many of the original manufacturers no longer exist. As a consequence, we've had to come up with the capability to reverse engineer many of the electronic components that are still being used in today's front-line aircraft. We are systems manager for several systems, and as a consequence we are exporting much of our technology. We have an advanced microelectronics facility which I've often described as being able to take five grains of sand and build a chip. The people are that good!

We can no longer do business as we have in the past. We have to recognize that the world has changed. Just a few years ago, the Air Force had 9,600 aircraft. Very shortly, we will only have just over 8,000. Having fewer aircraft to maintain has freed up some capacity at the depots, and we do, in fact, have too much capacity at the depots. The question is: "How do you leverage that technology, maintain the industrial base, and preserve the capability that is absolutely critical to successfully prosecuting a war?"



A New Reality

- President Clinton - Reduce government manpower
- Vice President Gore - Reinventing Government
- Defense Secretary Perry - Move defense business toward commercial practices and sources

Defense Depots - Too much capacity



Much is said about reducing government manpower, and much is said about reinventing government. More is probably said than is understood, and more is written than is practiced. The fact is, we must change. It has been suggested that we move toward commercial practices. I agree. However, I would caution that we certainly don't want to base our ability to prosecute a war on winning the most economical war. So, we have to build

down with caution, and clearly, we have to understand the cost of doing business.



Future

- The pessimist says: 'Depot closures'
 - Immense closure and relocation costs
 - Military capabilities lost
 - Communities and regional economies impacted
- The optimist says: 'It can't happen to us'
- The realist says: 'There are other ways'
 - Privatization
 - Interservicing
 - Dual Use



Given that we have excess capacity, one would suggest that as we began to close depots or reduce capability, we must be concerned about relocation costs. Clearly that is a factor. That we are going to lose tremendous military capability is an important factor as well. Communities' and regional areas' economies are going to be impacted. The optimist says: "It can't happen to us. We will be saved by the NPO — normative political override." The realist would say — at Sacramento, we think that we are realists: — "Perhaps this is an opportunity. Perhaps we can engage in some privatization through our incubation process. Let's bring on industries where we have unique capabilities. We'd then have capability not only for defense use, but also for private use as well. It maintains and enhances not only our national defense, but also the industrial base that will be so critical for us to sustain a war once the horn goes off."

We also have a fairly sizable interservicing effort. You heard General Yates mention that we are proceeding at the speed of light in that arena, but we have already captured quite a bit of the interservicing market.

Dual use is the notion that I want to advance even further. Under the dual use concept that was so eloquently briefed by General Paul, there are lots of opportunities to not only incubate new industries, but to also enhance our national defense posture. That's what I want to talk about during the bulk of the briefing.



One Approach The Depot Dual Use Concept

- Depot Dual Use addresses both the national defense needs and domestic economy needs - beyond technology transfer
- Depot Infrastructure has both military and non-military applications
 - Lowers the cost to the war fighters quickly
 - Serves the public interest
 - Maintains military capability
 - Enhances the community



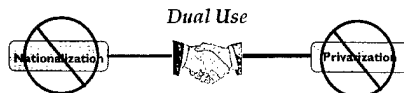
When we talk about dual use from an operational concept, we think in terms of national defense needs and the domestic economy. It goes well beyond technology transfer. We are moving from an operational environment to a private environment in terms of operational technology transfer. It serves us no use to win the Cold War and lose the domestic economic war. We have to be concerned about the total strength of this nation, which also includes economic security. The underpinning of national security is economic security. Our dual use concept actually reduces costs for the war fighter.

We have a tremendous amount of overhead in nonproductive plants and facilities. As we begin to share technology and facilities, it actually lowers the cost for the war fighter. It also serves the public interest by maintaining our military capability while it enhances the community as a side benefit.



Depot Dual Use Concept Constraints

- Noninterference - Activities will not interfere with the military mission
- Use of unique capabilities - Applications will not compete with private sector sources
- Public Interest - Activities must support the public interest



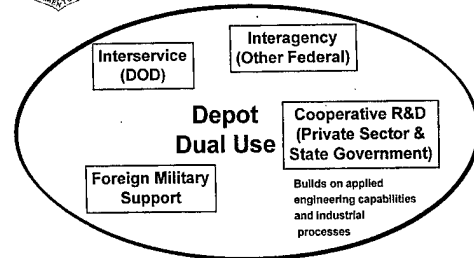
Obviously there are constraints. First, technology must not interfere with our military mission. Foremost, the depots exist to support deterrence, and if deterrence fails, to help render a swift and decisive victory. That must be our primary focus.

We also must make sure as we begin to engage in dual use technology and incubating industries, that we at the depots are not in competition with private sources. That's a very critical point. We must also make sure that as we begin to incubate industries and transfer technology under the dual use approach, that our efforts support the public interest and that it not be done for private gain.

General Yates has been very specific — we will not engage in the nationalization of industry. We will not engage in privatization of our tax-funded facilities — the depots. So when we talk dual use, we are really talking about a sharing arrangement — a partnership in which we are not competing with an existing source.



Depot Dual Use Current Focus



Our current focus is in a number of areas. In addition to the interservicing arena, we are heavily involved in the foreign military sales. We are also getting more involved in the interagency arena — working closely with the Federal Aviation Administration and the Department of Energy. In particular, we are heavily involved in the cooperative research and development area — CRDA. We are using our applied engineering capabilities to enhance the industrial base and support national defense.



Dual Use Highlights... Interservice/Interagency

- Navy F-14 CAD/C
- Marine vehicle transmissions
- NASA T-38 radomes
- Army radar
- Army gyros and indicators
- Army electro optics/night vision
- Army communication systems - AN/TRC-170
- Army fighting vehicle electronics
- Army TMDE/RADIAC
- Navy ship based beacon - AN/SRN-15A
- USDA Forest Service - State fire fighting ex-military aircraft components

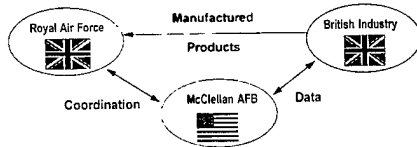


Already we are successfully involved in a number of interservice/interagency dual use projects. We're maintaining the Navy's central air data computer (CADC) for its F-14 fighters, transmissions for Marine vehicles, radomes for NASA T-38s, numerous Army electronic components, and we are supporting the fire fighting aircraft of the U.S. Department of Agriculture's Forest Service.



Dual Use Highlights... Royal Air Force/British Industry Microelectronics Obsolescence

- Nimrod and Sentry Aircraft Data Link II Module redesign using VHDL
 - International CALS demonstration project
 - Using logistics retrofit engineering process



In one instance, we used our microelectronics capabilities to solve a problem of obsolescence. I mentioned earlier that many of our systems are approaching that geriatric phase of the reliability curve. Therefore, a lot of the original manufacturers are no longer in business even though we still need a capability. So, through our retrofit engineering process, we have actually been able to update systems where necessary or provide a procurement package to industry in order to modify, maintain or enhance systems that are no longer in production. As an example, we used our very high speed integrated circuit hardware description language — VHDL — in coordination with the Royal Air Force. We provided a repurchase package to a British industry which manufactured the "widget," a data link module used in the Nimrod and the Sentry aircraft. It was completed in seven months. VHDL is not only a defense standard, but an industry standard as well. Through using this particular hardware descriptive language, we were able to provide a Compact Disk-Read Only Memory (CD-ROM) system to the British and they were able to produce the needed parts.

Our retrofit engineering process is fairly



Logistics Retrofit Engineering

Analysis

- Data Search
- Reverse Engineering
- Failure Mode Inspection
- Photomosaic Compilation

Prototyping

- Microcircuits & Boards



Design

- Conceptual Design
- Simulation
- Synthesis
- Timing Analysis
- Layout



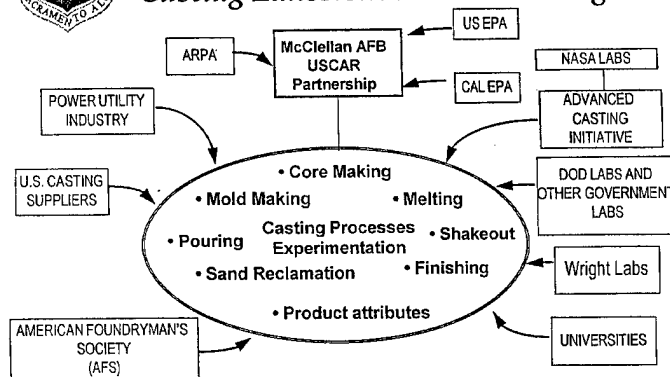
Testing

- Digital and Analog Testing

simple. We start with an analysis of the needed parts which includes the preparation of a functional description and a failure mode inspection. We then move to the design phase in which we actually do simulations, synthesis, and an actual layout. Next, we develop a physical representation through the prototyping process, and proceed through testing. We test from the chip to the board and from the subsystem on up through the complete system. That testing process results in a complete package with all of the documentation, which we hand over to a competing industry for them to produce the needed part. If no bids are received, we will produce the part if it has only defense applications.



Dual Use Highlights... Casting Emissions Reduction Program



Objective is a cost effective, near zero emission foundry

Another dual use initiative is in the area of casting emission reduction. Why are we in the business of reducing casting emissions? The Department of Defense is heavily dependent upon castings. It is no secret that we have lost more than 300,000 jobs over the last 10

years because our casting foundries simply didn't meet the pollution standards. Therefore, we need to recapture that market. A lot of the research that we are doing is not economically feasible for private industry to do. We've taken it upon ourselves to provide the castings we need, and we have the support of several other agencies including the power utility industry and the American Foundryman Society. We're working with the Wright Laboratories to come up with a process that models the foundry process — core making, melting, and shake out — and describes all of the product attributes.

This is a five-year project. What we hope to develop is a casting emissions model that identifies the sources of pollution and identifies new processes and technologies that will reduce this process to near zero. I am not so optimistic as to believe that we will ever reach zero, but I believe we can certainly approach zero with new technologies and new processes.



Casting Emissions Reduction Program

- Compile comprehensive data base related to 189 EPA hazardous air pollutants
 - Identify known cause & effects
 - Identify questionable or needed data
- Establish fully controlled and instrumented pilot foundry
 - Individual source control and sample collection
 - Warm-up capability for faster steady state
 - Aluminum and iron capability
- Baseline process and experiment
 - 4 cylinder engine block castings
- Measure casting and emission effects
 - Determine optimum process
- Other applications:
 - Near net shaped parts
 - Rapid first article

Our first step is to identify the 189 EPA hazardous air pollutants. The number will probably grow. In 1977, we only had seven EPA-identified pollutants. You can see the trend. We are going to come up with a fully-controlled and instrumented pilot foundry. We are well on the way to doing that. We're trying to identify the various processes and the materials that result in pollutants. The proof in the pudding will be when we produce a four-cylinder aluminum engine block.

Another project we're involved in is an electric vehicle partnership. In California, we are being forced to comply with rigid air

quality standards. By 1999, we must have a pollution-free vehicle. We teamed up with the Sacramento Municipal Utility District to co-produce electric vehicles.



Dual Use Highlights... Electric Vehicle Partnership

- Local Utility and McClellan AFB joint venture
 - Apply and demonstrate Electric Vehicle technologies
 - Address DOD fleet needs at California Bases
 - Convert base fleet to zero emission by 2000
 - Share expertise and resources
- Currently underway
 - Base vehicles at:
 - » McClellan AFB
 - » Travis AFB
 - » Lemoore NAS



– Composite application to electric vehicles

What do we bring to the table? We are the system manager for the stealth fighter which employs light-weight structural composites. We found that composites provide a very durable structure and lightweight structure. At present, batteries are the major barrier to the production of an efficient electric vehicle. Present batteries are simply too heavy. Our composites technology had great application here. So, not only are we helping the Air Force to meet the California standards, but we can also explore and export our composites technology.



Composite Application to Electric Vehicles

- Digitized 3D data collected using SM-ALC Coordinate Measurement Machine
- Computer model basis of subsequent structural analysis and crash worthiness assessment



We are using several other technologies in support of producing an electric vehicle. We are using our coordinate measurement machines to come up with a computerized model for use in structural analysis and in determining crash worthiness. We've found that composites are very crash worthy. Things will hit composite vehicles and just bounce off. We are concerned that the person might be decapitated because of the sudden jolt, but certainly the car will maintain its integrity.



Dual Use Technologies Composites For Infrastructure

- California Highway Infrastructure
 - In Need Of Upgrade Against Earthquakes & Aging
- Air Force Advanced Composites Program Office
 - Advising California State Department Of Transportation's (CALTRANS) Composite Column Retrofit Program

Without Wrap

With Wrap



Photos
Courtesy Of
CALTRANS

We have also used dual use to assist Southern California in recovering from the recent earthquakes. I mentioned that we are a center of excellence for composites. We were asked to team up with the California Department of Transportation to find a way to reinforce the earthquake-damaged bridge columns. We did that by building composite collars for the columns. Our experience in this project has not only enhanced our knowledge of aircraft battle damage repair, but it has supported the rebuilding of southern California. We've been working this project in concert with General Paul's people in the materials lab. This technology has quite a potential for commercial application.



Dual Use Technologies Composites For Infrastructure

Cooperative Research & Development Agreement Negotiated

- | | |
|--------------------------------|--|
| • McClellan Provides: | • CALTRANS Provides: |
| - Material Spec | - Open Environment To Test ABDR Techniques |
| - Manufacturing Procedures | - Large Area Application |
| - Testing & Inspection Methods | |
| - Structural Analysis | |
| - Field Support | |

Implementation Based On CALTRANS Completion Of Statement of Work

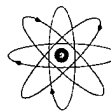
We provided the California Department of Transportation with the material specifications and the manufacturing procedures. This provides us with an open environment for actually testing the proof of concept for aircraft battle damage repairs. It is another win-win situation. As General Paul said so eloquently, the dual use initiative is win-win for national defense and the industrial economy as well. I am really excited about the notion of technology transfer and dual use.

Another application is somewhat unique. We have the only source of neutron radiography on the West Coast. There is a facility similar to ours at the Massachusetts Institute of Technology on the East Coast. We have used our facility to study such things as hydrogen embrittlement in titanium engines. It is very difficult to identify the amount of hydrogen in titanium blades, but we are able to with neutron radiography. I often describe n-ray as one step above X-ray. X-ray will identify a lesion and it will identify corrosion once it has become visible. The N-ray is so finite in its definition, that it will identify both conditions at the onset. It will identify the hydrogen ion proper. We're using the technology in several areas. The first is in neutron-captured tomography.



Dual Use Highlights... Technology Transfer

- Reactor applications:
 - Neutron Computer-Aided Tomography
 - University of California at Santa Barbara
 - Boron-Neutron Capture Therapy
 - University of California at Davis

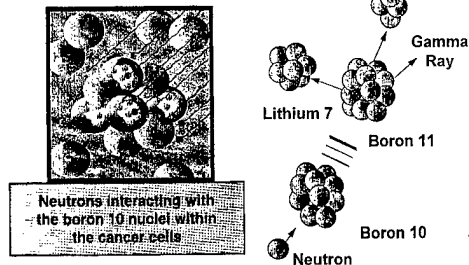


In the past, the X-ray provided a three dimensional picture which was collapsed into a two-dimensional picture. In the process, it lost fidelity. In the medical arena they overcame that by using the magnetic resonance indicator (MRI). Well, the MRI is quite good, however, it does not give near the fidelity of the n-ray. So, we have been able to provide our n-ray facility for computer-aided tomography. General Paul showed you a typical mammogram. That fidelity gives you the earliest detection of the onset of tumors or cancers. In concert with the University of California, Davis, we've taken it a step farther using what we call boron-neutron capture.

We use a neutron source at McClellan. Boron tin happens to be a neutron-capture agent and when the subject is injected with boron tin, it concentrates in the tumor area. We then put the person in the beam of the n-ray. That beam gives off a tertiary particle,



Boron Neutron Capture Therapy



called an alpha particle, which is lethal in terms of treating the tumor. Boron neutron capture has been around for about 20 years; however, we have not used it here in the United States. The Japanese have used it very successfully. We have now recognized that perhaps it has some relevance, and our neutron source at McClellan is being used in concert with UC-Davis to treat what were inoperable tumors.



Dual Use Highlights... Environmental Technologies

- Enabling partnerships:
 - Environmental Process Improvement Center (EPIC)
 - Western Governors' Association
 - Clean Sites
- Successes:
 - Groundwater containment removed 41,000 lbs of VOCs over 6 years

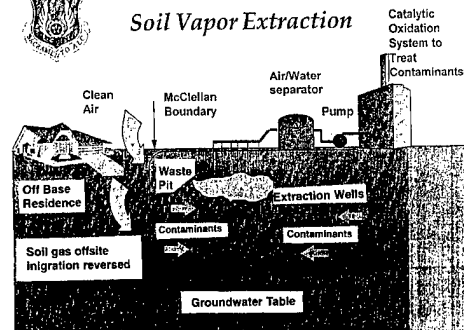
Soil vapor extraction removed 46,000 lbs of VOCs in 8 weeks



At McClellan, we've been heavily involved in the environmental clean-up. McClellan Air Force base opened in 1936 and we've been polluting ever since 1936. We were forced to begin cleaning up the environment about ten years ago when threatened by heavy fines. I'm firmly convinced that you can get a lot more done with a kind word and a fine than you can with a kind word alone. We decided to spend lots of money to clean up what potentially is a \$10 billion mess.



Soil Vapor Extraction



Through our old technology of filtering and cleaning ground water contaminants, we were able to remove about 41,000 pounds of volatile organic compounds in six years. With newer technologies like soil vapor extraction, we were able to remove 46,000 pounds of contaminants from the ground in eight weeks. We are exporting that technology for commercial application.



Conclusions

- Depots have application in dual use
 - Infrastructure has both military and non-military application
- Capabilities can support industry
 - Microelectronics reprourement packages
 - Unique capabilities for technology application
- Result: win-win

In conclusion, dual use certainly has application for national defense and the domestic economy as well. It is win-win for the industrial base and it supports where we are going in the national defense industry. As we provide reprourement packages for those industries that found it uneconomical to tool up for parts that may be needed on only a sporadic basis, we boost our national defense and, ultimately, America. That is the end of my sermon, thank you.

Question & Answer Session

Dual Use Technology

Panel:

Brig. Gen. Richard R. Paul

Director, Science & Technology, AFMC

Maj. Gen. John F. Phillips

Commander, Sacramento ALC

GENERAL HATCH: *Thank you, John. Could we ask you and Dick to come up and take a center seat for a few short questions? The first is a general question combining three or four different questions. If you are working both the government and the commercial side, how do you avoid compromises or losing something for the military requirement while you are trying to satisfy the commercial requirement? Have you thought ahead to that possibility and how do you draw those distinctions?*

MAJ. GEN. PHILLIPS: My entering constraint was that we must do it on non-interference basis. To the extent that we can provide a reprourement package and get a defined deliverable, a contractual deliverable, then we are satisfied that the contractor will provide the needed material that we need.

BRIG. GEN. PAUL: The only thing that I would add is that we want to work on the technology at a point short of the actual commercial application. We want to work together up to the point where an application goes one way or the other. Obviously, if an application goes commercial, we would not venture into it. Right now we are learning where that boundary is.

GENERAL HATCH: *Next we have a question from your industry partners in the audience. If they have a project that is a good candidate for dual use, how do they contact DoD or in our case the U.S. Air Force to pursue it?*

BRIG. GEN. PAUL: A place to start is a phone call to the TECH CONNECT hotline. They will put you in contact with organizations which actually work with you to co-develop the technology, or they will advise you on whom to contact. If it is within one of

our AFMC organizations, the Office of Research and Technology Application — ORTA — will hook you up with the right people.

GENERAL HATCH: *If patents come out of new technology, how do industry and the government share in the value received?*

BRIG. GEN. PAUL: Licensing agreements and royalties are worked out in any of the cooperative agreements. They are negotiated up front, and are usually done on a case-by-case basis. There have been recent changes to the law which have motivated our own laboratory people to participate. Previously, for any patents that our people held, the royalties or revenue went back to the U.S. Treasury. Now, under the new law, a percentage of those revenues can be paid to the inventor. The rest can go to that person's organization. So, for government employees, there is an added incentive for them to get involved.

MAJ. GEN. PHILLIPS: In fact, we have such an example at McClellan in the freon area and we are actually sharing in the economic benefits.

GENERAL HATCH: *There's been recent discussion of government funding of an effort to develop a flat-screen display industry. How do you view such efforts from an Air Force perspective? Would you participate?*

BRIG. GEN. PAUL: We're very interested in the development of flat-screen displays, and this is an area where we do not have an organic competitive capability right now. This is one of these ideas that falls under Title III of the U.S. Code. The question is whether we should develop a national capability in this area, and if so, are we looking for government help to give the U.S. that kind of capability? Flat panel displays are essential to our future

warfighting capability.

GENERAL HATCH: *Here is a question about another example. I saw the technology at Sacramento, John. It is what you call the world's largest CAT scan, that \$36 million installation of an articulated arm for corrosion control of aircraft. I know that commercial industry and the Japanese are interested in it. Have you continued to work that one?*

MAJ. GEN. PHILLIPS: Yes, we currently have pending a \$250 million request from the Federal Aviation Administration for us to do neutron radiography on general aviation aircraft which used to be physically inspected. They are concerned with the average age of 37 years for the general aviation fleet, and that there may be structural integrity problems which are not detectable to the naked eye. We are currently negotiating with FAA to do that kind of work for them. We have not advanced any efforts with the Japanese.

GENERAL HATCH: *As a follow up to that, is there any multi-national technology transfer and does dual use means U.S. only or do you have any multi-national efforts?*

BRIG. GEN. PAUL: Our focus to date has been only within the U.S. This is new ground and it has ramifications for companies in the U.S. which are owned by multi-national agencies. Our purpose is to promote U.S. economic competitiveness.

MAJ. GEN. PHILLIPS: I agree with that. I would add that we have been able to learn just a bit from the Australians and their service life extension programs. They will extend the operation life of the F-111 to the year 2020 and they have been working on integrity programs that may have some application to our work.

GENERAL HATCH: *Once again, thanks to you both for the two very interesting presentations. We thank you for being with us.*

Acquisition Reform

Panel: **Mrs. Colleen A. Preston**
 Deputy Under Secretary of Defense
 (Acquisition Reform)
 Brig. Gen. (S) Timothy P. Malishenko
 Director for Contracting, AFMC

General Hatch: This afternoon we tackle another interesting topic, acquisition reform. With Dr. Perry [Honorable William J. Perry] as the Secretary of Defense and Mr. Deutch [Honorable John M. Deutch] as Deputy Secretary, we have a unique opportunity to focus Defense Department leadership on this subject. The Administration deserves a kudo for creating the position of Deputy Under Secretary of Defense for Acquisition Reform. Joining us is Mrs. Colleen A. Preston who holds that position.

Mrs. Colleen A. Preston: What I hope to do today is to briefly cover the context in which we are doing acquisition reform and then to update you on where we are in our efforts.

You have heard many times before that we are facing new national security challenges in the political, the economic and the military arenas. We have a radically changed threat. We're not sure what our needed military capability may be tomorrow. We have a declining defense budget. We can no longer afford to support a defense unique industrial base.

We have had radical changes in technology development to the point where most technology development — state of the art technology development — is occurring in the private sector, not financed by the Department of Defense as had occurred for many years.

Given today's environment, how are we going to meet those national security challenges? First of all, in order to maintain our military technological superiority, we must rely on a globally competitive national industrial base — composed of defense unique companies, commercial companies and dual use suppliers. We must reduce our acquisi-

tion costs, both the internal costs within the government and the costs of our contractors, and the overhead that we absorb as we purchase supplies. We must be able to rapidly procure commercial and other state of the art products and technology. We must be able to assist in the conversion of defense unique facilities to dual use production. We must aid in the transfer of military technology to the commercial sector. And, we must preserve our defense unique core capabilities.

The system is so overloaded and cumbersome that it is no longer responsive to our customer needs....There are so many hand offs that errors and waiting time dominate the system. We have, in essence, an industrial era bureaucracy in an information age.

We know today that our acquisition system is not capable of responding to those needs. Our system is characterized by a complex web of laws and regulations that were adopted for laudable reasons. However, in the past, our acquisition reform efforts hung up because we did not address the reasons why these provisions were adopted. Think about it.

We have legislation to ensure that the acquisition process is fair to every participant in the process. We have rules and regulations to ensure that there is no fraud, waste and abuse. To ensure that the government received a fair and reasonable price, we have cost and pricing data requirements. As a check on the government's authority and its

demands upon suppliers, we have a law that precludes, in certain circumstances, the use of fixed-price contracts in research and development. We also have provisions that will further the socio-economic goals of this nation.

As a whole, there are tremendous barriers to the acquisition of commercial items. Government-unique laws and regulations are applied not only to prime contractors but also to subs. We have DoD requirements and budgets that fluctuate significantly. Companies see that doing business with the government is risky at best. Not only are they concerned about the market and the stability of the market, but they have to worry that if they don't meet a contractual requirement, not only are they subject to whatever damages they would face in the commercial marketplace, but also potential civil and criminal penalties as well.

The result is obvious. In toto, the system is so overloaded and cumbersome that it is no longer responsive to our customer needs. We have organizations, legislation, policies, and regs that lack flexibility and agility. There are few incentives to take risks. There is no one person accountable for the entire process. There are so many hand offs that errors and waiting time dominate the system.

We have, in essence, an industrial era bureaucracy in an information age. General Yates mentioned this in his keynote speech. Dr. Perry, Mr. Deutch and I believe that we must totally realign and reengineer our acquisition process. We can no longer deal with the system that was designed for an industrial era with the rigid lines of authority, reporting, rules and practices that address every contingency.

So, what do we hope to accomplish? We want to fundamentally reengineer the acquisition system. Why do we have to do that? The existing system can't sufficiently evolve to meet our customers' needs. It just will not work. We are through tinkering around the edges.

We still believe continuous process improvement is not only necessary but will continue. However, we are to a point where that alone will not get us to where we need to be in the not too distant future. We have to reengineer and then start from that new base

and continue our efforts to constantly improve the system.

We, in short, must integrate, broaden and maintain a national industrial base sustained primarily by commercial demand. We must remove requirements uniquely imposed on federal contractors to the maximum extent practicable. And, we must adopt business processes that are characteristic of world-class customers and suppliers.

Having said that, let me assure you there is no one suggesting that we wholesale delete all the safeguards that have been placed in the system over the years. It would be ludicrous to try and sell that approach on the Hill since we have to justify every single change we're making. We have to justify any change in terms of how it will meet the needs that were originally identified and the reasons those provisions were adopted in the first place. We're not suggesting either that there be a wholesale removal of the socio-economic provisions that we have decided as a nation are important to include in our procurement process.

We, in short, must integrate, broaden and maintain a national industrial base sustained primarily by commercial demand. We must remove requirements uniquely imposed on federal contractors to the maximum extent practicable. And, we must adopt business processes that are characteristic of world-class customers and suppliers.

But, we've come to a point where we must have a balancing of interests. The risk of fraud, waste and abuse has to be balanced against the costs incurred to ensure that the system is perfect and that no one takes advantage of the government. The socio-economic goals we hope to achieve may become so costly that not only are we not achieving the goals, but we are taking away from efforts to

work them in a more reasonable and productive sense. We may have put our efforts over such a large expanse of contracts that we are not making a difference and we are not, in effect, achieving the goals that we set up.

So how are we going to reengineer the acquisition system? We've decided to look at acquisition in terms of an overall framework of how we buy, what we buy and under what terms and conditions we buy. First, for the "what" DoD buys, we must look at the requirements determination and resource allocation process. I say that in one breath because that's really where the problem lies. We have to look at the convergence of two issues: one is the determination of a need for a military capability and the other is the costs, schedule and performance risks associated with a given particular solution. We have to look at the budget constraints that we're going to face. And, we have to come up with a solution in the future that will constantly evolve.

If we can't stabilize our determination of needed military capability, and figure out a new way to deal with evolving solutions by using the new technologies that we have in modeling and simulation, then we're never going to have stability in programs.

A military need or military capability is fairly stable even in today's environment. Yet, we have to be ready to change that determination of need as the times change and our environment changes. And, those areas that are very unstable — the proposed solutions to a needed military capability — will be more so in the future. That's where we require that balancing test and a determination of whether or not we're going to fulfill that need only 85 percent of the way. For example, for lift requirements, whether we're going to trade off airlift for sealift capabilities.

So, looking at the requirements determi-

nation process is a key to everything else we do in the major systems acquisition process. If we can't stabilize our determination of needed military capability, and figure out a new way to deal with evolving solutions by using the new technologies that we have in modeling and simulation, then we're never going to have stability in programs. If we don't, we're going to continue to allow the comptroller to rule our lives through budget decisions that are not based, necessarily, on these parameters.

We're going to look at "how" we buy. We want to look at the entire milestone decision-making process for major weapons systems from start to finish. And, we're going to do it with a clean sheet approach as you would in any other reengineering task. We'll start with: What do managers from both the services and OSD need? What information do they need to be able to ascertain whether or not that program is working? What information do they need to revalidate whether a solution is the correct solution to that needed military capability? We're going to start with a clean sheet of paper and look at the DAB [Defense Acquisition Board] process from start to finish. We'll try to define what it is we need to accomplish with that system, then look at what is out there in terms of mechanisms to get the information and decide which we want to maintain and what new things we need to look at.

Under what terms and conditions will the system operate? If we are intending to truly rely on a commercial marketplace, we are going to have to do business in the commercial marketplace under the terms and conditions that commercial companies are willing to sell to us. In the past, DoD has been a very significant purchaser. We have been able to use our leverage in the marketplace to impose demands and requirements upon suppliers. We no longer are going to be able to do so. In 1965, DoD accounted for over 75 percent of the purchases of semiconductors in this country. In 1995, the projection is that we will account for less than one percent. If anybody thinks that we can dictate to the semiconductor industry how they're going to do business with us, we've got lots of things we can sell to you as well.

We're going to look at "how" we buy. We want to look at the entire milestone decision-making process for major weapons systems from start to finish. And, we're going to do it with a clean sheet approach as you would in any other reengineering task.

The bottom line is this: We have to start thinking in new and different ways. We set out this year to take advantage of the Section 800 recommendations because that panel, for the first time, of all the acquisition reform commissions or groups, justified what it was they thought needed to be changed and they proposed solutions to change that would address the fundamental underlying reasons why those provisions were adopted. We utilized the work of a Section 800 panel and spent a very long time working out a DoD position on those recommendations -- all 300 recommendations in over 1,800 pages of the report. We came up with a DoD bill, presented it to the Administration, then worked with the Administration and with the National Performance Review Group under Vice President Gore to come up with an Administration-wide, government-wide proposal. About that same time, the Senate completed its work on S-1587, the Glenn-Nunn bill which is patterned after the Section 800 recommendations. The Administration made a decision not to introduce a separate bill, but to work off of the House and Senate bills that already existed.

As a point of emphasis, we said that our near-term priorities were: increasing the simplified acquisition threshold from \$25,000 to \$100,000; increasing our ability to acquire commercial products and commercial state of the art technology; and adopting waivers for pilot programs that would authorize us to purchase commercial-like items even though they are military unique and would not necessarily fit the definition of a commercial item.

I'm sure most of you are familiar with our

pilot programs. It took us a lot longer to get coordination through the administration clearance process than anticipated. Starting from the baseline of removing every government-unique law or regulation in order to do business with commercial customers under their terms and conditions, you can imagine what we ran up against in terms of the legislative effort. When we sent our pilot package over to the OMB for clearance the first time, we had one agency that said "no comment," and we received non-concurrences from every other agency within the government. Not surprisingly, I might add, because we picked on everyone's pet projects. That's the nature of this game.

If these changes were easy, they would have been made a long time ago. But we're talking changes in the Davis-Bacon Act, changes in the Buy American Act, and waivers for the Cargo Preference Act. I could go on and on. It was amazing to me how many different organizations both within and outside government had an interest in these provisions.

So, we're fighting that battle on the Hill right now. S-1587 was marked up in the Senate Armed Services and Governmental Affairs Committee about a week and a half ago. We are awaiting the report on the bill. It was referred for 20 days to the Small Business Committee, but we hope to have it reported out and on the floor before the Memorial Day recess.

The House also acted on its bill, a bill that the Government Operations Committee had reported out of committee almost a year ago and the House Armed Services Committee reported out two weeks ago. Actually, they didn't order it reported. They marked up the bill and did not order it reported because there is a disagreement about the number of conferees that each committee would have, and whether or not there would be an equal number of conferees from the House Armed Services Committee as from the House Government Operations Committee. To get that resolved, we have gone to such lengths as to have Dr. Perry speak with Speaker Foley on the airplane to President Nixon's funeral. We have pulled out everything we could to try and get that issue resolved — without success

so far. But, the Vice President has called; the SECDEF has called; and we hope to have resolution soon. Once that happens, we'll have a House bill and then we'll have to go into conference.

When you see these bills, you will see that nothing ever comes for free. We are getting a lot of the changes that we wanted; we are negotiating with both the House and Senate on a daily basis. But, in many respects, for every one step forward we take in terms of streamlining, we are faced with a new and additional provision that Congress is trying to impose to resolve another issue or problem that they see. There is going to be a lot of work to be done in conference, and hopefully, we are going to end up with a bill that is less than 300 pages long. Somehow, it strikes me that you can't have a streamlining bill that is over 300 pages in length.

We have not been sitting still within the department during this time, although I admit the legislative effort has really dwarfed anything else we've been able to do. It's been a consuming 16 to 18 hour day operation.

But, we have had two very successful process action teams. And, since that is how we intend to achieve the rest of the reforms that we are working, I am very pleased to see what these teams have done. We are now finalizing what the additional process actions teams will focus on. The two current teams are our "Electronic Commerce and Electronic Data Interchange" team and our "Specs and Standards" team.

Let me talk first about "Specs and Standards." There have been a lot of rumors as to what we were doing and what the process action team would come out with. Let me just say that we hope to have the report released next week. You can take it as a given that there will be a change in the presumption from the use of military specifications to that of performance specifications or non-governmental specifications. That does not mean people will be precluded from using military specifications. Again, it will be a change in presumption. But the team did exactly what they were asked to do, that is, not study the problem, but develop an implementation plan that would get us from here to there. They have done a fabulous job, and there are a lot of

concrete steps that DoD is going to have to take as a whole. We are going to need the support of everyone in this room. With a clear action plan and I believe that's what we have, we can get there.

There are many people, including our EC/EDI process action team leader, Dee Smith, who have worked continuously to get these efforts off the ground. The EC/EDI [Electronic Commerce/Electronic Data Interchange] team — another team that worked almost around the clock for over 90 days — came up with a plan that would implement an EC/EDI system throughout DoD. They used the basic contract writing systems already in place, decided on an EC/EDI capability that we could standardize on throughout the Department of Defense and could provide one interface with industry — one entry point that will allow you to bid as a contractor against a requirement at Wright-Patterson [AFB, Ohio] and at the same time at Jacksonville Naval Air Station [Fla.]

We believe that this is critical in terms of selling Congress on the increase in the simplified acquisition threshold. Because, unless we can give people notice, a firm time during which their bids will be considered, and a guarantee that everyone who submits a bid within that period of time will be considered, we are not going to convince them to raise that small purchase threshold to \$100,000. And, you are aware that none of those three factors are guaranteed using the existing small purchase procedures. That is our fundamental stumbling block.

Right now we have Congress trying to not increase the threshold until after we get the EC/EDI capability in. We're trying to unlink the two, but there is no doubt that we're ultimately going to have some linkage. The problem is that the rest of the government isn't as far along as we are. Because of this process action team, we have just made leaps and bounds.

One of the pleasant parts of my job is that today I get to participate at Columbus, Ohio, in a ribbon-cutting ceremony to recognize the first application of our contracting transactions with the new Mega-center in Columbus.

Tremendous things are being done out there. Those who say that you can't reengineer

Reengineering the Industrial Base

a system from within, and you can't change a culture from within, are absolutely wrong. So far, we've had two process action teams that are perfect models of that change. They have shown that people want change, and they know what to do. Given the opportunity to make the system work the way they believe it should, they can come up with those characteristics. Thank you very much and I'll be happy to answer any questions later.

General Hatch: Thank you, Colleen. Assisting Mrs. Preston in this panel effort is Brigadier General [select] Timothy P. Malishenko. He's the Director of Contracts at AFMC [Air Force Materiel Command]. Please help me welcome General Malishenko.

Brig. Gen. (S) Malishenko: Thank you very much. It's my pleasure to be here this afternoon to be on the panel with Ms. Preston and to talk about not only acquisition reform but the reengineering processes.

I just have a few comments about acquisition reform, then I want to talk about reengineering processes and finally will give three examples where we're currently working on redesigning processes.



OVERVIEW

- Acquisition Reform Perspective
- Reengineering Processes
- Summary

Of course, we've started with the focus on the product — the output — that's going to serve our customers. That is what we really need to be concerned about. If we're not focusing on product, then we're just simply not doing the job.



ACQUISITION REFORM PERSPECTIVE

PK

- Focus on our product - providing first class, best value supplies and services to our customers
- The challenge - balancing risk with reducing oversight
- Tradeoff:
 - Consistency vs Flexibility
 - Guiding Principles vs Directive Policy
- Waiting for legislative acquisition reform is not an excuse

As was mentioned, this whole idea about balancing risk with reduced oversight is a tremendous challenge. Congress does not really want to eliminate the checks and balances and the oversights that exist. It's only by demonstrating that we are in control and are balancing the risks and having appropriate checks and balances that Congress will give us further latitude.

Let me also comment about "consistency" versus "flexibility." When we talk to industry, one of the great complaints is that from service to service, or even within the Air Force from product center to product center, there is a fair amount of variation. They don't like that variation. Well, I can guarantee that with more flexibility at the contracting officer level you're going to see more variation in the way people do business. I ask the question: "How ready is industry going to be to accept that kind of variation?"

We went through a great exercise removing nonstandard clauses, removing clauses that were specific to services, to a particular product or to specific logistics centers. Those are gone. We could very well be moving to where more flexibility means more nonstandard clauses.

Similarly, there is a concern over the FAR [Federal Acquisition Regulation] being written based upon guiding principles rather than as directive policy. Legislation was passed with respect to fixed-priced development contracts, but in the ordinary course of events within the Department of Defense, if we wanted to influence the action of all services and contracting officers and program managers, we would establish — within the 5000 Series of regulations or within the FAR

— directions not to use fixed priced development contracts over \$25 million. And, if you want any exception, you must have a certain level of management approval.

The FAR is what we use to institute a lot of the changes in our business practices. If we move to only using guiding principles and not giving prescriptive policy, then again we will have variation. Then, do you market the policy and plead for contracting officers to do that as opposed to putting out directive policy? We really need to think our way through the steps of how we manage the acquisition process.

Finally, at times acquisition reform is used as an excuse for inaction. It becomes a mantra of "It's not my fault," "I can't do it," "It's legislation, and, therefore, I don't have any ability to change or influence what's going on." Well, that is simply not true. There is a lot within our control. That is what I want to talk about.



REENGINEERED PROCESSES

- Must be integrated product focus
- Need cross functional and industry redesign input
- Must take advantage of information technology
- Get away from serial process

*Reengineered process must serve
IWSM and IPD*

In this whole area of reengineering processes, there's a couple of points to be made. First, the word integrated is thrown around a lot. But, I stand here as the head of a functional stovepipe and often the slings and arrows are thrown in our direction. To the extent that we look at processes in a narrow, functional way, we will have limited success in improving processes and the way we're doing business. We have to be integrated with our program management, financial management, and with a whole array of functions that are needed to get the day-to-day job done. That leads us to cross-functional teams and redesigning processes, and working with industry partners.

There is great leverage in information technology. We must take advantage of the

redesign of the corporate information management process to leverage this information technology.

Finally, serial process — hand off from one to another — is inefficient and is not the way to do business. In the end, we must serve IWSM [Integrated Weapon System Management]. By IWSM, I mean the single manager and the integration of both program and logistics support. Within what we call integrated product development, we look at source selection and requests for proposals and how we evaluate past performance. All have to be integral.



REENGINEERING PROCESSES

- EC/EDI (Electronic Commerce/Electronic Data Interchange)
- Contract Closeout
- Past Performance

I want to talk about three examples in terms of reengineering processes. These particular areas go to the core of what we're doing.

Ms. Preston talked about one of the first successful PATs which was a thorough look at the EC/EDI [Electronic Commerce/Electronic Data Interchange].



EC/EDI

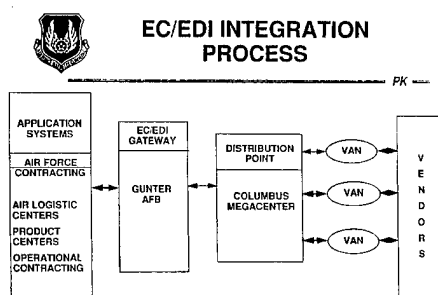
- July 93 - DOD EC in Contracting PAT
- Dec 93 - Report issued
- Jan 94 - OSD directed implementation
- Apr 94 - Funding kick-off
- Air Force Plan
 - 13 sites start-up by July 94
 - 98 sites over 2 years

AFMC is MOVING OUT !!!

In April, we received initial funding and now we're implementing at 13 different sites. Initially, those 13 Air Force sites include our five logistics centers, the central or commodities kind of buying, and also five operational contracting sites — at the installation level of those five ALCs, and three other sites, Peterson

Reengineering the Industrial Base

Air Force Base [Colo.], Randolph AFB [Texas] and Quantico [Marine Base, Va.]. Did the Air Force take over Quantico? No, we don't own it, but the Marines use the Air Force contracting system for business. By including Space Command at Peterson, Air Education and Training Command at Randolph, and then Quantico — the Marines, a non-Air Force user — we get a good spectrum for our initial test cases.



We have a specific flow for contracting EDI transactions. This afternoon we are going to open the Mega-center which stands in the middle of the system as a distribution point. The process starts at the logistics center level, at the product centers, where we will be doing this and also at the operational contracting or installation level. We will be going through a single gateway — electronic connection at Gunter Air Force Base [Ala.] — which then goes through the Mega-center at Columbus. There is a back up that will exist at Ogden, but our primary will be at Columbus. We will then go out through the value-added networks, using the standard transaction sets that will look the same to everybody and finally out to all of industry and the vendors and the small businesses.

We have run the test cases, the RFQs [Request for Quote], through this transaction, and it's worked successfully. We are progressively working our way through the various transaction sets — be they RFP [Request for Proposal], be they quotes, be they modifications — in order to validate that the system is working. Over time, we're going to be increasing that functionality.

There are lots of issues that come up in this whole EC/EDI process to get things to work. We are starting with a master solici-

tion and we're using an Air Force-like solicitation to get on line. It will be the same Air Force-wide. It'll be on the NET so contractors can look it up. It'll be a standard solicitation that exists for all of those electronic transactions.



EC/EDI ISSUES

- Establish Infrastructure and Develop Applications
 - Master solicitation - AF interim is in final review
 - Software development and testing is complete
 - Pursue incremental improvement of functionality
- Complete Government Workforce Training
 - Application software training started 18 April 94
 - Buyer/contractor training is a critical step
- Complete Vendor/Industry Conferences
- EC/EDI Policy Issues - lots of new issues e.g.
 - Contracting officer warrants
 - Vendor registration and performance

Our software development and testing has been completed. Now we're moving on to the training phase. In April, we started the software training with about 45 of our folks training at our contracting lab in Ogden [Utah]. Right now we have training programs going on at the buyer level. Initially, it is a train-the-trainers effort so they will understand how to use this new tool and then they can go back to the local level.

Training is going to be a great challenge for us. I can guarantee at the local levels that small businesses that are used to dealing with the paper process and not comfortable with computers are going to require us to care and feed them. With our "small business" folks setting up business opportunity centers, with education and vendor conferences on how they go about participating in this new technique called electronic commerce, we will lead them step-by-step through the process. If they get closed out of the process, they're going to quickly complain, and we'll get lots of congressionals and lots of "help." We have to go down this road together in order to make it successful.

Now, when you go through as radical a redesign of a process as you're going through here, there are going to be lots of issues that come up. Just the issue of contracting warrants is an interesting one for us. Right now when a buyer does a transaction and prepares all the paperwork, it goes to a contracting

officer who signs the order. Well, who does that electronically? If the buyer has done all of the work and is ready to go, we now send it off to somebody else just so they can push the final button? That means post-changing the way we structure current contracting warrants to one of limited warrants up to a certain dollar value. It affects our training. It affects certification. It affects lots of ways that we deal with the workforce. We're going to have to come to grips with all of these issues.

How will we accomplish vendor registration? Right now, we have about 800 contractors that we've registered with GATEC [Government Acquisition Through Electronic Commerce], our initial prototype. We're going to take advantage of those, but I think we'll end up with a single 1-800 phone number, one point for anybody in the nation to register and get on the system so they will in fact be able to receive the transactions. But there will be lots of other policy issues. For example, how do we measure past performance with respect to electronic commerce?

We are moving aggressively to implement EC/EDI, and we are enthusiastic. I think it will be in the July timeframe when we see these first sites activated at the local level. After July, I think we'll see a steady increase, and over the next two years we will eventually expand to 96 sites.

Next I want to talk about past performance. Steve Kelman, Director of the Office of Federal Procurement Policy, has made the point that day-to-day when we go down to a WalMart, a Meyers store or wherever, we apply value-based contracting using price and quality. We make those personal decisions in our everyday purchases. Industry does the same. We should expect no less from the government.



PAST PERFORMANCE

• Issue:

"...consideration of contractor past performance is a matter of 'common sense,' and is done routinely in the commercial world and everyday life." (61 FCR 129)

Steven Kelman, OFPP Administrator

This is just a little bit of the history on the policy going back to late '92, when the OFPP policy directive was issued. There has been a lot of public comment on this policy. We continue to work implementation within the FAR and we are moving steadily down that road. In addition, Steve Kelman proposed the idea of pledges, of getting commitments from the different agencies. In January, 20 agencies committed to using past performance as part of the evaluation on 62 different contracts. We in the Air Force are participating. In our source selections, I believe we've been doing value-based, past performance, in-source selection since the late 80s. But, we can build on this approach and expand it.



OFPP POLICY KEY DATES

- OFPP Past Performance Policy
 - Dec 91 -- Policy letter originally published for public comment
 - 30 Dec 92 -- Policy Letter 92-5 issued
 - 17 Feb 94 -- Proposed FAR Implementation published in Federal Register for public comment
 - 16 Apr 94 -- Public comments due
 - TBD -- FAR change published
- OFPP Pledge Program
 - 3 Dec 94 -- OFPP Use of PPI Pledge Program announced
 - 26 Jan 94 -- SAF/AQC formally signs PPI use pledge
 - 17 Feb 94 -- OFPP Collection of PPI Pledge Program announced

What are the key requirements in the policy letter? First, there is the issue of data. You simply can't apply past performance criteria if you don't have past performance information. So you must have evaluation systems. In a minute I'll be showing you how we've been addressing those issues.



OFPP POLICY OFPP POLICY LETTER 92-5

- All Federal Agencies **MUST**:
 - Prepare past performance evaluations on all contracts over \$100K
 - Use past performance information in responsibility determinations for all sealed bid and competitively negotiated procurements
 - Specify past performance as an evaluation factor for all competitively negotiated procurements expected to exceed \$100K
 - Allow newly established firms to compete for contracts without past performance history

As a second tool, you must use the data. Suggested ways include both responsibility determinations and also measures of any con-

Reengineering the Industrial Base

tract over a hundred thousand dollars within overall source selection, which really means we've got to collect data on all of our competitive actions over a hundred thousand dollars.

The final point is that we've got to make sure that the system is fair. So in the absence of data, we will presume goodness, will assume low risk and then track the information from there.



OFPP POLICY PPI COVERAGE MATRIX

	PM/S&IO	S&T	BOS	T&E
DEV/PROD*	SYS CPAR PRA	SYS CPAR (OPT) PRA	N/A	SYS CPAR PRA
MODS/PDM*	SYS CPAR PRA	N/A	N/A	SYS CPAR PRA
SERVICES*	SERV CPAR PRA	SERV CPAR PRA	GAP	SERV CPAR PRA
SPARES	BRP/VRS	N/A	N/A	N/A
6.1, 6.2, 6.3A	N/A	GAP	N/A	N/A
COMMODITIES (Operational)	N/A	N/A	GAP	N/A

*Actions below \$5M are not covered (GAP = \$100K - \$5M)

PRA - Performance Risk Assessment

KEY: OBTAIN PPI

USE PPI IN SS

Across the top of this chart are the mission element boards, which is the way the command is managed and how it deals with product management and our logistics side, and with science and technology. It covers our base operating support, our installation level, and then finally, test and evaluation. Down the left side of the chart are the different kinds of acquisitions. This matrix shows on the upper part of the diagonal line how we are obtaining past performance information and then, on the lower half, shows how we are in fact using the past performance information in source selection.

Out of this we identify three significant gaps. One is within service contracts under BOS [Base Operations Support], where we don't have a measuring system and therefore cannot use past performance as a criterion. In the 6.1 and 6.2 funding area in science and technology, where again, we do not have a system in place, and then finally, gaps in the whole commodities business at the operational level. So now we have initiatives in each of these areas to come up with systems for past performance measurement.



OFPP POLICY PPI GAP SCOPE

PK

- SMALL SYSTEM GAP
 - Issued 158 contracts in FY92
- SMALL SERVICES (NON BOS) GAP
 - Issued 367 Service/Repair contracts in FY92 (Includes PDMs)
- BASE OPERATING SUPPORT (BOS) GAPS
 - Commodities: 23 IFBs/106 RFPs issued in FY92
 - Services: 269 IFBs/138 RFPs issued in FY92
- SCIENCE & TECHNOLOGY GAP
 - Issued 284 S&T contracts in FY92
 - Issued 52 Management & Support service contracts in FY 92

We have also identified areas and levels of business where we have gaps in terms of the small vendor system and services. We did a test last year of service-based contractor performance assessment reviews (CPARs). We used the forms on actual test cases; we prepared them; we sent them out to industry; we received their comments back; we went through a simulated evaluation; and we obtained industry comments. Overall, we received a very positive response. We ultimately tore up those reports and destroyed them because it was only a test case. But, we are now instituting service CPARs. We have a way to go with respect to Science and Technology contracting and also at the base and operational support level.



AFMC / INTERAGENCY CONTRACT CLOSEOUT PAT

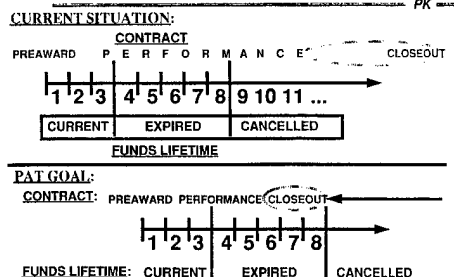
PK

- 15 Oct 92, AFMC/CC approved Interagency contract Closeout PAT Initiative
- Led by HQ AFMC/PKM - 50 member interagency/industry team
- 28 Feb 94, report issued
- None of the proposed changes require legislation

The final process redesign I want to talk about concerns a very large area. Public Law 101-510, what we call the "M-Account legislation," fundamentally altered the lifetime of appropriation. The result is we simply have to change the way we're running programs.



CONTRACT CLOSEOUT PAT SELECTED METRICS



This timeline really shows the issue. It involves the current situation, the time of three-year production current funds and five-year period as expired funds. After funds expired, we previously had an M-Account period that was authorized to pay for final contract settlement. We completed contract closeout in that time period and eventually when we closed the contract, we would pay the bills with the M-Account. Under the new law, after five years as expired funds, it moves to canceled status and that money is lost. This means we have to find the money in current accounts to pay for past bills.

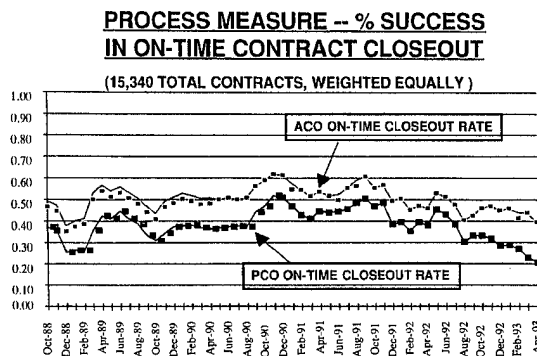
There is a much larger message here for all of our single managers and for industry. We've simply got to consider the lifeline of money when we plan our programs. If you plan programs that are going eight, nine or ten years, the money will be lost. You'll have to find the money again to pay the bills and we simply can't afford that. For every dollar that drops off the edge — that's been canceled — you've got to fund it with today's money. And, if you use today's money to pay old bills, it means new capability that you simply can't buy.

In the last six months of last year, our Air Force office in Albuquerque, which controls about a third of our Air Force contracts, identified some \$900 million that was going to be lost on September 30 and be canceled. We managed to reduce that to below \$200 million which was lost. Now, that review comes out every September. Last year, that involved three years of money because that was the final correction of implementing this M-Account legislation. Now, it is done year by year, so this year the magnitude, I hope, is not

quite as large, but on an annual basis as we come to September, we're going to have to work this issue very hard.



CONTRACT CLOSEOUT PAT SELECTED METRICS



We had a process action team formulated to address this whole contract closeout issue. This team of about 55 folks operated for about a year and a half to come up with recommendations. While I've not done the evaluation, I'm convinced that this drop off at the end of the chart is really because the people who normally do contract closeout were working on the process action team, and, therefore, nothing got done. There's probably a message for all of us in this. We pay a price for process action teams, so they need to get in, get the job done and get out.

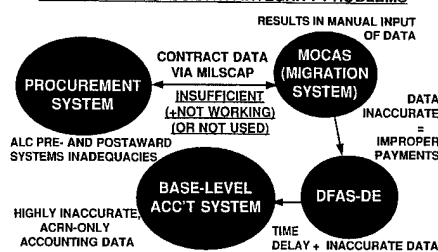
Next, the real issue is maintaining current data and linking up all of these separate systems. In our day-to-day business with our procurement systems and with contract line items, we keep very accurate data. But, we did not necessarily keep all of the data that the contract administration system, MOCAS, needed for those that feed information to the DFAS [Defense Finance Accounting System] folks, who do the payments. If we don't transmit accurate data, they can't accept the transaction. They then resort to a manual mode, which introduces errors. If you don't have accurate data, then you can't pay accurately. You then end up with disconnects. Then, the whole system starts to disintegrate on itself. Mr. Hamre [Honorable John J. Hamre, DoD Comptroller] recently testified before Congress about the problems in nega-

tive ULO [Un-liquidated Obligation] balances and how they are paying contracts.



CONTRACT CLOSEOUT PAT SELECTED PROCESS DEFICIENCIES

CURRENT PROCESS DATA INTEGRITY PROBLEMS



The solution begins with how we write contracts; how we keep accurate data; how we manage our money; and how we plan our programs. It is a macro problem that all sides have to be involved in — contracting, financial management, payment, contract administration, program managers. It's going to be a very big issue over the next few years.



AFMC / INTERAGENCY CONTRACT CLOSEOUT PAT

- 40 recommended process improvements
 - Changes to the way contracts and modifications are written (8)
 - Changes to existing contract management, administration, or payment processes (8)
 - Changes to automated data systems (4)
 - Changes to the contract closeout process (10)
 - Other (training, tracking, further evaluation) (10)

I won't talk to all of the recommendations other than to say we came up with about 40 process improvements. I have a very large report here on contract close out. This is going to be available in the government printing office so you'll be able to order a copy. It is very thorough. I think it will give you a lot of good insights. This summarizes the 40-some recommendations in the major areas, which cover the waterfront, whether its modifications in how we write contracts, how we manage our contracts, how we keep our data systems programmed and accurate and how we train our workforce. There is a huge amount of work to be done there.



SUMMARY

PK

- AFMC supports Acquisition Reform and Reengineering at all levels
- Supporting "bottom-up" (fix processes) and "top-down" (legislation) reform
- Integrated effort with Industry is important

Finally, let me say, we're committed to acquisition reform. We support Mrs. Preston on her process action teams and will continue to do so. But, we're not waiting. There's lots that we can be doing now in reforming our process. We need to fix issues now, and we need to start at the bottom. We'll take whatever reform we can get from Congress and from OSD, but in the end, we're going to do it working together as a team in order to do a better job. With that, I appreciate the opportunity to speak today, and we'll be ready to answer some questions.

Question and Answer Session

Acquisition Reform

Panel: **Mrs. Colleen A. Preston**
 Deputy Under Secretary of Defense
 (Acquisition Reform)
 Brig. Gen. (S) Timothy P. Malishenko
 Director for Contracting, AFMC

GENERAL HATCH: *Thank you, Tim. We appreciate that presentation. As you might imagine, we've got quite a few questions. Let me combine the first two. Colleen, you talked earlier in your remarks about the legislative initiatives. This questioner says that he believes that the current bill appears to make only modest reforms in the acquisition system. Are you satisfied with this year's legislation and what further steps will DoD pursue?*

MRS. PRESTON: Let me just say that the legislative process is not yet finished. We are at less than the half-way-point in terms of trying to get a legislative bill adopted and signed by the President. We hope to have the opportunity to make substantial changes even after both bills clear the floor. We hope to make additional changes to the Senate bill before it goes to the floor for consideration, at least a floor amendment. In the House, we hope to see some changes as well. But it is never over 'till its over and we're going to keep pushing as best we can and for as long as we can to make sure the bills come out in a way that is a positive for all of us.

GENERAL HATCH: *Thank you, Colleen. The next two questions discuss the process action teams addressed by our speakers. From the industry point of view, please explain the process as well as the organizations which are being used to include industry inputs and participation. Who are the industry members? Could you address the perspective of the need for broadening your*

input on the process action teams?

BRIG. GEN. (S) MALISHENKO: Virtually all of our process action teams, involve industry input. Some years ago we had an extensive PAT on "requests for proposals." Industry had significant input on that team. Industry was also provided input to our process action team on contract closeout. We have standing teams on source selection, and I really can't think of any of these large process action teams where we do not have industry involvement. That involvement could be through AIA [Aerospace Industries Association] and CODSIA [Council of Defense and Space Industry Associations] personnel participating. This is done at the local level by asking them to participate through our industry representatives. We don't have trouble getting good cross-functional team support on any of our PATs.

MRS. PRESTON: We're struggling a little bit on how we develop our industry input. We had been advised from every one of our legal advisors that we cannot include industry on the teams because of the Federal Advisory Committee Act. On an informal basis, we are having them provide input and we go out and solicit their comments. After writing a report, we then send it out to industry and get comments back. We'd very much like to have an integrated team and there are some avenues that we are pursuing under the auspices of Defense Science Board. If there are some other ways, I'll find out from Tim on how we can have industry participate in a

much more formal way.

BRIG. GEN. (S) MALISHENKO: I would also comment that we're receiving a lot of comments through our regulations that we're required to publish in the Federal Register. Also, we receive comments on our RFPs through electronic bulletin boards. At the front end of our acquisition process, we have a lot of mechanisms for communicating with industry as well.

GENERAL HATCH: *A related question concerns the length of time that these teams will work. Is it subject dependent?*

MRS. PRESTON: With respect to our teams, yes. In fact, we learned from our first two process action teams that it's impossible to do something in 60 days. It's taken much longer and we're looking at a minimum of 90 days for any process action team and that could be extended as it is subject dependent. We found that it is even more critical that members of the process action team continue with whatever organizational structure we set up if we are to accomplish the implementation of the plan. It is a little more difficult for us running these PATs out of OSD than it is within the services. I think we've learned a little bit with our last two teams. To ensure that we don't lose sight of what the PAT team recommended, we are going to make sure that we set up organizations for follow up actions by each of the services and interested organizations.

BRIG. GEN. (S) MALISHENKO: I would also comment that when the process action team charter is very specific and very focused, it functions more efficiently. If you provide a very global charter, it gets to be very difficult. We have recently moved to establish integrated product teams in policy areas. These are standing groups which meet on a regular basis, maybe every two months, and talk about specific areas. They provide long term continuity that is cross-functional with good representation. These regular forums look at the way we ordinarily do business in terms of how we deal with these policy issues. They found that when we added up the costs of just doing a small PAT on subcontractors and source selection, the bill was going to be six or seven hundred thousand dollars when you started to look at just the cost of people's

time and travel. So they can get to be very expensive very quickly.

GENERAL HATCH: *The next questions ask about acquisition reform and the structure within the Defense Department itself and the services and management. I assume we're talking about the actual offices within the Department as well as the PEO [Program Executive Office] structure or even the JROC. Are you reviewing the structure or are you generally satisfied with that structure.*

MRS. PRESTON: Let me tell you what we are not reviewing first. We are not reviewing the issue of whether or not we will have a centralized acquisition organization. Both Dr. Perry and Mr. Deutch discussed that with me early on and we decided that there was no reason to look at organizational structure in that sense until we did some process reengineering and then determined whether or not we need to look at that issue further. But, I assure you that we have enough on our plate right now. That type of organizational change is very low on the priority list. That's also because this Administration feels very comfortable that the service acquisition executives who have been identified will have a very good working relationship with the Under Secretary of Defense for Acquisition as well as the Deputy Secretary of Defense and SECDEF. So, we're looking at a team environment within OSD as well.

With respect to overall organizational issues, we are at some point going to get back to looking at the PEO structure. I can't say that it's a priority now because it is not. It is on a list of those things that we might want to look at, at some point in time. We are clearly looking at organizational structures. Hopefully, starting within the month, we will look at the DAB process and the milestone decision making authority process. In that regard, we'll be looking at some of those OSD structures. Our bottom line is going to be: You have to add value to the process. If you're not adding value to the process, then you're gone. That's our fundamental starting point.

GENERAL HATCH: *Thank you, Colleen. That's a good intro to the next question dealing with the operational end of the acquisition business, both for the Air Force*

and the industry people. How will you approach those subjects of oversight and too much inspection and too much audit?

MRS. PRESTON: We will approach the issue from a couple of different ways. I'm a pragmatist by nature. It is not something that I feel like fighting for right now, because I see it as a useless exercise. What I do think we can do, however, is to look at oversight in a different way. What we need to do is make the environment such that people will not be averse to risk. That's the problem with oversight now. It's not necessarily the oversight that is a problem, although we probably have too much of it, but that the oversight makes people risk averse. That's the cultural change that we have to make. Is the only way to do it -- reduction of oversight? No, I don't think so.

I think that there are some things we can do by rewriting and restructuring our regulatory system so that we can provide some protection to people. General Malishenko alluded to the fact that there is a FAR rewrite in progress. We are just going through the final drafting of guidelines and principles and they are going to be out in the Federal Register, if not today, then very soon. I would hope that within DoD we will begin looking at a new approach that is a tailoring of the regulatory process and is the providing of guidance to people in the form of alternatives. On any particular issue, you would see guidance that would be provided as alternatives for consideration. None better than the other. Which-ever alternative you use, you are supported by the regulation -- so that you are not hanging out there alone. We had an interesting thing that occurred, I'm sure some of you in the audience have heard me say this before, and that is, when we redid the 5000.1 and 5000.2 Series [DoD directives], everyone kept saying, well, you must have maximum flexibility. That's what the system really needs. We went from a regulation that was partially mandatory and partially non-mandatory to an almost totally discretionary regulation. What has happened? We've found that people are applying more of the regulatory process now than ever was required under the mandatory provisions. Why is that? It's because they have to make a choice. They have to take responsibility for deciding not to apply a

particular provision. So, I don't think that's the way to go. People want flexibility, but they do not want a lack of guidance. They need someone who's going to be there to say, yes, that's an acceptable method of doing something and you're covered and you don't have to worry about it.

BRIG. GEN. (S) MALISHENKO: We have a real success story with our AFMC Inspector General, who has instituted process effectiveness reviews. As they go out and look at our processes in a very thorough way, they give us great feedback on how well they are working. We have a responsibility to worry about internal controls, to make sure our processes are in control and that we exercise financial and contracting responsibility. So, will there be no oversight, not looking, and not asking? I don't think so. We need to go out and review, but there is also a positive, constructive team approach. I wholeheartedly support the process effectiveness review that has been recently used.

GENERAL HATCH: *Thank you both. What is a reasonable projection of how much shortening can we expect in the milestone process? Also, can we assume that there will still be the potential for accelerated special access programs if needed?*

MRS. PRESTON: I couldn't even begin to guess right now. The target is not going to be a target of how much we can shorten the process. We don't want to look at these existing processes as a benchmark. We want to start from a clean sheet of paper. The service acquisition executives were in a meeting with me and Frank Kendell, who will probably lead our process action team, under the guidance of Noel Longuemare, the Principle Deputy Under Secretary of Defense for Acquisition Technology. It was very clear that everyone agreed we have to take that clean sheet approach. Until we decide what information is absolutely necessary, then we don't even want to look at what organizations or what documentation will be in that process. So, I won't even make a prediction as to how much we can shorten it.

GENERAL HATCH: *A final question for the panel is program specific. Will acquisition strategy issues be resolved to allow the JPATS [Joint Primary Aircraft Training Sys-*

**Reengineering the
Industrial Base**

tem] RFP to be issued next month?

MRS. PRESTON: Well, I can tell you that we're not holding up the RFP. We waived the review of the RFP for JPATS.

GENERAL HATCH: *Thank you both very much for very interesting presentations and we appreciate you being here today.*

Integrated Weapon System Management

57

Panel:

Maj. Gen. Roy D. Bridges, Jr.

Director, Requirements, AFMC

Colonel William D. Rutley

F-15 SPD, WR-ALC

Dr. Robert "Bart" Barthelemy

PGM Training Systems, ASC

Lt. Col. Joseph P. Bisognano

PGM, Communications Systems, ESC

GENERAL HATCH: *Next we will address Integrated Weapon System Management (IWSM), the new approach to weapons system acquisition and logistics. This approach certainly does reflect a major change in how the Air Force does business. A single manager is responsible for the weapons system from its development to its maintenance and logistics support and its upgrades into retirement. We have with us four distinguished speakers. Leading off the panel will be Air Force Materiel Command's Director of Requirements, Major General Roy D. Bridges, Jr. He will be followed by Dr. Bart Barthelemy, a name familiar to many of you from his earlier duties with the national aerospace plane, and he is now the Director of the Training Systems Product Group. He will be followed by the Director of the F-15 System Program Office, Colonel Bill Rutley, and then we will hear from the Director of the Communications Product Group, Lieutenant Colonel Joe Bisognano. Each of these gentlemen will give remarks about their areas of responsibility, the successes that they've achieved and the challenges that lie ahead. After their presentations, we will have a question and answer period. At this time, please help me welcome Maj. Gen. Roy Bridges.*

MAJ. GEN. BRIDGES: Thank you General Hatch and let me start by saying thank you for coming back from the break to listen to our session this afternoon. Why are

we even talking about IWSM today? Especially, since we've been working on it since 1991. Well, it is the foundation of our command and it represents a framework for change in the command. It is about cultural change, and cultural change is tough. If you don't believe that, you've never been married. You have heard before that IWSM was the unifying philosophy for the merger between the Air Force Logistics Command and the Air Force Systems Command. That was a marriage of sorts and we needed something to help us improve our business practices as we brought these two commands under one roof.

I'm going to briefly provide a definition for IWSM; talk to you about the philosophy — the eight tenets of IWSM — and give you a status summary on where we are in implementing this across the command. Then my distinguished panelists will talk to you about the real life of IWSM within three specific programs.

This is the definition of IWSM. It is encompassing. It is a philosophy; it is not an organization; and it is not a cookie cutter approach.

It empowers one person, the single manager, with authority over the widest range of decisions. From that respect it is visionary. We have had to accept the best we could get today in terms of how much empowerment we can give our single managers. In many respects, we are working with Mrs. Preston and other people in the Administration to increase the flexibility and authority of the single managers to help them make better decisions as we buy our weapons systems.

Key IWSM Positions

- SINGLE MANAGERS (SM)
 - System Program Director (SPD)
 - Product Group Manager (PGM)
 - Materiel Group Manager (MGM)
- KEY PERSONNEL SUPPORTING SM
 - Development System Manager (DSM)
 - Manages Development Efforts at PC
 - SM Located at a Different Center
 - System Support Manager (SSM)
 - Manages Sustainment Activity at ALC
 - SM Located at a Different Center
- ONE MANAGER - ONE PROGRAM
 - Applies to Single Managers, DSMs and SSMs

We have three kinds of single managers, two of them represented on the stage today. We have System Program Directors (SPDs) with authority for buying complete systems, such as the F-15 which Colonel Rutley will talk about.

We have Product Group Managers (PGMs) who are providing systems to both system program directors as well as other external customers. For example, we have training systems, which Dr. Barthelmy will talk about, or communications systems, which Joe Bisognano will talk about. We also have Materiel Group Managers (MGMs) who deliver what we used to call commodities. These are things like landing gear sustainment for all the weapons systems in the Air Force or fuels or support equipment. An IWSM organization has a single manager, and if he is located at an Air Logistics Center and has development still going on in his program, he will have a development system manager located at a product center who will report to him. If early in the life cycle of a program and the single manager is located at a product

center, then he will have a systems support manager located at an Air Logistics Center who is responsible for sustainment aspects of the program.

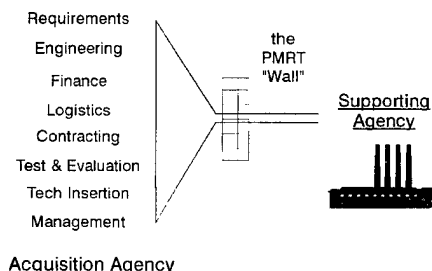
As a program moves through the life cycle, the responsibility never transfers from the single manager. He may move locations as the center of gravity shifts from development to sustainment. But, throughout the life of the system, there is one manager for one program. We have consolidated programs considerably, but within the consolidated program, there is one manager.

IWSM PHILOSOPHY



We developed the IWSM philosophy around eight tenets. I'm not going to talk to you about all of them today as many of them are fairly self-explanatory. They are all very important and they are interlinked. One of them — the eighth one, Integrated Product Development — was discovered as we went through the process of developing IWSM using a clean sheet of paper and a Total Quality approach.

SEAMLESS PROCESSES



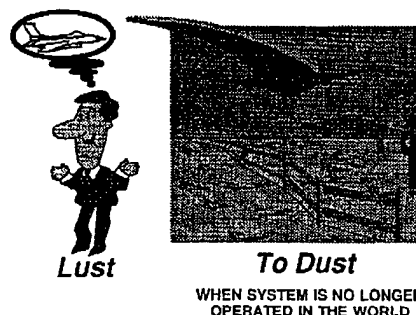
When we started IWSM back in 1991 after the announcement of the merger of the

two commands, we had a situation where we literally established a wall between the acquisition agency and the supporting agency as the system progressed through the life cycle. That wall was called the "transfer of program management responsibility." In many cases, single managers on each side of the wall were sub-optimizing decisions for a particular life-phase of the program.

To do IWSM, we wanted to use a Total Quality approach. So, we started by recognizing the eight processes that we used in both the acquiring and the supporting agency throughout the life of a system. We then had the eight process owners to look across 21 prototype charter programs for IWSM. They organized themselves using their very best ideas from the grass-roots level. After talking to both sides of the organization, the process owners found the best practices that were in use across both commands. We documented those best practices in our IWSM guide and then in our Air Force acquisition model which is a computerized aid to help remember and learn the principles. All the other 106 programs used these best practices to define how they would run their programs.

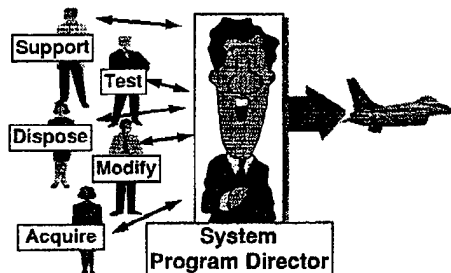
We improved the efficiency of this process significantly because we used to have a lot of "seam" organizations to translate issues from one side of this "seam" or "wall" to the other side. We did away with all those "seam" organizations.

CRADLE TO GRAVE



Another critical tenet of IWSM is that the single manager is now responsible for the system from cradle-to-grave. He now tends to look at each one of his decisions a little differently than he did before. I think we are getting a lot better decisions for the Air Force.

SINGLE FACE TO THE CUSTOMER



Finally, we had a very complicated process, where we had a different face depending on where the system was in the life cycle. Some parts had transferred, some parts had not transferred. You practically had to know the serial number of an airplane and look it up in the book to figure out who to go to if you had a problem. We have done away with that. Now all the decisions are made with one single face to the customer and the customer's voice is in everything that we do.

Summary

- Progress to Date:
 - 800+ Programs → 106
 - Full Operational Capability: 92
- IWSM is the KEY
 - Framework for Cultural Change
 - Enhanced Customer Satisfaction

In summary, let me give you a progress update. After the new command stood up and we had completed our process on the 21 charter programs, we began a complete multi-step process to go through and implement IWSM on all 106 programs. This is a reduction from 800 plus programs with which we started. We reached initial operational capability in June of 1993 and full operational capability on 92 of those programs this past March.

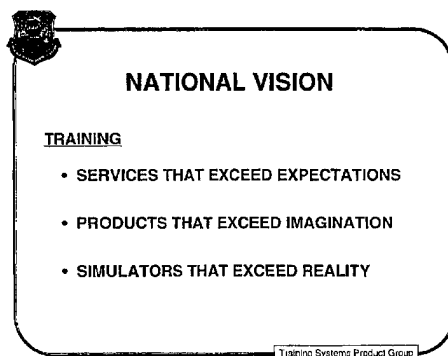
IWSM is a key for cultural change throughout the command. We have a long way to go. We are not finished because full operational capabilities simply means that the program is up and running using IWSM tenets. It doesn't mean that they are really fully optimized.

A key to integrated product development is enhanced customer satisfaction which is that eighth tenet of IWSM. You'll understand

more about the importance of IPD tomorrow when Major General (select) Bob Raggio, the F-22 System Program Manager, talks to you about IPD along with his industry partner, Mr. Gary Riley, Vice President and General Manager for the F-22 at Lockheed. Thank you.

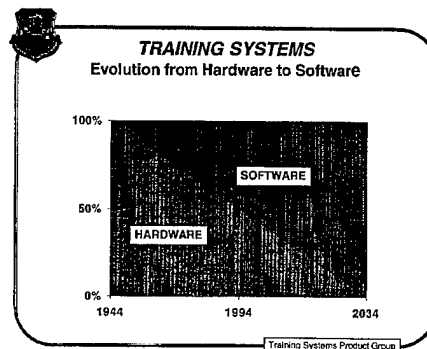
Dr. Robert "Bart" Barthelemy: You must be depressed after seven hours of discussion on reengineering, downsizing, reform, consolidation and 65 percent cuts. So, I'm here to give you some good news. The training area is blossoming. The training systems product group has a budget that is at least flat, if not increasing over the next five to ten years. Technology is just exploding. It is just bombarding us with all kinds of new possibilities and capabilities, and we are looking into the future with a whole new viewpoint than we have had in the past. The concept of IWSM makes so much sense to the training systems product group area that we've jumped into it with great relish and we've made some interesting progress.

Before we discuss IWSM, I want to talk about what the training systems area is all about. I've chosen to do it with organizational charts. The concept of training systems is an expanding situation and one that the Air Force and all of the services are going to be much more dependent upon. This has led us to a certain approach to IWSM that is based on the tenets that were just discussed, but one that is also tailored to our particular situation.



Because of our optimism and positive outlook, we've taken on a very strong vision. This is a national vision that is shared by the entire IWSM team within the Air Force, as well as the entire national industry team. As you can see, it is very optimistic: "Training

services that exceed expectations, products that exceed imagination, and simulators that exceed reality." That is what we intend to do. We can't do that with the structure and the system that we have today, but we will be able to do within the context of where we are headed.

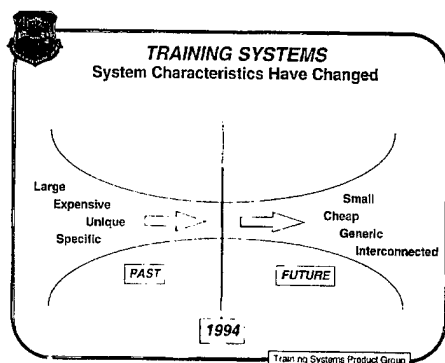


You've probably all seen the Link "blue box." Notionally, I went back to World War II and looked at simulators of that vintage. They were all hardware. The Link Trainer was a little box with some pressure gauges and things like that — no software and no computers as they hadn't been invented yet. It was just a hardware system.

The future prognosis is that hardware is going to go away. We are right about in the middle of the whole situation with 1994 at the 50-50 point. Not that we are spending 50 percent of our money on hardware and 50 percent on software, but today's training systems are transitioning from mostly hardware and a little software to mostly software. Eventually, near the year 2030, training systems will be all software. It will be virtual reality. There won't be cockpits. People will think they are in cockpits. Training will essentially be a total software system. That has a major implication on what we want to do in the Air Force and in the country in terms of training and education. If that is where we are going, we'd better set up organizational structures and systems that deal with that kind of a reality and not embed ourselves in the past on how we move hardware from an acquisition activity to a sustainment activity. That just won't hack it.

Because it is becoming more software intense, the distinction between the software

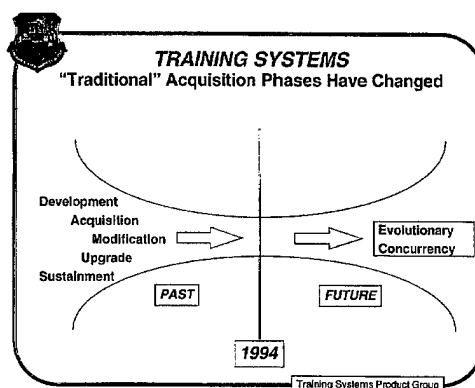
systems is going away. We are also demanding much more from our training systems.



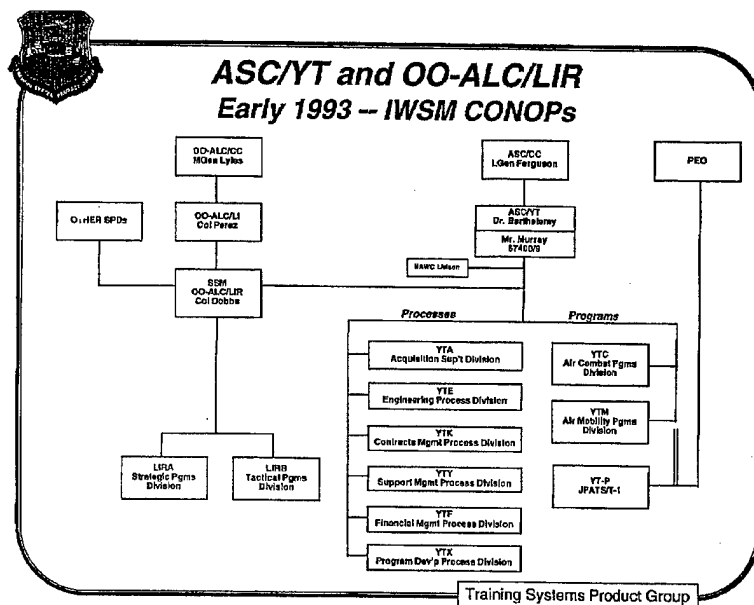
We are also demanding that they be cheaper. We've heard about affordability all day long. We also need them to be interconnected because the Air Force wants their simulators and their training systems to talk to each other since that is how we are going to fight the battles. There is no point in training individually when battles will be fought with a total team effort. We want small and we want cheap. The simulators of \$200 million to \$500 million are gone. The whole concept of training is changing. We have to construct a system, an IWSM system, that can deal with that major change.

Because it is intensely software oriented, the distinction between acquisition and sustainment — the distinction between modification and keeping things up to speed — is going away. Very shortly, it is going to be gone. We'll have simulators that will live for 20 or 30 years and what will change is the software. So, what used to be an acquisition activity will now be looked at as a sustainment activity. What used to be a sustainment activity may be in acquisition because modifications and upgrades will take the place of the normal way of doing business.

Given that situation in the future, we've done a lot of strategic planning and strategic visioning before we did anything about the organizational structure. What you are about to see occurred in the last nine months because we wanted to react quickly to the IWSM and the IPT thrust.



This was our organizational structure when somebody said: "Let's make this an IWSM activity." We first connected Ogden, the sustainment area, with Wright-Patterson, the acquisition side. Next, we looked at each of our organizations, at Ogden and at Wright-Patterson, and realized we had constructed systems that were quite disparate and also weren't really in keeping with the IPD or IPT philosophy.

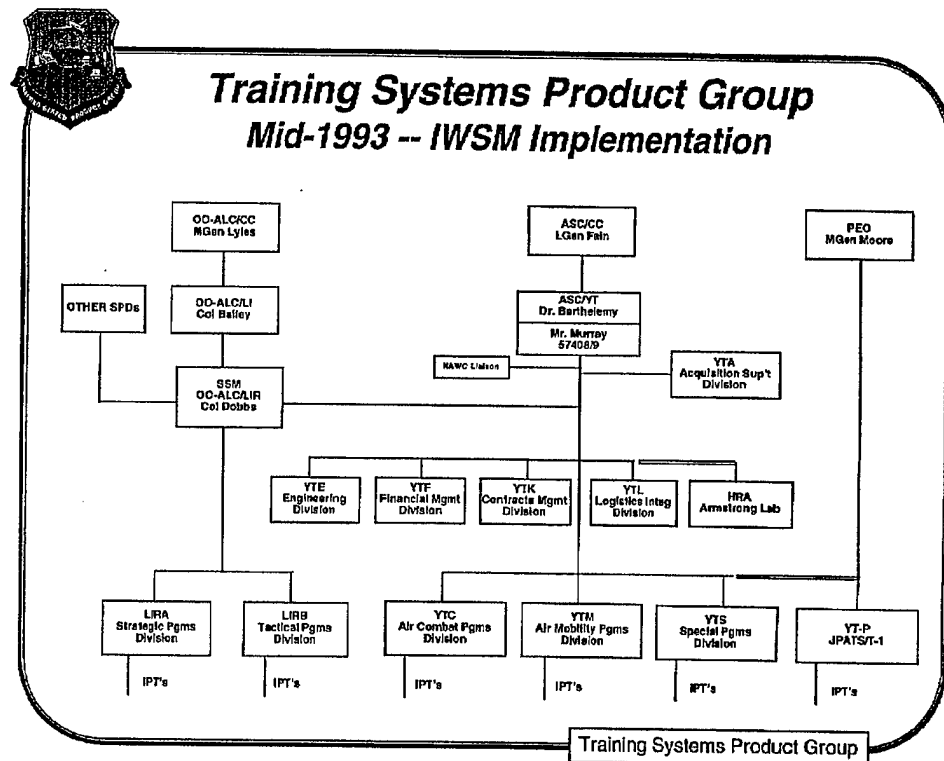


We did have process teams, as represented by the long boxes on the chart. There was some process activity on the acquisition side, but there was none on the Ogden sustainment side. We were totally incompatible. We drew a line that connected the two and said, "IWSM is alive." But, it really wasn't alive; it was just that we had connected the organizations.

About three months later we said, "Let's get rid of the process teams. Let's form IPTs for all of the weapons systems training systems on both sides of the fence." We formed 40 IPTs, for example we formed one for the F-15, another for the F-16, and one for the C-135.

about from an acquisition and sustainment process.

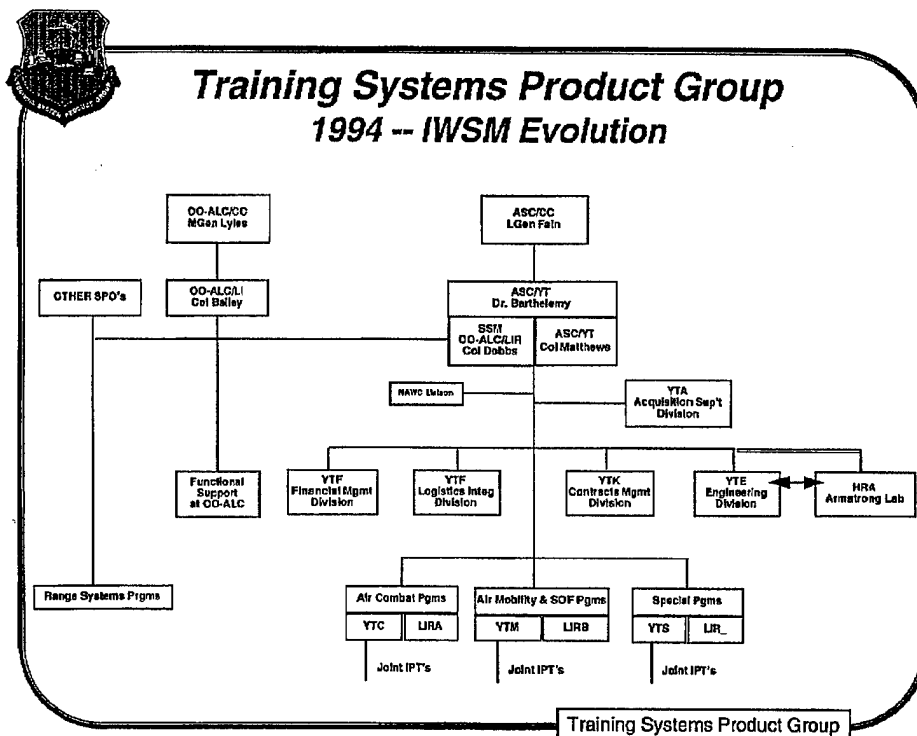
Now, there is a real merging of the two organizations. Even though all of the folks at Ogden still reside at Ogden, and all of the folks at Wright-Patterson still reside perma-



We had 40 different IPTs, some of which were exclusively at Ogden and some which were managed almost exclusively at Wright-Patterson, but we were beginning to see the common denominator — IPT. Once we found a common denominator, then we could find structures to truly integrate the whole IWSM concept. You are beginning to see the integration of the technology groups, the Armstrong labs and the Wright labs, into the IWSM.

I never think of IWSM as just acquisition and sustainment. It is development, acquisition and sustainment. Since technology is moving so fast, if you forget about the technologists and what they can do for the product business, you've missed it completely. So, IWSM is larger than even what we talked

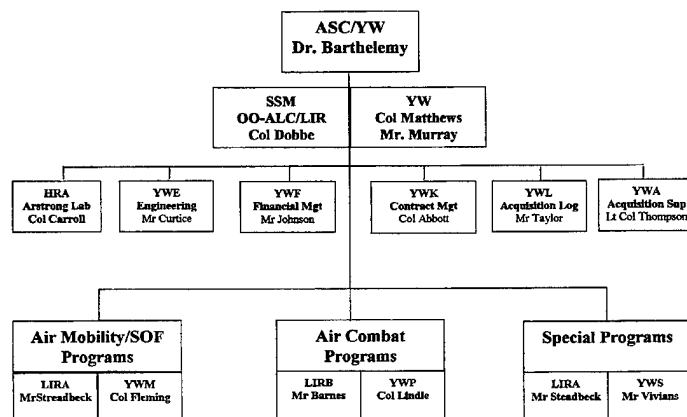
nently at Wright-Patterson, we have set up a structure where there is dual management of the integrated product teams. The chief at Ogden is my deputy and we also have a deputy on the acquisition side. We have a functional structure in the middle of the organization. At the bottom tiers, we have dual management of the major product groups and with combat systems, mobility systems, SOF [Special Operations Forces] systems and special systems, which include AETC [Air Education and Training Command]. All of the IPTs report to two people, one of whom is at Wright-Patterson, and the other is at Ogden. They have to be knowledgeable and they have to make sure that integration is occurring.



Each of the 40 IPTs have people from both Ogden and Wright-Patterson in them. The largest happens to be a SOF IPT, the SOF Training Systems Integrated Product Team, with 20 people from Ogden and 30 people from Wright-Patterson. Those people probably communicate daily, but I know they talk weekly in a video teleconference (VTC). They truly are operating as an integrated team. The head of the IPT is from Wright-Patterson and the deputy is from Ogden. There is a true merging of the two cultures. So, from the superstructure, at the top to the actual IPTs, the IPTs are kings and the rest of us are just there to serve them, including the entire functional group. We've transitioned to an organizational structure and a cultural change that supports IWSM, and that is how we operate.

I just want to mention one other instance of the change. There are very few engineers at Ogden because of a number of factors. Therefore, the engineers at Wright-Patterson support the Ogden activity. We do this through TDYs [temporary duty trips], but will eventually PCS [permanent change of station] them.

Training System Product Group



The Ogden contracting activity has come up with some wonderful ways of contracting with industry and we are taking some of the modeling contract and the contract support from Ogden to help our guys at Wright-Patterson. We are trying to make this a homogenous organization.

We operate using a few basic tenets. They are exactly what General Bridges was talking about: seamless operations, one voice to the user, true integrated teams to the point where each has somebody from both sides of the organization. It is still not to the half and half point, and maybe it will never be half and half. Maybe there are things that clearly ought to be predominantly done at one of the centers, either the ALC [Air Logistics Center] or ASC [Aeronautical Systems Center], but we will work that out. It has to be tailored, but the fundamental IWSM culture is now embedded in it.



Training Systems Product Group
1995

- Mutual involvement in all activities
- Seamless operations
- One voice to customers & suppliers
- Responsive Manpower & Workload Transfers
- Integrated Product Group Management
- Effective, appropriate product delivery
- Increased emphasis on technology integration
- Increased emphasis on joint ventures

Training Systems Product Group

How deep is this change? Well, it is not all the way down to every single person. We have 500 people in the training systems product group, about 150 folks out at Ogden and 350 at Wright-Patterson. I guess you could ask any one of those people about IWSM, and some people will say, "No, I'm not really comfortable with this." But, we are starting from the top and we are starting from the bottom and we are putting it in the smaller teams. That is one approach to success. If we tried to do it at the 500 person level, it would probably be hopeless.

We are also bringing in industry. I cannot say that industry is part of each IPT except from the standpoint that they are the contractors of the supply and the training systems' products to the IWSM team. But, we just concluded a meeting in Dayton on April 19, using NTSA, the training services association, to help us develop a vision statement with industry. The next step is to bring industrial partners into the IPTs beyond their roles as suppliers and contractors. That is the goal that we both share at both Ogden and at Wright-Patterson.



Vision Developed at 19 April 1994 NTSA meeting:

We, the DOD/Industry Team, are committed to providing training which allows all DOD personnel to perform their assigned duties to their full capability. Since we want to do this in the most efficient, timely, and cost effective manner, we must:

- (1) employ pro-active, aggressive, and commercial-oriented approaches to military training,
- (2) focus on an educated, undefinable customer needing flexible, responsive capabilities, and
- (3) provide interoperable, integrated, mission-oriented training.

Training Systems Product Group

We've come a long way. We're not 100 percent complete. There are still some cultural differences that probably will always be there, but we are making some great inroads. As we interchange people and interchange functions — I really do think the key is the small IPTs — folks can get together. If you walk into one of their meetings — it might be on a VTC because they are physically in two different places — you really can't tell who is from Ogden and who is from Wright-Patterson. We're feeling pretty optimistic and IWSM is coming along very nicely in the training systems product group. Thank you.

COLONEL RUTLEY: About three or four years ago I was heavily involved with trying to merge the F-16 program office together with the folks out at Ogden and watching the AFLC and AFSC dance that General Yates and General McDonald were trying to orchestrate. I was really concerned whether what we were going through was going to be the right thing to do — not from a paper viewpoint, but from the fact that AFLC and AFSC had their own cultures that had gone on for years, and infrastructures built up over many years. The clash might do more damage than good. I was completely wrong — absolutely 100 percent wrong.

Most of the problems that we have faced in putting the two commands together into what is now Air Force Materiel Command and also instituting IWSM have come about. The cultural clashes were there; the differences were there; the momentum was there; but the results have been quite startling. Even considering that we have a long ways to go, IWSM is critical to the support of the warfighter in the future.

In the F-15 program, the offices were put together by General Childress [Brig. Gen. James Childress] and General Kadish [Brig. Gen. Ron Kadish]. General Childers is now the PEO [Program Executive Officer] for the F-15 program, as well as others. They moved on and turned it over to me and Colonel Destout. Let me introduce you to my other half, Colonel Jim Destout my Deputy Director of Acquisition. You'll see from the two of us that the F-15 has no height requirements so we have true IWSM.

The F-15 IWSM culture is still evolving. It is just under two years old. I relate what we are doing to a two-year-old child because the culture is acting just like a two-year-old child. It is growing; it is learning; it is falling down a lot; making mistakes; whining; balking; and going backward and forward. The best of the two cultures is beginning to emerge, slowly, but surely. There is one team — F-15 A through E models — and all of us are responsible and accountable to the warfighters.

What is also evolving is a virtual team. I know most of us who have done the reading and gone to the various consultants understand what the term "virtual" means. What is evolving based upon the IWSM principles is the "virtual team" organization. We call it the virtual "TEAM EAGLE." At the smallest level, where we call ourself SPO-North and SPO-South [System Program Office], Jim has about two hundred people, and I have over a thousand at Warner Robins [ALC, Ga.], that includes the item managers and our production line workers. But, that is not the team. That is one part of the team. Beyond that are the program PGMs and MGMs, and others who work all these various programs that interface with the F-15 program. They join us in a number of forums as we try to work the F-15 as a team.

It involves the laboratory structure. We're involved in the TPIPT [Technology Planning Integrated Product Team] process and making sure that the technologies that are needed to support the warfighters are indeed ready and transitioned through the SPO as a team. At the product centers, the team includes all the munitions program managers that who are out there and critical to the F-15 weapons system to do its job.

It involves the human systems labs — the life support operations. Our three test centers are all heavily involved as teammates with the F-15 program. Our contractor teammates — from our prime contractor McDonnell Douglas through all the tiers of suppliers and subcontractors — are all on board as trusted team members.

Finally, it involves our AFMC headquarters, our Air Force headquarters, our Secretary of the Air Force, our PEMs [Program Element Monitor] and finally our PEO for whom we work. All are part of the virtual TEAM EAGLE, a single team for the warfighters. It is a tremendous challenge to bring all those people together. There are groups like DSAA, and other folks such as SAF/IA that work with us day-to-day. The challenge of the single manager and the challenge of the leadership of the F-15 is to bring all of those groups together, to give cradle-to-grave, seamless support presenting one face to the warfighter. And are we getting there? Is it perfect? No, we are only two years old. It is going to take a lot of time and persistence before we really are a seamless organization, where we act and think like one organization. But, we are getting there. It is happening.

You've heard about IPD and IPTs. We have a similar set up to what you just saw from Dr. Barthelemy. We call them radar, common avionics, weapons, air vehicle, operational flight programs and electronic combat. Those are the czars: they are co-chairs, SPO-North and SPO-South. They have counterparts developing the contractor teams because the contractors are members of these IPTs. We have 60 to 70 IPTs with a program manager assigned, a lead in both SPO-North and SPO-South. Others involved in the IPTs include contractors, laboratory people, other program director representatives, and people from other ALCs.

That helps make the organization a single organization. What makes it work is the baseline process. We have a baseline contract with the group IPTs and every individual IPT. That baseline contract is our empowerment tool. At the senior leadership level of the program, we have agreed upon cost, schedule and performance issues. In some cases our baselines are signed by other product group

managers or material group managers. These people are now empowered to make it happen. They have a simple, easy computerized reporting system to tell us every month where they stand with relationship to their baseline. Through this system, the program managers communicate if they need management help or do not need management help. If they sought help, where did they seek it from and did they get it?

We use that system and it is very, very powerful. It is also a little frightening for some of these folks. It is the first time they've been handed the stick and said, "OK, this is what you said you needed to do and what you were going to go do, the users agree, the warfighter agrees, go get it done." So that is working.

We have many forums that we use to foster teamwork and empowerment and ownership between us and the warfighters and to provide corporate heading checks. We have executive program manager reviews. We have subsystem reviews. We have sustainability reviews and budget POM [Program Objective Memorandum] reviews. Some of those, the ones I just mentioned, are all now going to be done at the same time in one week, three times a year, and our customer, the warfighter, is there with us every step of the way. In addition, our contractor teammates and PGMs and MGMs are present, so we are all together for a relatively short period of time to make sure we have a heading check on where we are going.

We have a business investment board. We don't spend a single nickel on this program in terms of tactical execution without the warfighter agreeing and concurring with what we are doing. We spend a couple of days working with wing commanders and what their key issues are and whether we are making the right decisions and heading in the right direction. Of course, we have lots of other forums like this that we use in combinations throughout the year to constantly cycle through and make sure we are doing the right things.

Education and training are absolutely critical for our folks, and Jim and I are still working on this. We are not satisfied with where we are going with that. We need to do more. We've done TQM [Total Quality Man-

agement] training, and we continue to do that. We've used "theory of constraints" to great effect. We continue to do integrated weapons system management training. We do integrated product team training. We are using Dr. Steven Covey's courses to help our folks learn how to operate in a new environment. We use off-site design shops, and we have a reading program. And there is going to be more to come, all aimed at making sure that IWSM becomes a permanent cultural.

What are some of the successes? We have a master plan — an absolute integrated living master plan — and most of our people understand what is going on, and it is getting better every day. We are working so all 1,300 people understand at least the basics of what the integrated master plan does. We have an integrated product team baseline process. It is not perfect, but it is a true system of empowerment and it is really happening.

Trust is going up in the team and fear is coming down. When you get those two things working that way, the barriers fall away and communications and expectations work really well.

Our warfighter feedback is outstanding. We have multiple feedback methods and all that is working very well. I think they are getting more and more comfortable that they are speaking to an integrated team. As an integrated team, we've worked with the F-16 to come up with post production support. What do you do when you are no longer in production? You have to sustain the weapon system for many years. We are working together with the F-22 and F-16 on a daily basis in weapons integration, symbology, technology and a number of other ways that is really exciting, at least as far as I am concerned. All of us are happy with that.

Our financial budget process has coherence to it, and it is tied to an execution contracting strategy that we review constantly. We are focusing on the F-15A through E together. No longer is it just the E models up at SPO-North and the A-D models at SPO-South. Now, all of the models are worked everywhere by the entire team.

Our programmed depot maintenance is something that I am very excited about. This is a group of 700 folks that were under the gun

a couple of years ago. Now, the last 115 jets have come out on time to the customer, in fact, under time. The last jet we put out for the warfighter was completed in half the time that was promised. That is pretty good. The cost per hour has come down. The number of flow-days has come down. The quality has stayed high. In fact, we have seen no major reportable defects whatsoever in the last two years. So we are returning quality to the customer. That produces warfighting capability on the ramp instead a target sitting somewhere at Warner Robins.

Our focus is on the warfighter. We have hotlines, and we have dedicated faxes for them. We have forums where they are involved in every stage of the game, including our off-sites. Team spirit is excellent. The love and passion for the jet is absolutely outstanding. And, when you have that focus — that love and passion for the jet and the warfighters who fly it — then you can do almost anything.

In the future, we will continue to provide the environment that allows the F-15 IWSM TEAM EAGLE culture to continue to mature. We must guide that maturation process through education and training, and we must have continuous improvement. We have flexibility. We are a learning organization. We are innovative. We do care about what we do, and we deliver quality work.

To help that process, we commissioned a study called "Eagle Vision." Along with our contractors and with the warfighter, we have an integrated team that is going to determine what the jet is going to do and have to do for the next 20-25 years. It is possible that the F-15 is going to be flying in 2020 or beyond. That means that there is still going to be a system program office for that long, 20 or 25 years from now, and some of the future crews flying the airplanes have not yet been born. So, we have quite a task ahead of us to make sure that we have a sustainable airplane out that far.

What is the bottom line? It is our people. As a group, you have talked about the importance of "vision." I completely agree with you. Vision really does count. But, what we talk about everyday is that the people of TEAM EAGLE strive each day to provide the

men and women who fly, maintain and supply the F-15 in the field, the highest quality jet at the lowest possible cost. That is what we do for a living. Thank you.

LT. COL. BISOGNANO: Like Dr. Barthelemy, I also have some good news. This is the last briefing of the day.

Let me just say up front that I am really happy to be here to discuss the Communications Product Group, and like Colonel Rutley, I am a believer in IWSM. I was not originally, but now, I am.

We are the communications product team. As General Bridges explained to you, we are a product because we cut across a number of different customers and a number of different SPDs. For example, we provide the HAVE-QUICK radio to Colonel Rutley and his F-15 SPD. So, we are a Communications Product Group.

General Bridges also described to you earlier the process of how the command went about consolidating Systems Command and Logistics Command. A couple of years ago I can remember being faced with the task of taking 40 different programs in various stages — from early development to extreme long-term sustainment. We sat in a room with our partners from Sacramento [ALC] and Warner Robins [ALC] trying to figure out where the center of gravity was. We asked: "How are we going to manage this beast? How are we going to create this communications product group? Where is it going to be located? Where is the management lead going to be?"

It wasn't an easy process and as we went through it, we defined IWSM several different ways. At first, we defined IWSM as "mine." Sacramento wanted to keep theirs. ESC wanted to keep theirs, and Warner Robins wanted to keep their programs intact. As we went through subsequent passes, the IWSM concept was a bit illusionary. We were still wondering what we were trying to do. Some people were stubbornly trying to create their pet process or create their group. It was messy, but it wasn't until the third and subsequent passes that we ultimately determined what IWSM actually was, and hopefully, we are very close to what that concept today.

THE BEGINNING

	1st Pass	2nd Pass	3rd Pass
I	It	Illusionary	Integrated
W	Will	Wondering	Weapon
S	Stay	Stubborn	System
M	Mine	Messy	Management

As a result of going through those various passes and making some very difficult decisions, we came to the organization that we have today. We have nine integrated product teams. We have system support managers at both Warner Robins and at Sacramento. We have integrated product team leads for each one of those integrated product teams. We've tried to consolidate the functional expertise at all the different centers into one integrated process and one team. Each integrated product team has membership from each one of the centers. Thus far, that has worked out very well.

COMMUNICATIONS PRODUCT
GROUP

BEFORE IWSM				AFTER IWSM			
PROGRAMS ACQ SUS		PEOPLE	DOLLARS (millions)	PROGRAMS	PEOPLE	DOLLARS (millions)	
ESC	10	90	\$322.3				
WR-ALC	10	26	110.2	CPG	25	144	\$479.9
SM-ALC	10	34	38.4				

This organization represents about 150 people and a budget of about \$500 million. We declared full operational capability on 1 July of last year. What are the benefits? What are we really realizing as a result of this organization? What are we doing well as a result of IWSM?

BENEFITS OF IWSM

- Earlier appreciation of sustainment requirements
 - A more significant part of the initial acquisition
- Unified approach to problem solving via IPTs
- Appreciation of a Communications Product vice individual programs
 - Much better customer support
- Consistent approaches to:
 - Contracting
 - Configuration
 - Testing
 - Ozone Depleting Chemicals (ODC)

We jotted down a couple of things for your consumption. First of all, and this is very important, if there is one benefit from this whole IWSM process, it is that we, on the acquisition side, have a much better understanding of the long-term sustainment requirements. When we make a decision today on what is going to happen 10 years down the road, we realize that we are going to have to live with that decision. So, we work a lot harder trying to understand what the reasoning is behind making those decisions up front. That is a very, very important part of this process.

We have a unified approach to the way we solve problems now. It is no longer just an answer from the sustainment side. It is no longer just an answer from an acquisition side when the user has a problem. It is an answer from a product group perspective. When we answer those questions, we hopefully take into account both an acquisition and sustainment side of the coin.

There is an inherent benefit of grouping together programs into a product group. Now, we can talk to our users as a communication product. Whereas before, we may have taken 40 different programs and we talked to our customers about each one of those individual programs as functional stovepipes. Now, we talk to SPDs and wing commanders and talk about communications in general. That is very important. In some cases in the past, we've provided a wing commander with a solution on one side and a problem on the other side. Before we consolidated our group, we didn't appreciate the problems that caused. Now, as a single product group, we speak with one voice.

In addition, we've tried to provide a consistent approach to contracting, to configuration control, to testing and to the problem of ozone depleting chemicals. We've tried to do that across all our programs at all three locations.

Another advantage to the IWSM process is our single face approach to industry. This provides us with more leverage from a management, from a financial and from a resource perspective. It is also good from the standpoint of industry.

BENEFITS OF IWSM (cont)

- Single Face to Industry; more leverage
- Sharing of Core process expertise
 - Engineering
 - Testing
 - Contracting
 - Configuration

I'll give you an example. At Sacramento and Warner Robins, they had contractors that were the same as we had ESC. But, by focalizing all the work under the single manager concept, we are speaking with one voice to that contractor, and likewise, the contractor is speaking to us with one voice. We think that provides a definite advantage.

We are also sharing the core process expertise. Dr. Barthelmy explained some of the advantages of doing that. We've experienced some advantages through sharing our engineering talent, our testing expertise, our contracting people and our configuration. We've tried to standardize that across all three centers. In some cases, we've sent people TDY.

This is another potential of this IWSM process. We've sent people out to Sacramento, for instance, for 30 days at a time to understand a little bit more about "sustainment." Hopefully, we can cross-flow that back and get some people from Sacramento to come back to ESC and understand a little bit more about the "acquisition" side. We have been able to share that expertise and we've had a couple problems where we've brought that to bear, and it has been very, very effective.

I also wanted to cover some success stories with you. We have a new consolidated PMD, which is incredible. We had this by FOC. We took about 18 individual PMDs, and consolidated them into one communications product group, PMD. We have one program element monitor. We talk to one person at the Air Staff and we have one dominant program element in which our money is programmed.

SUCCESS STORIES

- New, consolidated PMD
 - One Program Element Monitor (PEM)
 - One dominant program element
- Proactive relationship with Ground Theater Air Control System (GTACS) SPD
- More focused approach to user problems:
 - Liquid crystal displays
 - Supportability of Commercial-Off-The-Shelf (COTS) Items
- Better financial flexibility
- Video teleconferencing

We also have a more focused approach to user problems. Number one, we had a sustainment problem with a liquid crystal display in some of our airborne radios. Again, this radio was in sustainment. We discussed the problem and put some of our engineering expertise on it back at ESC. We went to the laboratories to get help and we created a team to solve this problem.

One of the biggest issues that we face in the electronics and the communications business is buying commercial off-the-shelf (COTS) equipment and adapting it to the battlefield. One of the biggest issues that we have in buying COTS equipment is the supportability of the equipment. How are we going to support it, both near term and long term? Bringing the sustainment people on board and discussing it in total from a cradle-to-grave approach has given us a much better appreciation in how we are going to do that.

We have better financial flexibility because all our money is now in one program element. That allows us to have flexibility in terms of moving money around, which is a huge advantage of this IWSM process.

Lastly, we use video teleconferencing. I know General Yates talked about that this morning. We've made a point to provide a video teleconference capability for all three of our locations. We meet at least on a weekly basis to discuss various issues.

Where do we stand today. Like Colonel Rutley described to you, we are still trying to educate the customers on the process. We created a brochure. I have one here. It may not seem like a lot, but believe me it has done an awful lot to educate the customers on what the communications product group is all about. It

talks about IWSM tenets and organization and things like that.

We are working hard to create a seamless structure. We think the video teleconferencing will help. It has already helped immensely. We have quarterly meetings with the entire group to discuss where we are going. We are trying to standardize key areas such as contracting and configuration control.

WHERE WE STAND TODAY

- Still educating customers on the process
 - CPG brochure
- Working hard to create the seamless structure
 - Video teleconferencing will help
 - Quarterly meetings to discuss status
 - Trying to standardize key areas
 - » Configuration Control, Contracting
- Looking for more visibility and guidance on the financial management process

Lastly, I would say that we are looking for more visibility and guidance in terms of the financial management process and how that actually will be used in IWSM ultimately. We are on the road to creating a process for financial management, but I don't think we are there yet.

In summary, we believe that we are the "Patriots" for the deployed communicator. We've come a long way since we started to meet in that room a couple of years ago when we tried to decide where the center of gravity is. We think that IWSM is the right way to go and we think we are doing very well. Thank you very much.

Question and Answer Session

Integrated Weapon System Management

Panel:

Maj. Gen. Roy D. Bridges, Jr.
 Director, Requirements, AFMC

Colonel William D. Rutley
 F-15 SPD, WR-ALC

Dr. Robert "Bart" Barthelemy
 PGM Training Systems, ASC

Lt. Col. Joseph P. Bisognano
 PGM, Communications Systems, ESC

GENERAL HATCH: *I would like to thank all of our panel members for giving us a very personal and a very positive report on two years of progress. One of the first questions on the list asks: "Do you believe you have the proper empowerment and authority under the new IWSM management compared to what you might have had before?"*

COLONEL RUTLEY: Yes and no. In most cases, the barriers that we put up are barriers that we put up in our own minds. Actually, within the law and regulations, there is more flexibility than we ever dreamed possible -- once we started to look at it in detail. There are still frustrations over the level in the Pentagon required to obtain a "mother, may I" on some issues of acquisition policy. There is still some fundamental frustrations on the financial side of the house where there isn't much flexibility with the colors of money. But, compared to the way it was five years ago, I certainly feel I have the support of people like General Yates, AFMC, Headquarters Air Force and the PEO staff to get things done. So, it is considerably better. There is more that can be done, and hopefully Mrs. Preston is going to make some of those changes happen.

GENERAL HATCH: *Next we have a specific question for Lt. Col. Bisognano. Under IWSM, your center partners are now part of your organization. Have the old*

minds of AFLC and AFSC changed, and has the philosophy helped create a new AFMC culture within your product group?

LT.COL. BISOGNANO: Slowly we are beginning to change the overall philosophy into one product. It is not sustainment, nor acquisition, but more of a consistent communications product group approach. Yes, we've come a long way in a short period of time. From an IWSM perspective, one of the smartest things we did is have the systems support managers work directly for the product group manager. That has been an important factor in creating one consistent product. But, as Dr. Barthelemy said earlier, if you ask 150 of our people if they all thought that the philosophy had changed and we are doing things differently, you wouldn't get a positive answer all the way down. But, we are starting at the top, and it is going to take some time before everyone believes that there is one product.

GENERAL HATCH: *Next, we have heard from the managers and the leaders, but how is IWSM being accepted at the working level? How well are the working level people talking to each other?*

DR. BARTHELEMY: In our particular case, we have 40 integrated product teams and so the teams which vary in number from 4 to 50 are totally focused on the weapons system or the training system for the weapons system.

And, at the working level there is true integration. There is no question about that because they understand that the weapons system training system is their goal. It gets more complicated in the middle, which is always the situation. The middle is always the hard part. At the top, we have commitment and leadership is really moving towards IWSM. At the bottom everybody is really committed to the product. In the middle, the functional experts, particularly the ones at Wright-Patterson who may need to be helping out the folks at Ogden, and maybe even the folks at Ogden who help the other away around, are still a little bit confused about where they should be.

There are still functional stovepipes that have to be broken up. One of the ways that we are attempting to do that, and we repeat this message over and over again: the only folks that really matter are the integrated product teams and all the rest of the us are there to support them. So, every time we go into an IPT meeting, we go in as helpers to those IPTs and that is where some of the change might occur.

GENERAL HATCH: *Thank you, Bart. The next question is addressed to General Bridges: How will industry benefit from this new management approach?*

MAJ. GEN. BRIDGES: Joe said it well in his talk. IWSM is not only a single face to the customer, but it is also a single face to industry. When we consolidated from 800 programs to 106, industry has a lot fewer people to see in order to talk business, and time is money. So, I think there are a lot of advantages there for industry. Anybody else have anything?

COLONEL RUTLEY: We've made industry a complete part in what we're doing. All of us are doing that. I'll just use our radar integrated product team as an example. In each case, there are SPO-North, SPO-South, Hughes, and McDonnell people at every level of those teams, both project and sub-project level. So, these teams make their life a lot easier. For the most part, expectations are very clearly understood, and we develop things together. We've almost completely eliminated the finger pointing, and the trust has gone up quite a bit.

DR. BARTHELEMY: I have one com-

ment, particularly on the connect with industry. As a mentioned before, we had a meeting on April 19 where we invited industry representatives to help us do strategic planning at an IWSM level. It was an all day meeting, and I think the shift was so immense that at lunch a bunch of people left the meeting. They had anticipated that we were going to give them the requirements in the morning and they were just going to respond to them in the afternoon. We kept saying, no, we really want to work together and develop a plan. Well, the folks who stayed loved it. Now the folks who left want to get back on the bandwagon. The participation of industry in the implementation of IWSM is a culture shock, too. You have to understand that we really want industry to be partners as opposed to us giving you requirements and then you responding with product.

GENERAL HATCH: *Is that integration of government and military people occurring across the board on the integrated product teams?*

PANELISTS: Yes.

GENERAL HATCH: *Earlier this morning General Yates spoke about the dynamics of change and about measuring change so we can continue to improve. Have you set up any systems of measurement to ask yourself how well you are doing? How well you can evaluate what you are doing under this changed approach to management?*

COLONEL RUTLEY: I'll just comment that we do have metrics even though almost everybody hates to hear that word. But, it is a core approach that all have agreed upon and that tells us whether or not the cultures and the changes that we're making are providing the warfighter with a better service. Ultimately, the warfighter, in our case, decides whether or not all of this makes any difference to him. I wish a couple of my F-15 fighter pilot friends could be here to tell you what they think, but you'll have to trust me when I tell you that Lt.Col. Rod Gunther, who is our contact point for the ACC [Air Combat Command] staff, would tell you that it has gotten so much better. We are so much more responsive to their needs than we have ever been before. Is it perfect? No way. Do we still make mistakes? Absolutely. But the

mistakes are rare, and they're recoverable, and we are marching in formation with our customers. So ultimately the test is: Is the warfighter happy? One of the questions asked: Are they happier? The answer is yes.

MAJ. GEN. BRIDGES: General Yates is leading us to be a command that is a quality Air Force organization. We do self assessment using Malcolm Baldrige criteria, the same as used by world class industrial partners. Along with that, we need a fact-based information management system in order to guide our decisions. Paramount among those measures are how well are we meeting our customer's needs. How happy are the customers with what we are providing? We have metrics to measure that. They can and will be improved. Today, you've heard a lot of people talk about another big focus: reducing the cost of ownership of our systems.

We have pioneered a metric on "cost per flying hour," and we are starting to focus our single managers on things that reduce the cost to the warfighter so that we can afford to keep more systems on line.

Those are just two examples. We have a long way to go because coming up with very effective metrics that can be used from a person working at the lab bench or on the depot production line or in the program office and be rolled up all the way and be meaningful at a higher level are difficult to come by, particularly if you are not in a profit making business.

LT. COL. BISOGNANO: As General Bridges said, there is a formal way to ask for customer satisfaction. Now, we do that every six months with everyone of our users. From an informal perspective, we are getting strong feedback that the user is very satisfied in being able to go to one place for all his or her problems. In other words, being the single face, has helped the customer in identifying where to go to solve issues and solve problems.

DR. BARTHELEMY: I just thought of one other metric that might interest you. We just instituted something called the "SPOPAR for our product group which is our evaluation by industry. We sent out fifty of them corresponding to all of the programs that we had. We got about 60 percent back which is really

amazing when you think about asking industry to evaluate us and also to sign their name. On a scale of 0 to 6, the average was about 4 which to me is very interesting because people are gutsy enough to say, hey, there is something still wrong here, but yet the overall average is certainly not two or three, it is four. So, that is another measure. It is not only the customer that we are trying to figure out if they are you more satisfied with the new relationship that we've developed; it is also the supplier, and industry.

GENERAL HATCH: *Thank you, Bart. We also have a couple of questions in the financial area. I know Al addressed financial resources, but what about flexibility? With your cradle-to-grave approach, do you still have the restrictions in the authorization and appropriation process on the color of the money, or can you move funds around when you think you need to?*

MAJ. GEN. BRIDGES: I'd like to start the discussion of this question because it is at the heart of IWSM and represents the visionary part of the definition of IWSM. Fundamentally, we would like to have one color of money -- green. If somebody would like to put limits on how much we can spend for a specific period of time, or better yet, to accomplish a specific task, then O.K. We may have to go back and ask for more authority. But, right now we have a very complicated set of rules for defining different buckets of money with very little flexibility to move within those, even within one program. This certainly inhibits us from doing as good a job as we could do. A lot of this has to do with how we've done business for many, many years. A lot of this means that we need a lot of auditors to look at all the rules and see if we are following them. We would upset a lot of rice bowls if we change. Some rules are found within the Constitution and Congress, so we are going to have a hard time getting all the way to the end of this road. But, we are committed to reengineer that process in little steps and we have done everything we know how to do so far, and we are asking for authority to do more.

GENERAL HATCH: *I think Mrs. Preston could be helpful there. Thank you for that response. How do you look at the*

personnel management issue? How do you move people around after that first assignment? Do you suggest people should cross the lines back and forth among the acquisition specialties?

COLONEL RUTLEY: I agree very strongly with what General Yates has done, especially at the senior level. Now that is beginning to permeate the system. Until we get the people moving back and forth, we will have great difficulty in growing the true AFMC culture over time, which is less than two years old. Down at Warner Robins, I have people who spent their whole lives on the Systems Command side of the house. Now, we are moving people even down to the GS-12/11 level and at the captain/lieutenant level. They had been in the supply and maintenance business, and we're moving them into the product center world. That mix must continue so people get the full spectrum of what cradle-to-grave really means. They are going to get experience by working on the IPTs where they meet members from all the areas and eventually cross over into other areas. We are having some success at that. I think it is critical.

DR. BARTHELEMY: From a functional standpoint, the IPT situation is really terrific. When you place an engineer or financial manager or contracting person in the IPT process, they get to know the other functional disciplines as well. Of our 40 IPTs, we have about six that are headed by engineers and not project management people. They are learning that the distinction between some of those folks will go away as they move. My recommendation for young people is to get on those IPTs, learn what the other folks are doing, take on some of the leadership and keep bouncing back and forth between your sort of functional side and the project management side. I think that will really work out.

GENERAL HATCH: Thank you. Here is a specific question for Colonel Rutley. You are the head of a large major program and you have some common items with other programs. How do you balance responsibility for your unique items with common items that you may share with other managers?

COLONEL RUTLEY: That is a major complication. We share engines with the F-16. We share pumps and we share air speed indicators and wheels and breaks and things like that with other airplanes. What is really terrific is we are working this with those other weapon systems. We set up our system supportability review back-to-back at the same location with the same PGMs and MGMs, and we're going to attend each other's meetings. So, we are working together where we have a common piece of equipment, like a radio or electronic warfare. We work with those PGMs and MGMs, not just on an every 90-day basis, but on a daily basis at lower levels. Their representatives work on various forums including parts -- critical items such as MICAPs -- critical to the warfighter. It is difficult. You've really got to force it to happen. Leadership can make sure it is happening by getting the PGMs, MGMs and SPD together at least every 90 days or so. You make sure that you've got a heading check on where you are going. It is really helpful for us to articulate the problem. We started to run out of tires. When we are totally focused on engines that was good because without the engines you don't go very far. However, we discovered that we were so focused on engines that the poor little guy out at Ogden stuck up his hand and said: "Wait a minute; I don't have enough money to buy your tires. So, in July or August of 1994, you are not going to have tires for the airplane." We were able to highlight that issue through my briefings as a system program director and the tire people got more money. So that is part of our job to make sure we articulate those PGM and MGM needs as part of the weapon system.

GENERAL HATCH: It is quite clear that when you put the development house and the sustainment house together and you use words like seamless organizations, you derive long term efficiencies and benefits. I'm glad to have these four people and the rest of the people at Air Force Materiel Command on our team and doing a great job. We thank you gentlemen for being with us this afternoon.

Dr. Philip P. Panzarella Executive Director, ESC

General Hatch: Our first speaker this morning is the Executive Director of the Electronic Systems Center, Dr. Philip P. Panzarella. He is well known to many in this audience. He was stationed at Wright-Patterson from 1992 to 1994 and now has major responsibilities as second in command at Hanscom [AFB, Mass.]. He's going to talk to us about military specifications. Dr. Panzarella.

Dr. Panzarella: Good morning. Because it is so important, I'm going to try to make interesting what is rather a mundane subject. As you'll see, it is one of the key elements of acquisition reform.



Key Element of Acquisition Reform

- Acquisition reform defined as:
 - Best commercial practice
 - Maintain public trust
 - Foster integration of defense and commercial industrial sectors into national industrial and technology base

It is one of the acquisition reform initiatives that Colleen Preston [Deputy Under Secretary of Defense, Acquisition Reform] kicked off. The thrust of this effort is commercialization which should come as no surprise to this audience because that is where we are heading.

Why do I say this is a key element of acquisition reform? You're going to have to wait to figure that out. However, I will tell

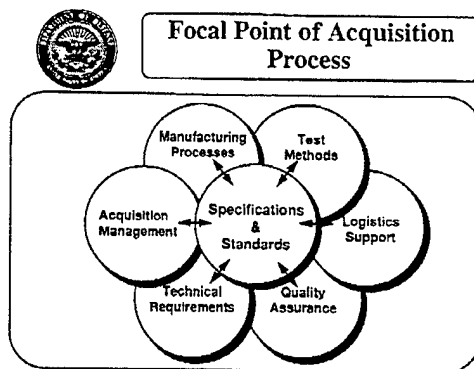
you that the reform is defined as something very specific.

When we talk about reform, we mean using best commercial practices while still maintaining the public trust. It won't work if we enter into a business area that will be written up by a watchdog group because they think we have abrogated our responsibility to the public trust.

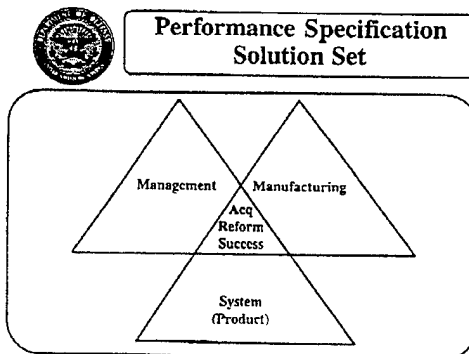
We use public funds, and yet, we want to foster the integration of the defense and commercial business. Why? From our experience, we know that two separate production lines at one plant — one using MILSPECS and the other commercial specs — does not work. You know that. I know that.

So, why is it so important? First, "Specs and Standards" touch everything that we do in the acquisition cycle. Whether it is tests, logistics, quality, requirements, the technical side, management or the manufacturer; it touches everything. As mundane and as boring as it is, you cannot avoid the subject. That is why Colleen Preston put a group together to study the issue.

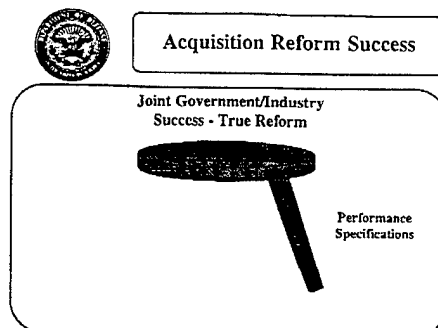
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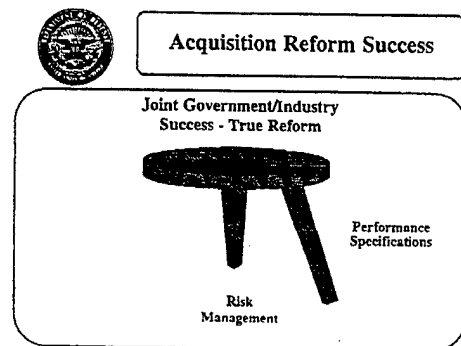
If you really want successful acquisition reform, you must look at three domains: The Product in the systems specifications world, Management Specs and Manufacturing. Changing just one, will not mean anything. Taken by itself, each is a necessary part of the process, but is not a sufficient part for the reform. So, my pitch this morning is that all three have to be attacked. If you don't attack all three, you are not going to do a good job at reforming the process.



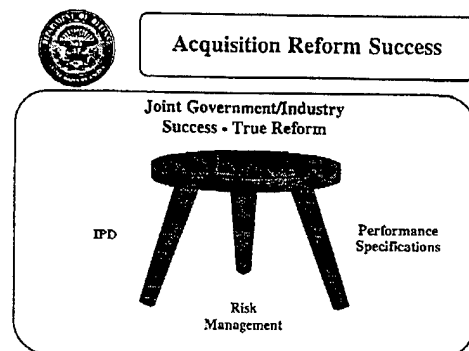
It is like a milking stool with three legs. So far, everyone has only talked about one leg — "Performance Specifications." It is extremely important, but again, by itself, it isn't capable of making the reform happen. You have to look at other elements.



What is another possible element? The second leg of the stool is a Risk Management Strategy. Why is that important? If I put out a contract as a performance spec, I have no way of judging the risk, and we're both along for a ride. I maintain that we don't know where the ride is going to take us. So, if we are going to only use a performance spec, we must be careful. The assistant secretary realized that. A way of making sure we are managing the risk is finally coming together. Later today, you will hear more about this issue.



The third element supporting our milking stool is Integrated Product Development and the use of Integrated Product Teams. Without that mechanism, this process becomes problematical.



You can define it, and you might be able to do it, but, without each of these elements, you can't make it work. So, if you get nothing else out of the talk, remember the stool. Combining all three elements makes the system stable.

What was our overall strategy? First, we created a cross-functional process action team [PAT] to develop the strategy. We wanted to

look at a conversion from military unique specifications to commercial standards. In fact, we have already adopted commercial specifications, especially in the electronic industry. We moved to commercial item descriptions rather than detailed specifications and drawings under the DoD system. We even looked at cancelling a large portion of the MILSPEC population. How much? We estimate that we could cancel a third of the military specifications. After Mr. Deutch's letter, you'll probably see an acceleration to achieve that reduction.



Overall Strategy

- Create a cross-functional PAT to develop specific and comprehensive plan and strategy to:
 - Reduce military unique Specs and STDs
 - ✓Conversion to commercial
 - ✓Adoption of Commercial
 - ✓CIDs
 - ✓Cancellation
 - Upgrade remaining military unique Specs and STDs for compatibility with modern process technology
 - Define automation needs to support above
 - Create a Training Plan to foster cultural change

For the specs that remain, we want to upgrade them for compatibility with modern process technology. After all, many of these things were established before we thought about controlling the process. We need to automate to sustain it and support it. Finally, we should create a training plan for implementing this cultural change.

We're along for this ride and we have to focus on several areas. One, is certainly the weapons systems. That is what we're all about. But, we can't avoid other things. We must look at replenishment issues. The Air Force uses the term sustainment, but we had a joint group and as the Army uses the term replenishment, we added it to our vocabulary. You can translate that into supportability and sustainment.



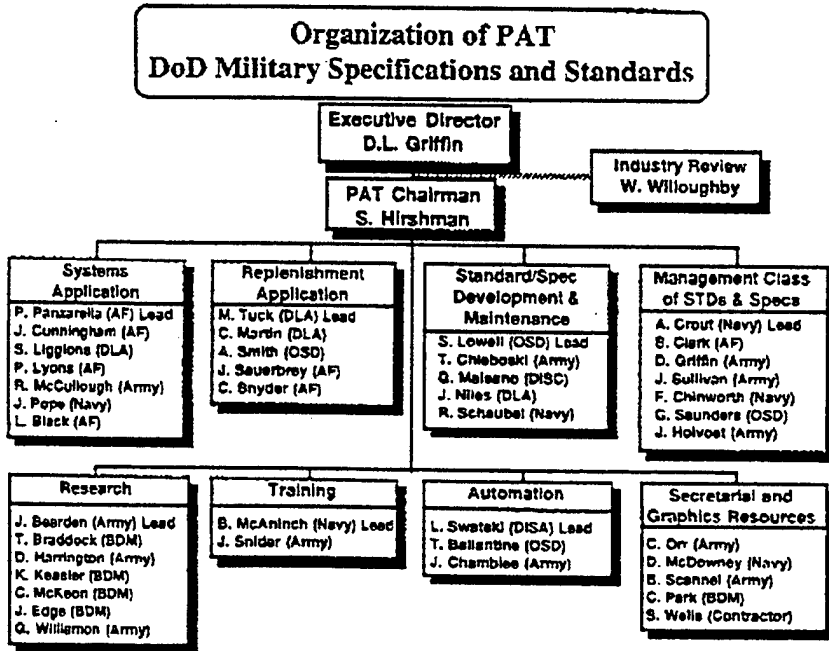
Approach

- Develop focus areas
 - Systems
 - Replenishment
 - Training
 - Automation
 - Standard/Specification Development & Maintenance
- Management Specifications & Standards
- Relate each focus area to problems and issues
- Analyze the problems and develop recommendations
- Develop implementation plan

Our other focus areas include automation of training, development and maintenance of the specs, and developing management specifications and standards. In the report, we had to relate problems and issues associated with each of these areas, and also had to find solutions. Now that Mr. Deutch has put out a general letter, the report should come out in about a week or so. We have also addressed a number of specific issues, such as how to change DFARS.

We tried to answer a number of questions. What laws might have to be changed? What acquisition policies might have to be changed? Those issues have been drafted into the report, and we will put out the information very rapidly. This is just a heads-up on these actions. The report contains recommendations and an implementation plan.

Who is on this team? It is a multi-service and multi-functional team. Colleen Preston, who talked yesterday, asked D. L. Griffin from the Army to head up the effort. Pat Hirshman, the PAT chairman is also from the Army. Will Willoughby heads the Industry Review effort and talks to industry to make sure we are following a path that is compatible with both worlds. These folks were our senior membership, and I headed up the Systems Group.



Plan of Action

- Review previous initiatives
- Develop strategy and recommendations
- Evaluate impacts of recommendations
- Identify
 - Barriers
 - Pros and cons
 - Risks
- Create implementation plan
- Develop metrics
- Ensure a system for follow-up

We also had to evaluate the impacts of any recommendations. We couldn't be foolhardy and still maintain that public trust. It was necessary to identify and balance the barriers and potential risks to implementation before we could come up with recommendations. We created the implementation plan, and set the development of metrics as a way of looking for follow-up to see how things are going.

What reports did we look at? There's a bunch — about 35 in all. But, a key one was the Saunders and Van Opstal Report in July of 1993 which essentially covered integrating commercial and military standards. The Defense Science Board had issued a very interesting report in 1977, the Shea Report, that we did not throw away, but incorporated in our effort. We used the Costello Report as well as previous work that Dr. Perry had done, not because of his future position, but it was good work.

Colonel Mark Tuck from DLA [Defense Logistics Agency] was lead for the replenishment area. The other team leads included Steve Lowell of OSD for Standard/Spec Development, Al Crout for Management Class Specifications, and Training was headed by Bill McAninch. There was Leonard Swatzki in Automation.

Our research group was not doing "research and development," but was a research team to provide us with the necessary background material. We also had an admin support team. We spent four months on the process action team. There were a lot of good people, and I had a little fun despite a rather boring subject.

How did we organize ourselves? First, we started by reviewing previous reform initiatives. We've had more initiatives on reform, and the subject of specs and standards than you can shake a stick at. Not only did we wish to develop a strategy and recommendations like so many of our predecessors, we worked an implementation plan. That is what made this group different. We will see how it goes.



Key Reports

- Road Map for MILSPEC Reform: Integrating Commercial and Military Manufacturing CSIS Working Group on Specifications and Standards - Jul 93 (Saunders/Van Opstal)
- Defense Science Board report of the Task Force on Specifications and Standards - 1977 (Shea)
- Enhancing Defense Standardization, Specification and Standards "Cornerstone of Quality" report to Secretary of Defense by the USD (Acq) - Nov 88 (Costello)
- Defense Science Board Report on the Use of Commercial Components in Military Equipment - Jun 89 (Perry)
- New Thinking and American Defense Technology Report of the Carnegie Commission on Science, Technology, and Government - May 93 (Perry)

We also used key Air Force reports. The CADE Report, Clear Accountability and Design, was about getting us out of your business and keeping us from limiting your design space. That forum was sponsored by General Yates through the CEOs of the many companies represented here. It has been accepted and been applied at ESC. We reviewed the AFMC guides on IPD as well as the Modification Management Process. There was a very interesting white paper on "Putting Acquisition to Work," sponsored by AFSC [Air Force Systems Command] when General Yates was there.



Air Force Key Reports (Program Management)

- Clear Accountability In Design (CAID) Report
- Air Force Supplement 1 to DoDI 5000.2
- AFMC Guide on Integrated Product Development
- AFMC Guide to the Modification Management Process
- White Paper on The New DoD Acquisition Approach - Putting it to Work, HQ AFSC, 1992

At the time our PAT was meeting, there was a "Military Standard 499B" in draft. Appropriately, that standard has now become an example of how to describe performance requirements, not "how to." A philosophy came out in 1992 that described a Systems Engineering Master Schedule that later fed an Integrated Master Schedule. We used that, too.



Air Force Key Reports (Systems Engineering)

- MIL-STD-499B (Draft), Military Standard Systems Engineering
- MIL-HDBK-499-3 (Draft), Systems Engineering/Configuration Management Life Cycle Application (IWSM)
- ASD-TR-91-1045, Systems Engineering Master Schedule, ASD/ENS, 1991

As I said, during this process, Will Willoughby was out there working with industry. He solicited feedback that caused some mid-course corrections on the project. At first, industry said: "We've heard it before and it's a worthy goal but prove that this is really different; let's see the new policy and once the acquisition letters come out, we'll respond." They said: "Very interesting; must we participate?" They also suggested that government must participate in industry panels to make sure that if we move to any other set of specs and standards, we would have our voice heard.



Feedback

- Worthy goals
- Government must participate in industry panels to include their wants/needs in Specs and STDs
- Many MIL Specs and STDs have become de facto commercial STDs
- Why does DoD want to be a National Standards body?
- Societies require resources to adopt/maintain Specs and STDs
- John Deere and Sears rely on performance specifications and partnering
- DoD has infrastructure to develop Whittle-type interactive information/training system

That started people thinking of how to place government people on boards that set national standards. We learned that about 20 percent of the commercial aircraft requirements use military specs and standards as de facto standards for the commercial marketplace.

About 17 percent of the specs used on commercial engine specs are military, we don't want to throw those away. We have to migrate them. At one time, we said there should be a national standards body. Industry said: "Why, we are already involved with many technical societies, and we have trade associations. Why do you have establish a national standards body?" However, we still had to think about that, and maybe it shouldn't be a national standards body. Maybe, we could rely on our participation in those bodies that deal with standards as the way to do it. That discussion provided a valuable mid-course correction.

The societies adopt and maintain those specs and standards. But if we are going to put a big load on those societies, there is talk of grant money being given to the societies to

help them put MILSPECs into the national society format.

We found that many commercial firms rely on performance specifications. John Deere and Sears rely on performance specs and partnering. We should, too.

We looked at industry training programs that were tied to culture change. We listened to one pitch from a company which has a rather large group of medical doctors who must be certified every so often via a training program. They used an INTERNET type of network to send their training over computer terminals. We decided that we had the infrastructure needed for this training without having to buy it.

So what are the recommendations? The first suggests we get senior leadership involved. Well, we've gotten everyone involved including the Vice President, so I think we have senior leadership involved. We'll see how this generates policies or letters to protect you. But, I will say that senior leadership was involved.



PAT Team Major Recommendations

- Role of Senior Leadership
 - Senior DoD management take a major role in establishing the environment essential for acquisition reform cultural change
- Standards Improvement Executive
 - Formalize the responsibility and authority of the Standards Improvement Executives
 - Provide resources necessary to implement the standardization program within their Service/Agency
 - Assign senior official oversight and policy authority

We set an executive function to provide the right management environment and shortly you will see the guidance from this process.

You can't have a cultural change without training and education and that is what we're going to do. We're not going to do it ourselves. We'll do it as a team so both sides of the fence — contractors as well as the govern-

ment — will receive training to make sure we transition to the new culture.

You'll hear me repeat "performance spec" over and over. The guidance will come out from the acquisition executive along those lines.



PAT Team Major Recommendations (cont)

- Training and education
 - Direct revision of the training and education programs to incorporate specification and standard reform
 - Contractor participation in training effort shall be invited and encouraged
- Performance specifications
 - ACAT programs for new systems, major mods, technology generation changes, nondevelopmental items and commercial items shall state needs in terms of performance specifications

Manufacturing and manufacturing standards as well as their management standards will be converted to performance standards. We want to certify local standards -- industry and company-wide standards. Guidance will come out to that effect, but if you don't do it, you will have to justify your position. We will implement Innovative Contract Management which essentially incentivizes the contractor to give alternative solutions.



PAT Team Major Recommendations (cont)

- Management and manufacturing standards
 - Direct that management and manufacturing standards be cancelled or converted to performance or non-government standards
- Innovative contract management
 - Direct that new high value solicitations/ contracts encourage and provide incentives to contractors to submit alternative solutions to military specifications and standards

We will base our standards on a level of trust between industry and the military. If you don't believe that the government is interested in this change and you keep falling back on the old MILSPECs and Standards, you will have no one to blame but yourselves. There's been an honest effort on government's part to give you some leeway to apply commercial standards. And, we're looking for incentivization strategies to reward you for doing that.

You may have heard about the recommendation to prohibit the use of MILSPECs, however, the full policy also says exceptions can be authorized by the Service Acquisition Executive. That is actually what the guidance letter will say.



PAT Team Recommendations (cont)

- Restrict use of military Specs and STDs
 - Prohibit use of military specs and standards for all ACAT programs except when authorized by SAE or designees
- Oversight
 - Direct government oversight be reduced by substituting process control and non-government standards in place of quality control testing and inspection and military-unique quality assurance systems

When it comes to Oversight of programs, we are getting out of that mode. We will rely on a process control — "Quality" — mode of operation for tests and inspection. It will be similar to the FAA philosophy of accepting some level of contractor tests, if they are well-documented and if placed into the integrated master plan.

When it comes to Contractor Test and Inspection Programs, we need to look at stress simulation, and dual use test facilities. We'll see that being authorized along with a set of metrics to assure that we're not putting ourselves at undo risk.



PAT Team Recommendations (cont)

- Contractor Test and inspection
 - Direct a goal of reducing the cost of contractor-conducted test and inspection
 - Use proven techniques including simulation, environment testing, dual-use test facilities, process controls, metrics, and continuous process improvement
- National standards
 - Encourage an increase in the number of partnerships with industry to develop non-government standards for the replacement of appropriate military standards

We talked about the use of national standards, and decided that we're not interested — except in very unique areas — in having a set of military inspection standards. There will soon be a large rush to convert the standards we do have into commercial spec standards that are sponsored by national agencies.

Another key area is a desire to automate the process. We don't have a plan on paper yet, but you'll see some attempts in this direction along with the necessary financial support to make sure that it's done.



PAT Team Recommendations (cont)

- Automation
 - Assign Corporate Information Management (CIM) office for standardization documents preparation and use
 - Direct use of automation to improve the processes associated with the development and application of standardization documents and DIDs
 - Direct the application of automated aids in acquisition

In short, let me tell you what's needed. We need to delay taking over functional control until after completion of the DEM/EVAL phase. We don't need to take detailed configuration control of production for some complex systems. It may be appropriate after production for some simpler systems, but in other cases it may never happen.

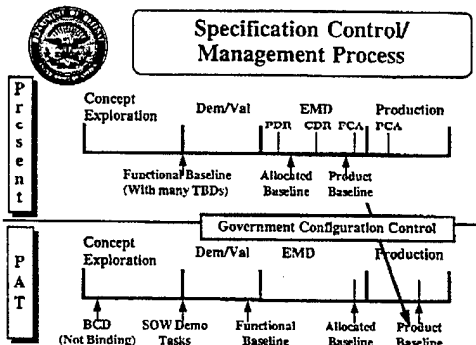


PAT Proposal

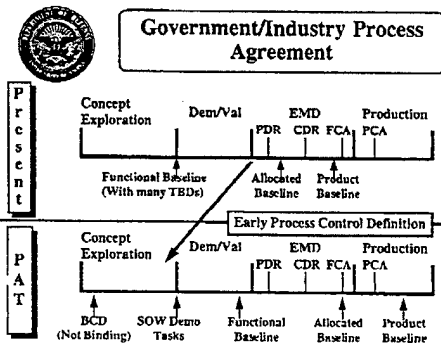
- Tell industry what performance is needed
- Delay taking functional control until after demonstration/validation
- Don't take detail configuration control until
 - Production for complex systems
 - After production for simpler systems
 - Maybe never on some systems

It sounds like a free ride, but, I assure you that it's not. This is what we're talking about. We all know how to play the game: we establish an A, B, and C spec. We establish control over a program very early on. Then what do we do? We make engineering change proposals and we trade off capability as we negotiate back and forth with the contractor. You have overhead; we have overhead. We spend a lot of money. Some suggest that we keep a lot of people employed for very little gain. Then, we get into the A-B-C spec arrangement, and before we know that we can really make the weapon system, we're in tight control. We trade a lot of papers and give ourselves a false sense of security. Then the question gets asked about delays, delaying until fairly late in the cycle. We say that we can establish a reasonable product baseline after we know what we're doing.

Whose process is going to work? Is it going to be the contractor process? But, if the contractor process is working, I still must be sure that I have oversight.



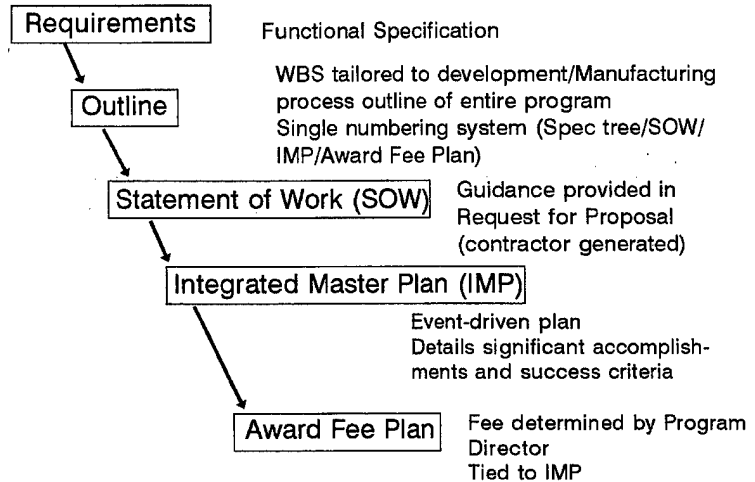
To change this, we must have agreement on what process is going to be used early in the game. We will begin talking with the contractor about the process very early in the cycle. If we agree on the process, then we can shorten the process.



However, if we mess up these changes, we'll be stuck with them. That's about as clear as I can make it. This is a rare opportunity. It requires a huge change in the system and we must do it right. Because, if we don't do it right, we're never going to get a chance to do it again. It is a very interesting time with this Administration as they are willing to take the risk.

A lot of people have given reform some thought. We have an approach that has a chance.

Risk Mitigation Strategy IPD



So, how are we going to mitigate that risk? It is a chain of events starting with Requirements followed by a WBS tailored to development and a clear manufacturing process outline of the entire program. It means an award fee plan tied to the Integrated Master Plan (IMP) statement of work that provides guidance for your industry generated proposals. An event driven management document that is oriented toward exit criteria and an award fee plan makes this whole thing viable.



Conclusion

- Leadership and Resources required for cultural change
- DoD must transition to stating requirements in terms of performance rather than "how to"
- Standardization process must be improved to maximize use of resources
- DoD must transition from viewing industry as adversary to development of teaming relationships
- Education is the key element

**Reengineering the
Industrial Base**

Leadership has jumped on board, they've allocated the resources to make it happen. We're going to state requirements in terms of performance rather than telling what or how to do it. The process will maximize the use of our dwindling resources. We must move from viewing each other as adversaries and develop a team approach. And, we have to educate each other on doing this the right way.

**Summary**

- Individual recommendations have been applied with great success and proven in a limited number of current programs
- For reform to succeed, we must employ all or most recommendations in the majority of DoD's programs
- The Challenge lies in leadership, education, and implementation

All of the things we've talked about have been applied somewhere in the acquisition cycle at some time with great success. The big question is: Can we make that success apply to a broader system? You can't succeed by only working one or two of these changes. You must implement the changes as a complete set. With that as a summary, let me spend the remainder of the time allotted answering questions.

Question and Answer Session

Military Specifications

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Dr. Philip P. Panzarella
Executive Director, ESC

GENERAL HATCH: *Thank you very much, Dr. Panzarella. This is an important subject for our audience. Here is a good lead question. Can we get a copy of your briefing? AFA will distribute a copy of the briefing to all members who have attended the symposium. We will also publish the proceedings of this symposium in detail including the Q and A sessions and we'll distribute a copy to each and every one of you. It is an important part of our mission in life to make sure that other people have the benefit of these symposium presentations and the discussions by our speakers. We'll also provide copies to Capitol Hill and the aerospace industry.*

In the time remaining, I have at least a half dozen questions for Dr. Panzarella. Yesterday following her session, Mrs. Preston was standing downstairs and when asked whether her office was blocking an RFP by reviewing the specifications, she said: "No, my office is not blocking that RFP. But it is one of the worst ones I've ever seen for a non-development item. It is 700 pages long."

Dr. Panzarella, for some MILSPECs there is no commercial counterpart. How would the waiver work for these unique standards?

DR. PANZARELLA: If there is no commercial counterpart and one cannot be established, we'll probably have to use the MILSPEC but it can be tailored to the situation. For instance, in stealth technology there isn't much in the way of commercial standards. Remember, in some cases, we will request alternative proposals. In the solicitations, you will be asked to provide what you think should be the right specifications and standards, and during that time, I encourage you to tailor the spec to meet the performance

of the product. I'm not sure it will be a very formal waiver process. It'll just be the way we do business.

GENERAL HATCH: *Industry has a huge interest in specification reform, but you did not have industry representation on your process action team. Do you believe industry interests were adequately represented?*

DR. PANZARELLA: Yes. Because of the time limitations for my pitch, I didn't mention the federal laws that restrict industry interests. If you have one specific industry segment represented, but others are left out, then some will have a problem with your procedure. To avoid this bias, we invited inputs from associations like SAE and IEEE who represent broad industry viewpoints. In the Air Force, we've been successful using CODSIA for this purpose. But for some reason, it didn't work on this particular panel.

We did receive inputs from industry through Will Willoughby talking to industry — the specifications and standards associations. Even though they couldn't be formal members of the PAT, we didn't leave out industry. In fact, we distributed preliminary drafts of our report to industry, and we received almost a thousand comments. Before they can become formal members of the team, we need changes in the law to allow it.

GENERAL HATCH: *Thank you, Phil. What effect would commercialization of specifications and standards have on procurement data?*

DR. PANZARELLA: That is a very good question. In much of our procurement data, we already have a strategy to reengineer the data so it is more commercial. We are using performance specifications in the procurement process. It is a little more expen-

sive, and that is going to hurt part of the cultural change. But, in the microelectronics area, we've taken mil spec logic circuits, and converted them to IEEE VHDL descriptions and then put out that description to commercial processes to obtain a product. It has been very successful. The Air Logistics Centers are all pursuing this, but the one doing the most business is Sacramento Air Logistics Center. They put out a \$650 million contract for commercial processes using IEEE descriptive language. They are using a commercial processes on their chips and in the last three years, they've done over \$320 million worth of business. They are resoliciting the contract because they are going to use it up.

It can be done, and it will be the trend. Unfortunately, it is expensive up front. In the microelectronics case, it was not too expensive. According to the Pentagon and Boeing Electronics, in one of those logics, it takes \$76,000 to take your tech data package and give it to another manufacturer for production. That is \$76,000 per logic. The cost is tremendous when some jobs have 86 TTL logics. Using commercial specs, we finished 86 TTL logics — including prototype chips as well as the VHDL IEEE language — for \$200,000. That is a huge savings. In the report, it suggests savings of about \$300 million on just that area in microelectronics.

GENERAL HATCH: *Thank you, Phil. The next question asks about the potential for increasing subjectivity in evaluations. Will moving to performance specifications create a significant change in the way industry will propose and government source selection will evaluate and select successful*

contractors? How will you mitigate the risk, both to industry and the Air Force by the increased subjectivity which will be exercised by source selection evaluation boards and source selection authority?

DR. PANZARELLA: That is a very key question. Because we don't do source selections very well, we're going to have more up-front resources and source selection. We're going to have more highly qualified people on those source selection teams. We're going to burn a lot more time and energy getting to the right solution early in the process. On the PAT, we maintained that good administration of the process will save money overall. Up front in the source selection process, we must have smarter, better, and higher qualified people for longer periods of time to make sure that we don't have arbitrary subjectivity creeping into the process.

GENERAL HATCH: *Thank you, Dr. Panzarella. We have one final question. You mentioned that the report would be out in about a week and would talk about changing the regulations. Do you have any idea of the timeline needed to move these draft changes to laws over on the Hill?*

DR. PANZARELLA: Colleen Preston said that Mr. Deutch had signed out the cover letter for the report which is at the printer. We put timelines on all of the recommendations, and I must refer you to the report for that information. Those timelines will be monitored by Mrs. Preston's staff.

GENERAL HATCH: *Thank you so much Dr. Panzarella. We thank you for being with us today.*

Integrated Product Teams

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Panel: **Major General (S) Robert F. Raggio**
F-22 Program Director
Mr. L. Gary Riley
Vice President & General Manager,
Lockheed F-22 Program

MAJ. GEN. (S) RAGGIO: We we are going to talk about something that we've been implementing now for three years in the F-22 SPO [Systems Program Office]. Gary and I are privileged to have inherited a program from giants like General Jim Fain [Lt. Gen. James A. Fain, Jr., Aeronautical Systems Center] and Mickey Blackwell who laid in a structure that is magnificent and is working well today. These people went to great lengths to change the culture and to establish a structure that is still working today.

There are a lot of people who are going to run over the same road. We did some things right, and there were some things that we could have done better. There are also pitfalls to watch on implementing IPTs. If you don't take them into account, you are really kidding yourself. That is what we'd like to concentrate on in this briefing. Gary and I will give it together because we frankly do everything else together.

MR. RILEY: Almost everything.

MAJ. GEN. (S) RAGGIO: I was going to say that sometimes our spouses think we spend more time with each other than we do with them.

The purpose of the F-22 program is to develop, field, and support the next generation air superiority fighter. That has not changed and will not change. Secondly, the purpose of the program is to establish a standard of excellence for acquisition.

Today we will discuss the Integrated Product Development (IPD) philosophy; the organizational changes that were required for us in the government and on the contractor side; the implementation of metrics — without which I don't think IPD works; the lessons we've learned; and then we'll give a quick summary.

What Is IPD/IPY?

"Integrated Product Development Is A Philosophy That Systematically Employs A Teaming Of Functional Disciplines To Integrate And Concurrently Apply All Necessary Processes To Produce An Effective And Efficient Product That Satisfies Customer's Needs."

Purpose Of F-22 Program

- Develop, Field, and Support the Next Generation Air Superiority Fighter Weapon System
- Establish the Standard For Acquisition Excellence

This is a good definition of IPD. I've seen a lot of them and this one really does capture its character very well. It comes from the Air Force Materiel Command IPD guide. It states it is a philosophy for bringing all of the different disciplines together. A very important point is that you do IPTs to affect IPD.

If your objective is not to do Integrated Product Development, and you just want to establish a bunch of IPTs, I think you are missing the point. The point is you want to do

Reengineering the Industrial Base

integrated product development and you are doing integrated product development by the formulation of integrated product teams — which is no more than the right people with the right expertise, tools and dedication. That's what constitutes an IPT.

The Bottom Line Is...

IDP IS NOT ABOUT
CHANGING *WHAT* YOU DO

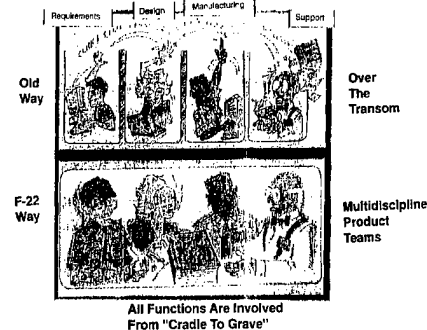
ITS ABOUT CHANGING
HOW YOU DO IT!

The bottom line is it is not changing what we do, but changing how we do it. It doesn't make program management any easier. We still have the challenges. We still have the every day battles. We still have all of the same constraints. It makes the product better.

MR. RILEY: I just want to make one little interruption. When General Raggio talks about change, one of the things that we have learned is that IPTs are not all that new to industry or to the Air Force. We've been doing them on a much smaller scale for many years. In the black world, it is almost forced upon you. You didn't call it IPTs. You called it compartmented programs. We discovered during that experience if you can get everybody working together, up front, that changes which are inevitable get accomplished much earlier in the program phase. The earlier you capture the changes, the cheaper they are to incorporate.



"Over The Transom" Method Is Out



In the past we used to define the concept, hand it off over the transom to the designers, then over the fence to the manufacturing branch, and ultimately down to the support side. We'd find changes that were required to meet each one of those disciplines became more and more costly over time. Thus, the earlier you catch a change and the sooner you incorporate it, the less costly that change is going to be.

The problem, of course, is that it costs much more, up front, to bring those multidiscipline teams together. What we've now done is shorten the time span necessary and mashed them together. When we are able to incorporate changes, minimize them, and make the changes early in a program, the cost impacts to the program are much less.



Environment



- Roles Of The Government And Contractor Have Changed Dramatically With The Use Of Cost Type Contracts, Since It Shifts The Balance Of Risk
 - Government Assumes Total Cost Risk
 - Government Must Be Part Of All Decisions

FIXED PRICE CONTRACT

- Contractor Assumes Total Cost Risk
- Contractor Must Deliver Product Regardless Of Cost
- Requirements Must Be Well Defined Which Normally Translates Into Detailed Specs
- Potential For Adversary Gov't/ Contractor Relationship

COST PLUS CONTRACT

- Gov't Assumes Total Cost Risk
- Contractor Performs Best Effort Toward Delivery Of Product
- Requirements Must Be Broad (Flexibility) & Design Trades Must Be Accomplished
- Potential For Team Building

Balance Cost/Schedule/Performance With Structured, Disciplined, Clear Guidance

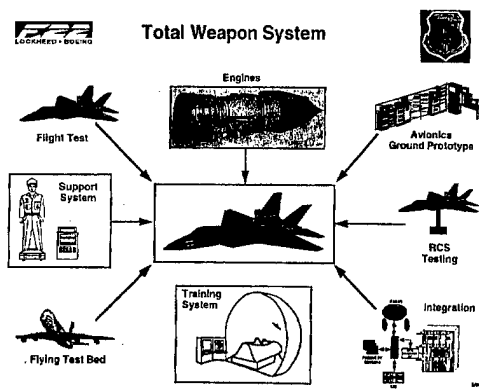
MAJ. GEN. (S) RAGGIO: As we go through this discussion on F-22 IPTs, it is important to note that a lot of the philosophy is applicable to other programs. However, every individual program has to tailor IPD and IPT for themselves. You can't take the F-22 approach and use it in a cookie cutter fashion.

A big change in the environment on F-22 is the contract type. This is a cost plus contract. This is the old fixed priced contract and these are the things we dealt with under fixed price. There definitely was a potential for adversarial government contracting relationships. Under a cost plus contract arrangement, there is a tremendous environment for team building. There is only one pot of money. And, every dollar spent by the contractor comes out of that one pot. He will do whatever you want him to do and it all comes out of that one pot. So this is really teaming because the pot doesn't get refilled.

MR. RILEY: Our portion of the contract is about \$11 billion and covers everything but the engine. We have a supplier base that is nation-wide.

We talk about the diversity of the cultures of the program. When we sit down and compare notes concerning the cultural changes within the Air Force and the cultural changes within the industrial community, the changes are very similar.

We found if you don't have the support of top management, the implementation of an IPT and IPD concept isn't going to happen. We brought together on the contractor team, not only the three major contractors — General Dynamics (now Lockheed Fort Worth), Boeing and Lockheed — but also over 1,100 major suppliers throughout the country. We have found that without changes to the management styles within each of those companies, from the CEO on down, then implementation of the IPT philosophy has been ineffective. We've had to make changes throughout the teams and throughout the supplier community to implement that philosophy. General Raggio has had the same experience in the Air Force community. There are those who are believers and there are naysayers out there. Dr. Panzarella suggested that change must be cultural for it to be effective and long lasting, but the cultural change has to really start at the top. Lip service doesn't cut it in this environment.

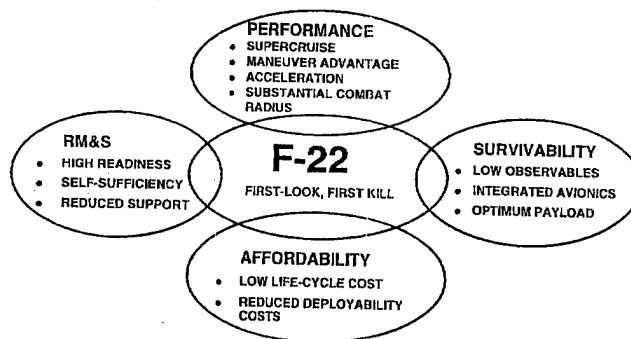


MAJ. GEN. (S) RAGGIO: Another thing that is different about the F-22 is that we are talking about a total weapons system — the air frame, engine, support systems, training systems, and all of the other stuff that feeds into those. Right away you start seeing the formulation of four different IPTs — separate and distinct.

The engine is really a subsystem of the airframe, but it is a separate contract with Pratt and Whitney. My other teammate, Walt Bylciw is sitting right out there in the audience and could be right up on the stage giving the same talk in the same place with Gary Riley and me because the relationship between Pratt and Whitney and the SPO and the relationship between Lockheed and the SPO are exactly the same. In fact, the cooperation between Lockheed and Pratt and Whitney in the F-22 program is something that is unprecedented.



How Do We Achieve A Balanced Design?



Reengineering the Industrial Base

This is what makes IPTs the most valuable, but it's one tough thing to do on a daily basis. When you are shooting for performance, survivability, affordability and maintainability, it is really tough to reach the optimum balance. If you don't have people from all of those disciplines on the IPT, you are not going to get a balanced design. We have a cardinal rule on the IPTs. If anyone walks away from a session on an IPT saying, "I've got every thing I wanted," then you probably don't have a balanced design. That discipline probably got more than it should have gotten because everybody should leave the IPT team with, "I had to give up something to get the balanced design."

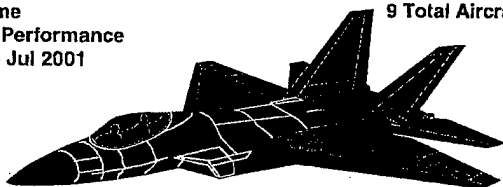


Aircraft EMD Contract



LASC Prime
Period Of Performance
2 Aug 91 - Jul 2001

Design, Develop & Flight Test
9 Total Aircraft



Cost + Award Fee
- \$11B Program

LASC - GEORGIA

Forward Fuselage
Edges
Horizontal Stabilizers
Vertical Stabilizers
Mate & Final Assembly

Avionics Integration
Common Integrated Processor

Mid Fuselage

Communication, Navigation
Identification
Electronic Warfare
Stores Management System

LFWC - TEXAS

Support System
Training System
Development & Data

BOEING - WASHINGTON

Aft Fuselage
Wings

Radar
Common Power Supply

2624
4251 0N 15

MR. RILEY: Lockheed Aeronautical Systems company is the prime contractor on the F-22 program. The relationships we have with our sister company in Fort Worth (formerly General Dynamics) and with Boeing, are those of teammates not as subcontractors. In working with the three teammates, we have to continually reinforce that we are in this as a team and not as a prime-subcontractor relationship.

We have nine flying aircraft that we are building. Two of them are two place. We are also building two ground test articles, a static and fatigue.

When the program was initially set up, it was three major corporations — Lockheed,

General Dynamics, and Boeing — trying to divide the airplane up into thirds. We were trying to ensure that we each had an equal third of the manufacture and design.

Lockheed-Marietta is manufacturing the forebody, the edges, and the empennages. Lockheed-Fort Worth manufactures the midbody. Boeing is manufacturing the wings and afterbody.

A tremendous amount of integration has been required across the three companies. I believe without IPTs, we wouldn't be able to implement the kind of rapid changes in the corporations and the rapid transmittal of data between the three companies as well as we are.

We have several IPTs which are made up of members from all three companies. We'll have an IPT leader who has a group — say in armament — who has people working for him from all three companies. They will spend time at their home company and they will spend time in a co-located facility. The members of the IPT do not think of themselves as working for Boeing, Lockheed-Fort Worth or Lockheed-Marietta. They work for the armament IPT.

MAJ. GEN. (S) RAGGIO: I would say that this is a double-edged sword. It would be a lot simpler to have one contractor in one location doing F-22. But I wouldn't want to have to pick just one of our present contractors because each of them bring individual strengths to the program. I think we've capitalized on those individual strengths. However, the fact is that having three companies in three places increases the integration effort.



Engine EMD Contract



Design, Develop & Test
18 Installed Engines And
9 Spares

Pratt & Whitney Prime



Cost + Award Fee
\$1.65B Program

Support System
Training System
Development & Data

The engine development effort is a little more straightforward. Walt Bylciw runs the engine program out of Pratt and Whitney as the prime contractor. It is a cost plus award fee program worth \$1.65 billion. Included within the contract are also the support systems, training systems, and development and data.



F-22 Team is Widely Dispersed

- 26 Major Subcontractors - Total Of 1,150 Suppliers
- 42 States Plus Puerto Rico
- Total Projected Direct Employment 15,000 EMD & 27,000 Production

GE

Fairchild

Sanders/GE

Parker

Curtiss Wright

TRW

TI

EDO

WEC/IT



Walter Kilde

Lear

Harris

Litton

Kaiser

Sanders

Rosemount

As Gary said, we are talking to 26 major sub contractors and a total of 1,150 suppliers in 42 states and the Commonwealth of Puerto Rico. There are 15,000 jobs in EMD and another 27,000 projected in production. We couldn't have pulled all that together without the IPD environment.

Integrated Product Teams

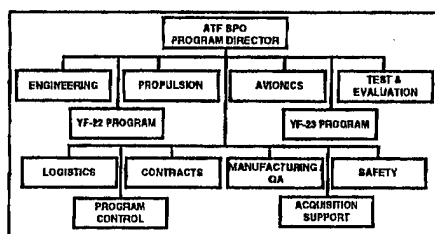
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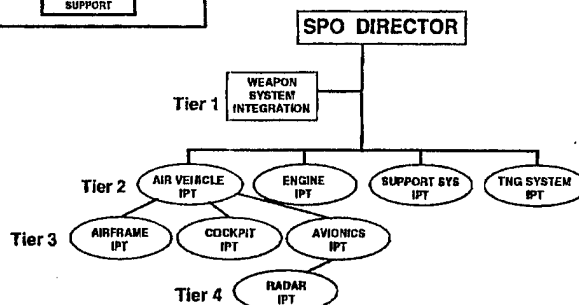
The SPO Made Organizational Changes



From A Functional Oriented SPO



To Integrated Product Teams



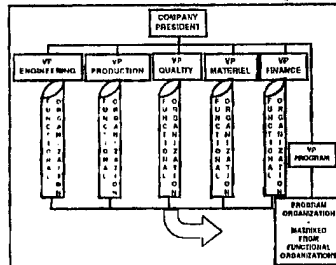
The SPO made organizational changes from how we were structured in the demonstration/validation (dem/val) phase to how we're organized now. Instead of having the breakdown by functional disciplines common to other SPOs, we have a weapons system integration group that consists of the functional leads that tier down.



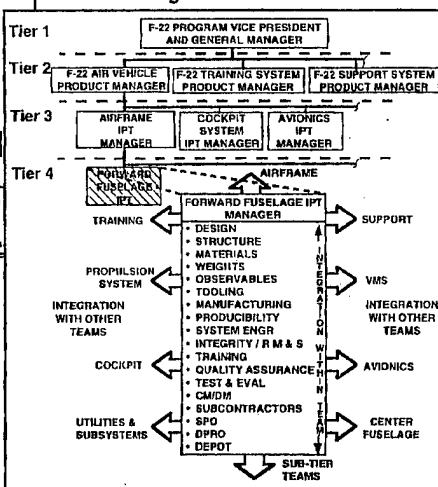
... And So Did The Contractor



From Functional "Stove Pipes"



To Integrated Product Teams



MR. RILEY: In the past, our company was organized with "stovepipes." We had strong functional organizations that provided resources to each one of the lines of business that we had — tactical aircraft, airlift and maritime patrol aircraft. What we've done for the F-22 program is to create the IPT structure.

In our forward fuselage IPT that is worked in Marietta, we have a team made up of individuals from design, structures, materials, manufacturing, tooling, etc. Every one of the representatives of these functional branches that make up the IPT is co-located. They provide the expertise that is necessary to make sure we cover every piece of the airplane during its development. Representatives from the SPO, DPRO, logistics and training organizations are also members of our IPTs. Also included are the suppliers. We have people also out of the supplier community that are co-located in almost all our IPTs.

To assure the integration of the team's efforts, we have "Analysis and Integration" IPTs that function in a systems engineering capacity at each and all IPT levels. At the tier-two level, all IPTs report to one of four product managers: Air Vehicle, Support Systems, Training Systems and Systems Test. The product manager is accountable for product completion — design through manufacture.

MAJ. GEN. (S) RAGGIO: We are trying to blur the lines of who an individual is employed by. We want them to identify with being a member of their IPT.

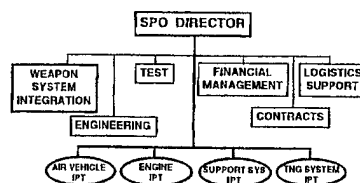
This is very important. The DPRO at every location is a part of the IPT — part and parcel of the every day operation of the IPT. Also, on the SPO side, you have an exact replica of the company at each tier. Everybody has a counterpart. Issues can be resolved at the lowest level possible. It builds trust and if the trust is not there, you can see it right away. You really can.

MR. RILEY: Before you go on Bob, you mentioned our tier-two leaders (product managers) representing the three companies. Two are Boeing employees, one from Fort Worth and the other Marietta. Reporting to me are three program managers, one at each company. They are accountable for the performance of their piece of the program for their respective company.

MAJ. GEN. (S) RAGGIO: If I had to pick one key point on the success of IPTs and the F-22, it is that the organizational structure of the IPTs matches the work breakdown structure, or the work breakdown structure was built into the IPTs. The funding flows through the IPTs. Statements of work are generated by the contractor, an RFP, request for proposal, is generated and developed into an Integrated Master Plan (IMP). These are the things that make up a contract.



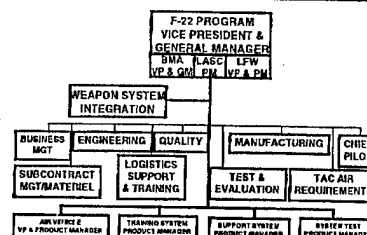
Organizational Compatibility



- Contractor & Government Organizations Mirror One Another
- IPTs Are Responsible For All Aspects Of Product Development, Manufacture, Test, And Delivery
- Issues Are Resolved At The Lowest Practical IPT Level

REQUIRES:

- Frequent And Open Communications
- Mutual Trust Between Team Members



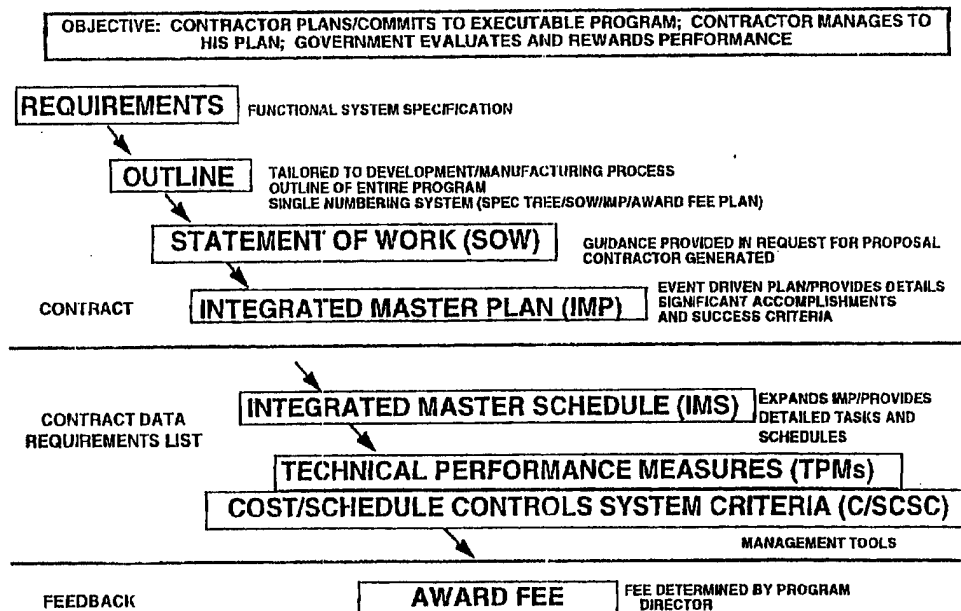


Integrated Management Structure



Integrated Product
Teams

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to track his task accomplishment. Motivation is provided through the award fee. That is the profit line for the company.



IPT Management Tools



- Every Individual/Team Has A Tool Set
- Tool Set Begins With Identification Of A WBS Item (e.g., 1000 - Air Vehicle, 1500 - Vehicle Management System)
- Tool Set Includes:

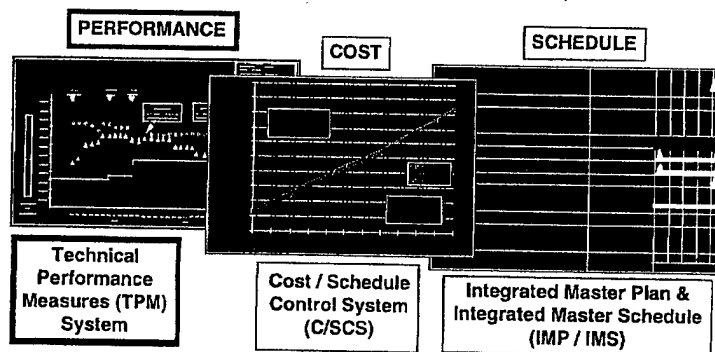
- SOW Task - IMP Section - Specification Paragraph - Budget	PLAN AND COMMIT
- Technical Performance Measures - C/SCSC - IMS Section - Award Fee	TRACK
	MOTIVATE

Every IPT manager, every person on every team, has the same IPT management tool set.

It begins with his work break down structure (WBS). The tool set includes his statement of work (SOW), his integrated master plan (IMP) section, his specification paragraph and his budget. That is what he uses to plan and commit. He uses technical performance measures (TPM), cost/schedule controls system criteria (C/SCSC), and his section of the integrated master schedule (IMS)



Implementation Metrics



Now we'll talk to each of these areas, performance, cost and schedule. This is where we are implementing the metrics, without which this system does not work.

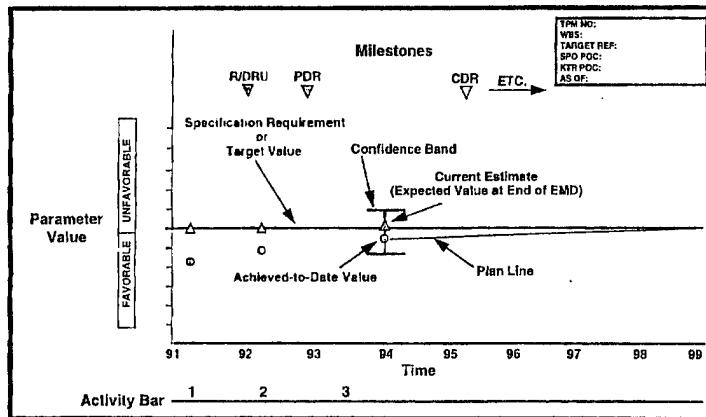
Let me speak to one of our favorite tools here — technical performance measures (TPM). This is really the F-22 metric. We've

Reengineering the Industrial Base

got this same format for all of the metrics in the program, including the ones for production of the engine at Pratt and Whitney.



The F-22 Metric Technical Performance Measure (TPM)



What is important about the metrics is that the SPO counterpart is identified, the contractor counterpart is identified by name, and the rose is pinned upon that person's chest. He is responsible for knowing what is in that metric and what affects that metric.

Also identified in the metric are the milestones and target goals, what has been achieved to date at any time in the program and what is projected at completion.

There is an interesting story behind why it was named a "technical performance measure." The first ones that were really integrated completely in the IPTs were the engineers and the managers. In retrospect, that was probably the easiest one. I'd say we're about 90 percent done there. The next one is much tougher — the business end — integrating that on to the IPTs. We're still not completely there yet, we're still working on that. In integrating the engineers, we found that one of the cultural barriers was that an engineer paid attention to technical things. That was their legacy. So, we called them all technical performance measurements (TPM) to encourage the engineers to pay attention to them, whether it was technical or not.



Critical Characteristics

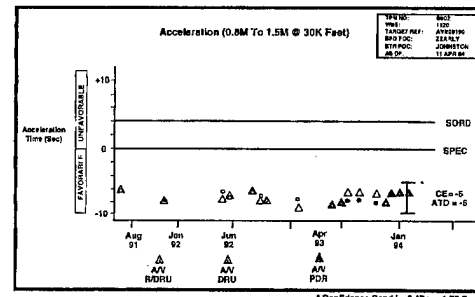


- Radar Cross Section
- Combat Radius
- Supercruise
- Radar Detection Range
- Acceleration
- Independent Airlift
- Maneuverability
- Sortie Generation Rate
- Payload
- Mean Time Between Mx

I think we've done a marvelous job of solidifying the requirements with our user. There are ten characteristics that are in the acquisition program baseline — radar cross section, supercruise, acceleration, maneuverability, payload, combat radius, radar detection range, independent airlift, sortie generation rates, and mean-time-between-maintenance. Each of these have a TPM.



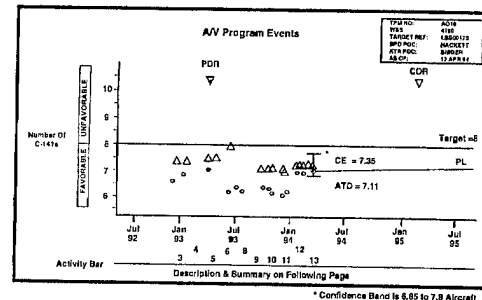
Acceleration TPM



For example, you could pull up the TPM on acceleration conditions and identify the zero-point, the data we are tracking and a confidence band for the final data.



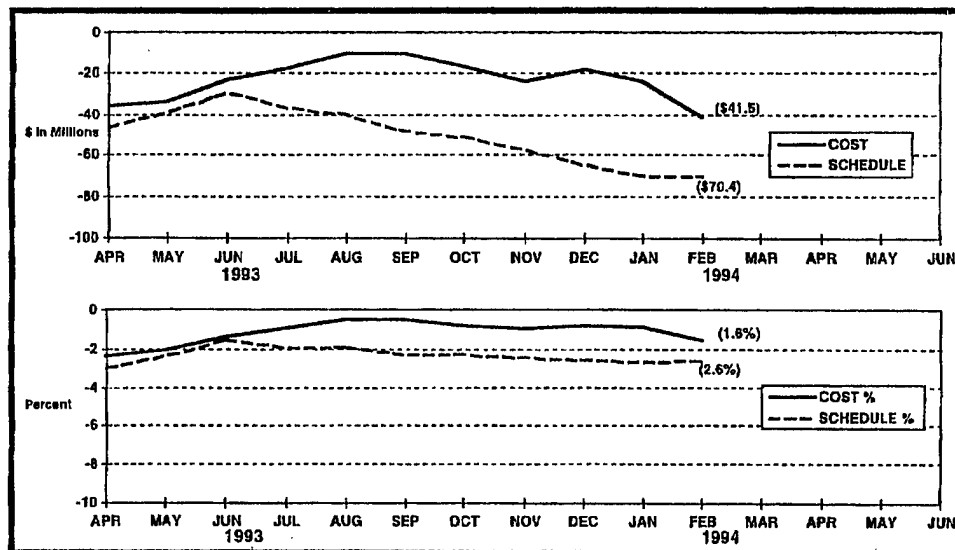
Independent Airlift TPM



This next example is less technical but tracks independent airlift. Under certain conditions, to deploy, we must carry all the gear for the F-22 on eight C-141s. When the "loggies" started putting more stuff on the plane, we started to bounce over the line. By tracking this data, our review spotted the trend and we said if it doesn't fit on eight C-141s, they are not taking it. When you use the measurements in your reviews, the system works.

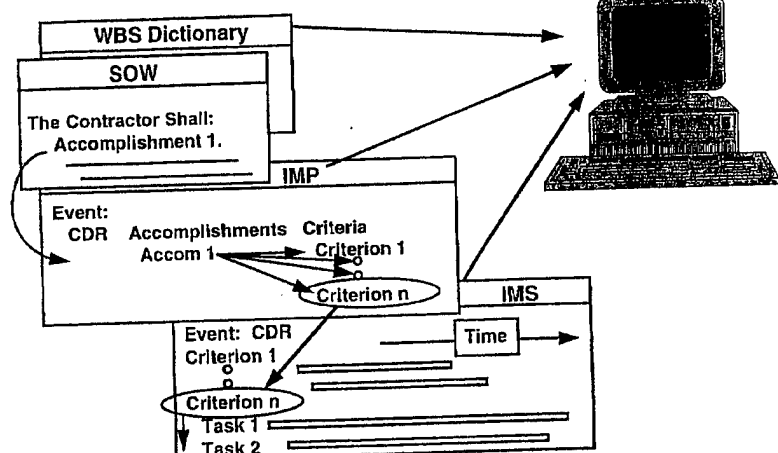


Cost Performance (C/SCSC) (Cumulative Variance Trends)



As Of: Feb 94

MR. RILEY: We use similar metrics for cost. We measure both cost and schedule as a percent of performance. We are correctly tracking within 2 percent of cost. All of our TPMs are reviewed regularly and action plans reviewed as appropriate at our program management reviews. We're doing quite well from the standpoint of overall cost performance, but we continue to track ourselves very hard.



MAJ. GEN. (S) RAGGIO: And, then the last area is the schedule, our integrated Master Plan (IMP) and Integrated Master Schedule (IMS), and how those two work together. Essentially, the statement of work states the contractor shall accomplish certain requirements.



IMS Used To Manage Schedule Progress



EVENT	SIGNIFICANT ACCOMPLISHMENT ACCOMPLISHMENT CRITERIA TASK	ACTIVITY NUMBER	SDW REF
VMS CRITICAL DESIGN REVIEW (CDR)		J03	1880
VMS DETAILED DESIGN COMPLETE		J0306	1880
VMS COMPUTER RESOURCES CDR COMPLETE FOR EACH CDR		J030616	1890
MEDS DEMO/REVIEW UPDATE (DRU) COMPLETE		J030616A	1910
PICC CDR COMPLETE		J030616B	1910
POWER SUPPLY CDR COMPLETE		J030616C	1920
METS CDR COMPLETE		J030616D	1920
TPS CDR COMPLETE		J030616E	1920
TPS SW CDR COMPLETE		J030616F	1920
VMS VKS CDR COMPLETE		J030616G	1920
VMS VKS CDR COMPLETE		J030616H	1920
VMS VKS CDR COMPLETE		J030616I	1920
VMS VKS CDR COMPLETE		J030616J	1920
VMS VKS CDR COMPLETE		J030616K	1920
VMS VKS CDR COMPLETE		J030616L	1920
VMS VKS CDR COMPLETE		J030616M	1920
VMS VKS CDR COMPLETE		J030616N	1920
VMS VKS CDR COMPLETE		J030616O	1920
VMS VKS CDR COMPLETE		J030616P	1920
VMS VKS CDR COMPLETE		J030616Q	1920
VMS VKS CDR COMPLETE		J030616R	1920
VMS VKS CDR COMPLETE		J030616S	1920
VMS VKS CDR COMPLETE		J030616T	1920
VMS VKS CDR COMPLETE		J030616U	1920
VMS VKS CDR COMPLETE		J030616V	1920
VMS VKS CDR COMPLETE		J030616W	1920
VMS VKS CDR COMPLETE		J030616X	1920
VMS VKS CDR COMPLETE		J030616Y	1920
VMS VKS CDR COMPLETE		J030616Z	1920

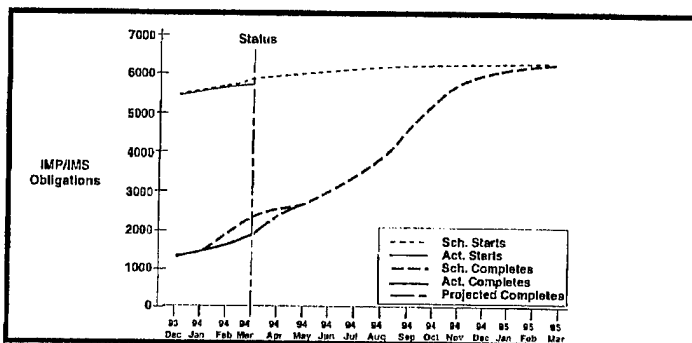
- The IMP Is Expanded To Incorporate All Detailed Tasks Required To Accomplish The Individual IMP Criteria
- The Tasks Are Then Applied Against A Time Line To Develop The IMS
- System Is Automated On Artemis™

MEDS DESIGN REVIEW UPDATE (DRU) COMPLETE	J030616A	
PICC CDR COMPLETE	J030616B	
POWER SUPPLY CDR COMPLETE	J030616C	
METS CDR COMPLETE	J030616D	Completed 182002
TPS CDR COMPLETE	J030616E	
TPS SW CDR COMPLETE	J030616F	
VMS VKS CDR COMPLETE	J030616G	
METS SOFTWARE BASELINE RELEASED	J030616H	
VKS CDR UPDATE COMPLETE	J030616I	
PICC SPEC V&V PLAN COMPLETE & AVAILABLE	J030616J	
ACTIVITY NAME	ACTIVITY CODE	A M M M A S O N D J F M A M J J A S O N D
		1993 1994

4035.0R 35



Schedule Performance Air Vehicle IMS Tasks to CDR Total for All Schedules



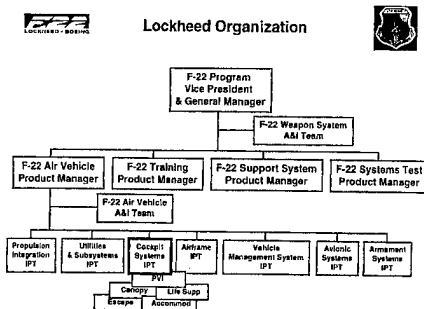
Sch. Starts	5474	5620	5717	5757	5802	5878	6027	6010	6187	6223	6254	6263	6272	6275	6275
Act. Starts	5123	5803	5826	5782											
Delinc. Starts	6	18	25	27											
Delinc. Starts (Cum)	10	32	57	64											
Sch. Completes	1320	1505	1665	2053	2682	2727	2984	3340	3827	4558	5324	6740	6982	6158	6275
Act. Completes	1354	1478	1636	1872											
Delinc. Completes	42	490	556	635											
Delinc. Completes (Cum)	14	23	231	208											
Behind Sch. (Cum)	0	0	0	68											

As of March 94

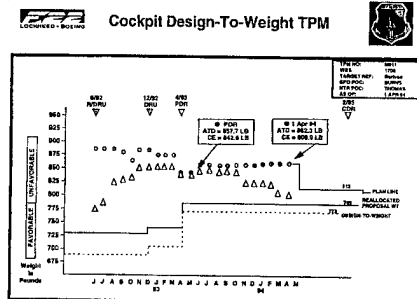
Those requirements become part of an event. For example, one event may involve a critical design review (CDR). For each required accomplishment in the statement of work, we have established criteria and a schedule of tasks. This becomes the Integrated Master Schedule.

Anybody on our computer network can pull up an event and review the performance criteria, tasks, and milestones. All this is on a data base called "Artemis."

When I go into a review and ask how many tasks have been closed, how many have been opened, how many should have been opened, and how many should have been closed, and I'm able to get the answers.



MR. RILEY: Now, we will move from the generalities of what we do to a specific example using the actual charts to measure the cockpit system IPT. This is a tier-three IPT.



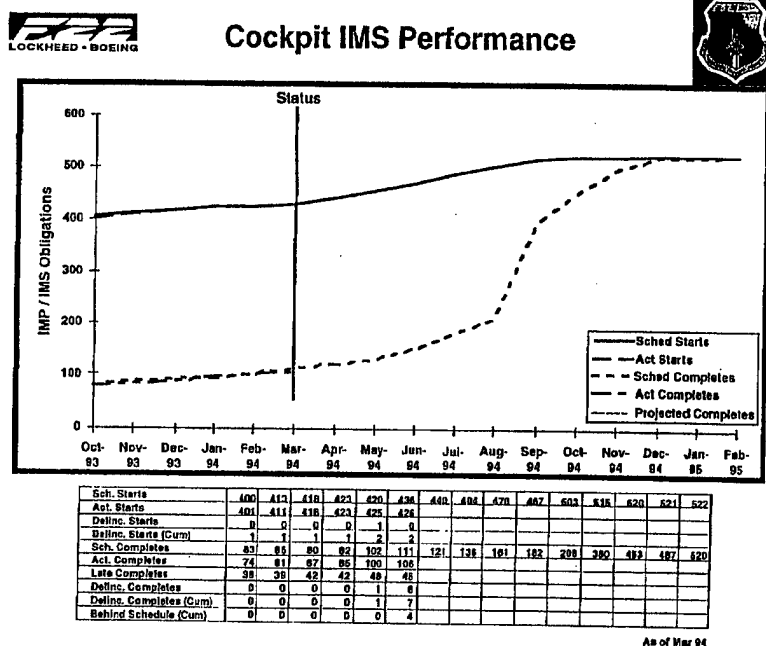
One of our performance TPMs that gets an awful lot of publicity is weight. As we have progressed in the development of the aircraft, the weight has risen. We have a plan of how to accomplish weight improvements with a view toward returning to the proposal weight.

For example, Kevin Burns in the SPO and Ken Thomas at Lockheed share the responsibility for monitoring this TPM for the cockpit IPT. Costs have also increased in the cockpit design area and we are working to reduce those costs.

MAJ. GEN. (S) RAGGIO: In the last decade, costs, schedule and performance date fell into disrepute because the data was always 90 days late and nobody paid attention to it. General Fain demanded in the contract that the bidders give him firm financial data 30 days after end of month close out. He also demanded that they give him flash data, first look data, five days after close out. Everybody said that's impossible. I'm telling you, it is not impossible; it is being done today. Flash data is not good data, it has a lot of mistakes in it, but once the IPTs look at it and

confirm the mistakes, the data that is in at 30 days is good, hard financial data.

MR. RILEY: That was not an easy task when you consider that the majority of all IPTs have to incorporate their supplier cost data as well. One of the hardest hurdles to get over is making sure you have current supplier data. It now takes us about three weeks to get complete cost data available bettering the 30 days required in the contract.



For example, we are tracking performance for the Cockpit IMS. There is still an evolution of the process as we work the IPTs and the TPMs associated with them. For some activities, we didn't have a good handle on the status. We have now expanded the measure to include a look at how we are tracking all the work that is taking place. For the Cockpit IMS, we have 323 items in work and we use the "Artemis" system to check on what is ahead or behind schedule and then assess the impact.

Reengineering the Industrial Base



Award Fee Process



- Award Fee Is A Motivational Tool
- F-22 Contractors Selected Based On Their Plan To Deliver A Weapon System On Schedule, On Budget, That Meets Specifications
- F-22 Award Fee Process Is Outlined In Award Fee Plan
 - Each Period Culminates With An Award Fee Decision By The Fee Determining Official Based On A Recommendation From The Award Fee Review Board
- The F-22 Award Fee Process Is A Win-Win Proposition

MAJ. GEN. (S) RAGGIO: What you just went through was a program review of the cockpit IPT. That is how we take all of the reviews on all of the IPTs. Gary and I take the reviews at the tier-three IPT level. We spend a lot of time looking at tasks where we're behind. We hold a lot of detailed discussion on those areas and focus in right away on each team because it team is a little sub-SPO. Each team operates in their own decision space and their own reporting. Now, the big trick is to integrate that.

We used to integrate functions in the old projects office in the SPO. Today we are integrating products across IPTs. You still have to do that integration, otherwise that becomes an independent product team and not an integrated product team.

In the end we have the award fee, and here's the philosophy of award fee on F-22. It is a cost plus contract. The contractor states right in the statement of work what he will perform — cost, schedule, and performance. He built the triangle to stay in. In staying in the triangle, he has the opportunity to earn 100 percent of the award fee. It is not for work "extra and above" the contract.

We don't want any extra and above work done. We want exactly what was promised. That will earn 100 percent of the award fee. It is a win-win situation.



F-22 Lessons Learned

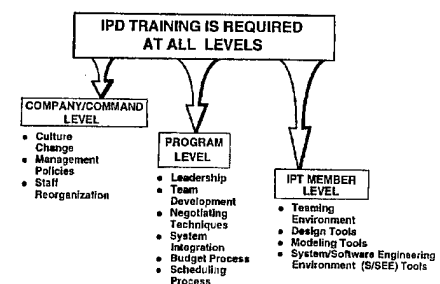


- IPT Training Is Essential At All Levels
- The Idea Is To Employ IPTs To Accomplish Integrated Product Development
- IPT Philosophy Takes Leadership Commitment from the Top on the Part of Both Government and Contractor
- Management Cultural Changes Do Not Occur Overnight
 - Functionals Tend To Flock!
- IPTs Must Have Experienced And Empowered Members
- The "I" In IPT Can Easily Become "Independent" Vice "Integrated"
- Integration Across The IPTs At Every Level Is Absolutely Imperative

Let's get to the lessons learned. This is the most important part. Don't ever underestimate the amount of training that is necessary to implement IPTs. By training, I mean training at the company and command level. If you don't have a culture change within the leadership — from the CEO leadership down — forget it. The policies have to be changed. The staff has to be reorganized and that commitment is not simple to get at the top. It is a lot simpler to get lip service than it is to get real action. Believe me, the CEOs of Boeing, Lockheed and Pratt and Whitney have bought in at the CEO level, I am convinced.



F-22 Lessons Learned (Cont'd)



At the program level it is equally important. It becomes important at each of the IPTs. We have sent each of our IPTs in the last two years to an individual conference away from the normal workplace. We have to do that periodically just to keep it going because the natural state is to fall back into the way we've always done it.

As I've said, the idea is to employ IPTs to accomplish integrated product development, not just to do IPTs. IPD must be the end game.

Functional leadership must be handled with care. If not explained properly, you are going to have all of your key functional people go into a defensive crouch because they think it is the end of their existence. Nothing could be further than the truth. Nothing. IPTs require more functional involvement, not less.

The functional responsibility becomes one of ensuring that each of those IPTs have the right people on it. We have found that not everybody is right for an IPT team and, believe me, not everybody is made up to run an IPT team. When you've got the wrong person there, you've got to have the ability to put the right person in. IPTs must have experienced people — very experienced people. They have to stand alone and unafraid out there, so they have to be experienced and they have to be empowered. It is also easy to become independent rather than integrated. You have to watch that.

We've found that at every level — tier-one, tier-two, tier-three, tier-four — we had to establish an integration team. An analysis and integration team was needed to keep the level integrated. Without it, we had problems.

MR. RILEY: Let me just add some experiences we had when we first selected the IPT leaders. Basically, we took the lead engineer in each discipline and made them the IPT leader. That was unfortunate in a few cases, not only for the team, but also for the individuals themselves. Not all good engineers make good IPT leaders. We have made changes where we now have manufacturing people leading an IPT in the design phase because they turned out to be the best leaders. It is an integrated team and, remember, we have manufacturing on that team along with support and training assets as well.



F-22 Lessons Learned (Cont'd)



- IPT Managers Must Have Authority Over Personnel And Budget Resources
- An Integrated Network Of Communications Software Tools Is Mandatory
- Physical Collocation Of Core IPTs Is Essential And Collocation Of Dispersed Teams Is Required On A Periodic Basis
- Set Team Goals And Objectives - And Track Them!
 - Ensure All Team Members Participate In Decisions
 - Develop Meaningful Team Metrics

One of the hardest things to do is to get people to give up budget authority. The IPT leader has the total budget authority not only for the functional branch that he was selected from. Getting over that hurdle was a major accomplishment.

The three companies came to this contract with different and distinct ways of doing business and we had to establish a common architecture for all systems across all three companies. That caused each of the companies to change the way they did business on the F-22 program. The biggest change is in the software tools themselves. We are completely integrated. We are real time. There are work stations talking to work stations, just as if they were right next door to one another.

It also helps if the IPTs can be co-located. Each company has specific areas of responsibility. For example, the hydraulics team is located in Fort Worth, but they have members in Seattle and Marietta. To make the IPT cohesive, they communicate. We use video teleconferencing five and a half days a week for about 12 hours a day. We also bring those teams together at least once a month, if not more often, to meet in one location and go over common issues.

Finally, team goals and objectives have to be set and tracked. It is always hard to go out and get somebody to set goals and objectives, but once they are down and monitored it makes the job easier to do.



F-22 Lessons Learned (Cont'd)



- Understand Who All Your Customers Are
 - Active Customer Involvement Is Essential
 - Traditional Roles Must Change
- Put The Right People In The Right Job At The Right Time
 - Appoint And Train "Leaders"
 - Replace "Leaders" That Don't/Can't Lead
- Commit to Continuous Improvement

"Understanding your customers" is an issue that has really been an educational process for us. It takes the ability to set up and frankly discuss issues. It's fun to watch new people come on the program. We bring people on from the Air Force and from industry, and you find out that they initially collapse back

Reengineering the Industrial Base

into their functional shells. We just recently had an experience in Fort Worth where we did what we would call our initial dry run of a roll up of an EAC with Air Force participation. It was a shambles. For the new people on the program from the Air Force, the first time they saw it, they questioned what was going on. And, rightfully so. They had never been a participant in a contractor's initial dry run before.

Getting the right people on the right job at the right time is tremendously important. We still struggle with making organizational changes, but the sooner you nip it in the bud, the better off we are.

MAJ. GEN. (S) RAGGIO: You can't do that one without functional support. You need functionals helping you out to select the right people. If you find the same thing that we found, first you think the engineering management is a challenge. Then you keep going and say, no, the bigger challenge is the financial community — bringing them completely in on the IPT team.

MR. RILEY: There are so many stories that go along with what we've done with people and how they've changed their perspective. We have a business manager who was the Vice President of Finance at Marietta who is now the team business manager. We would fight endlessly to get the finance organizations to let go and play in the IPT process. He is now one of the strongest advocates that we have toward IPT involvement — pulling away from the functional finance core and getting out to the IPTs. Finance is probably the last stronghold because it is the company's bread and butter.

Committing to continuous improvement is important. The groundwork was laid by General Fain and Sherm Mullen in establishing the IPT concept and the way we've employed it on F-22 program. It has been tremendous and Bob and I have had the opportunity to really do the refinement that goes with it. There is going to be a continuous need for refinement, and we're still working on it and making mistakes everyday. But we are able to make corrections, get them turned around and learn from each and everyone.



Visible Benefits To The F-22 Program



- Improved Design Maturity
 - Identified And Resolved RCS Problems
 - Air Vehicle Weight Control Program
- User Involvement In Design Solutions
 - All Participants Understand The Issues
 - Enhanced Customer (User) Satisfaction
- Improved Management Flexibility
 - Identify Problems Earlier
 - Get Faster Agreement On Solutions
 - Better Response Time To Contingencies

BETTER MUTUAL UNDERSTANDING OF EACH OTHER'S CONSTRAINTS

MAJ. GEN. (S) RAGGIO: I think there have been visible benefits in the F-22 program. I caution again that you can't take everything we have done and directly apply it to your situation. If you are different in any way, shape or form, you've got to tailor this stuff to your program.



Summary



- F-22 Program Management Is Convinced That The Process Works - Results Are Real And Visible
- Management, Organization, And Contract Structure Are Breaking New Ground In Weapon System Acquisition
- The F-22 Team Organization Is Tailored To The F-22 EMD Program
- IPTs Are Now A Way Of Life For The Program After 3 Years Of Operation
- Each Situation Requires Its Own Unique Solution Based On The Individual Program

In summary, I don't think we can go back on F-22 now. It has been in being three years in the SPO and I don't think people could operate any other way. I think the same thing is true at Lockheed. For a long while, the F-22 program was an anomaly. Then the programs in ASD changed over to IPT — B-2 changed over to IPT and the training systems SPO began using IPTs.

Each situation requires its own variation on the IPT system. I've presented what, from our perspective, is the way to go for us. We are happy with the way it is running right now in F-22. I guess it is time now for questions.

Question and Answer Session

Integrated Product Teams

Integrated Product
Teams

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Panel: **Major General (S) Robert F. Raggio**
F-22 Program Director
Mr. L. Gary Riley
Vice President & General Manager,
Lockheed F-22 Program

GENERAL HATCH: *Thank you, that was a very interesting presentation and a most important one for the U.S. Air Force. We're glad to have both of you in your organizations. With Lockheed-Marietta, Boeing, Lockheed-Fort Worth, Pratt and Whitney, 26 major subs and hundreds of suppliers, how do you move the data? What kind of hook up do you have for information systems?*

MAJ. GEN. (S) RAGGIO: Gary talked about the computer system we established and how all locations are on the "Artemis" data base. I don't think we could ever do it without a computer system that links up all locations and all teams. That is critical.

MR. RILEY: That's right. We have work stations not only at the three major team members, but we also have them out in the supplier community as well. The suppliers also use a common data base. It was a contractual requirement so there is nobody out doing their own thing and using their own databases.

MAJ. GEN. (S) RAGGIO: It is not only the computer systems. When we have a program review, we couldn't afford the travel budget for everybody to travel to one location all the time for meetings. Now most of the meetings and most of the reviews are handled by video teleconferencing at the three locations. It really makes it beneficial because all the members of the team can attend.

GENERAL HATCH: *The next question for General Raggio is, "what has been the Congressional reaction so far to the increased up front risk money required in the IPD process?"*

MAJ. GEN. (S) RAGGIO: For those who understand it, it has been very positive.

One of the biggest hurdles I've had is that there is a tremendous fixed priced mentality throughout the entire infrastructure. And, I don't single out the Congress at all on that. It's true with the Air Force, with OSD, with the Congress and there is a thought process that runs to an "us versus them" fixed-price mentality. I'd say that is the biggest single evolutionary change that still has to be completed. When you are working cost plus and in the cost plus environment, statements like "keep their feet to the fire," "It's their nickel," et cetera are nonsense anymore. That is still to be fully appreciated.

GENERAL HATCH: *In the briefing, both of you addressed the interfaces. We talked about 10 critical characteristics and the logistics growth metric. The question asks about user interface into the IPT.*

MAJ. GEN. (S) RAGGIO: That is an excellent question and if I didn't cover that, I was really remiss. We have pilots from ACC and some of General Loh's maintenance people on the IPTs. They are assigned by tail number, by name, to the IPTs. When we have an issue we need to resolve, we have input from the pilots and maintenance guys right there on the IPT to affect the changes. It works out well. Guys from ACC/DRB are involved in everything on all of the IPTs.

GENERAL HATCH: *Thank you. Two questions addressed to both of you are: "to address the value and the cost of the integrated risk management process implemented on the F-22 program as schedule and funding changes occur; and the other one is as the tasks are completed and the program moves through phases, how do the IPTs change to meet the current tasks?"*

MAJ. GEN. (S) RAGGIO: Let me take the funding one first. It is my favorite subject. I would say that in the two years that I've been on the F-22 program, the greatest challenge to the success of the F-22 has not been a technical challenge. Rather, it has been a funding stability challenge. I firmly believe that we can do a lot of work in the area of acquisition reform and much of that work will be very good. But, the real key to acquisition reform is funding stability for programs.

It is difficult for some people to realize how detrimental a \$200 or \$300 million hit is to a program the size of F-22 program. They will say, "Good God, the budget is \$2.1 billion." The only way that I can explain that to people is to say, well, if you have your own budget and you are doing well and making \$100,000 a year with two or three kids in college, a new car, a new house, and a couple of investments and all of a sudden you have a bad winter and your electric bill doubles. It went up from say, a thousand to two thousand. That thousand dollar increase is a small part of a hundred thousand dollar salary, but if you've got everything else committed on the budget then you may have to take actions to pay that bill which will have serious repercussions for the rest of your budget. When you've got things laid out in an integrated fashion as we have on the F-22, and you take a hit of the size we've been taking for the last couple of years, there are tremendous repercussions throughout the team.

MR. RILEY: I would like to add that it has been one of the most trying experiences we've gone through. If you can recall in the "over the transom" way we used to do tasks, all you had to do was worry about stretching out one of those tasks when you ran into a budget stretch out. Now we are so integrated and are committed to maintaining the integrated product teams, figuring out where cuts can be taken is a much more difficult task. What pieces of that pie have got to slide? What pieces can't be moved? It has been a very difficult task to make the right things happen. It is taxing the IPTs and it is taxing management of the program to make sure that we don't create a disconnect of the IPTs.

The second half of the question dealt with what are we doing as we transition from the

design phase into testing and manufacturing. There is another thing we need to bear in mind too, and that is the big M in this EMD on this program. One of the early experiences from the industry side for those of you that are experiencing this is that a basic reward system was really difficult in coming about. How do you bring in an IPT leader and recognize him? He might have been just a design engineer, a mid-range engineer, but you found out eventually or ultimately he was really the best to lead that team. Each company that we have on our team has trouble with that and we've each approached it differently, but we've all ended up about the same place right now. You treat them almost like you do with field service people. You give them a special bonus during that period of time and recognize that this is a job in transition as you go through it. It has been a tough one to handle, but we will be phasing out a lot of the people. We will be bringing in other skills that are the primary driver for the IPT during that phase of the program.

GENERAL HATCH: *Thank you. The next few questions talk about awards. Is there one award fee equally split between companies or can you give three different fees?*

MAJ. GEN. (S) RAGGIO: There is one prime contractor on F-22. That is Lockheed-Marietta. That is who we have the contract with. That is who gets the award fee. The work split and the sharing of the profits of the award fee is a company issue. And they handle that in their own way. It is one award fee to Pratt and Whitney. It is one award fee to Lockheed-Marietta.

GENERAL HATCH: *A follow-up question asks: "Usually contractors have high expectations, and if the award fee comes out lower, then management changes. What award fee percentage are you currently giving?"*

MAJ. GEN. (S) RAGGIO: I would say the high expectations are probably on my part. I do have very high expectations because I feel we have selected the best aerospace company in the business for this program and we've got the best minds and the best management involved. So, I do have very high expectations on the award fee. The award fee

has been running anywhere from the 80s to the low 90s through the periods and it depends upon each and every period.

MR. RILEY: I believe at the end of each award fee period we have been in complete agreement that there has been an appropriate award. It is a very interesting procedure we go through.

GENERAL HATCH: *The next question refers to a Wall Street Journal story quoting the F-22 SPO that the F-22 will cost \$130 million each for 442 aircraft at 48 aircraft per year. The question asks if that is the right set of numbers? If not, what numbers are you using?*

GENERAL RAGGIO: To answer that question, I'd have to have my code sheet in front of me because every time you talk about unit costs you have to first of all say, are you phrasing those in "then-year dollars" or "base-year dollars." Is it production unit costs? Is it fly away unit costs? It really is a very confusing issue.

My answer is that it doesn't mean a damn in EMD. The EMD program is going to cost what it is going to cost whether we buy 10 or 10,000. The unit cost is based on a projection. We don't know how many F-22s we are going to buy, and no one does.

If you put this into a time span, in 1918 we had the strongest military on the face of the earth. In 1928, ten years later, we couldn't pay the troops. We couldn't buy gasoline. We trained with broomsticks for guns. Ten years after that, 1938, we were trying to take on a threat in Europe and we barely won. It wasn't Desert Storm. We barely won World War II.

If you put the F-22 buy in that same time frame, and say the (Berlin) wall came down in 1989, 1999 is 10 years later. That is comparable to the 1928 point. We are not yet through EMD on F-22. Ten years more and we are not through production. Now I submit that we know no more about what is going to happen 20 years from today than the people at the end of World War I did about what was

going to happen in 1938. I have no idea how many F-22s we are going to buy. Right now it is budgeted to be 442. We may need a lot more, we may need a lot less; however, it doesn't impact the cost of EMD, because the engineering and manufacturing development program is a set program regardless of the number of aircraft.

GENERAL HATCH: *Here is a related question. The GAO has just recommended that the F-22 program be delayed for a number of years. Have you responded to that suggestion and can you describe the major impact this would have on the program and the management structure?*

MAJ. GEN. (S) RAGGIO: Yes, we've responded to it. And it will have grievous impacts on the program. The Pentagon is handling that issue for us. The Air Force has done a thorough review of the GAO report and it was fatally flawed in that it didn't capture all of the emerging threats, specifically in the ground threat environment. It would have a tremendous impact on the program.

GENERAL HATCH: *Another question has to do with your success with the IPT and IPD. Do you have other Air Force program managers and other people from other services coming to see you and picking up on some lessons learned?*

MAJ. GEN. (S) RAGGIO: Yes. And I often hear from General Yates and General Fain that it is part of our job. We've had the opportunity to walk down the path, so, like we said today, we'd like to share some of the lessons we've learned. We have had a lot of visitors, not only from the Air Force, but outside as well. NASA and the FAA have come by. They wanted to see if the program was adaptable to their needs and if it could operate successfully within the constraints forced by their respective operating environments.

GENERAL HATCH: *Once again, will you join me in thanking these two gentlemen for joining us today.*

Depots and Private Competition

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Major General Kenneth E. Eickmann Director of Logistics, AFMC

MAJ. GEN. EICKMANN: Thank you, General Hatch. As you can see from the agenda, I'm here to discuss Depot Maintenance Competition. Are there any questions?

Actually, I am not going to spend a lot of time talking about depot maintenance competition. Competition has been a very highly debated subject recently. We have guidance from the Deputy Secretary of Defense and we are implementing that guidance. I'll talk, however, about some other things we're doing to re-engineer the industrial base.

Before I do that, let me share something with you. Some of you have heard this, but I thought I'd share it with the rest of you. Competition sometimes drives people to do strange things. Similarly, I was on a promotion board recently where some people did some strange things. I thought about it, because I was thinking about what am I going to say to this group. As early as this morning, I was still thinking about what I was going to say to this group.

This board came to mind where some letters were sent to me as the board president. It was obvious after reading the letters that the guys who wrote them didn't know what to say to their audience (board) either. It has pretty much been a tradition you shouldn't write promotion boards unless you really have something to add. If you are just going to chat with the board it is generally not a good idea. If you don't write in complete sentences, for example, it doesn't usually impress the board.

I got a letter from an individual that said, "Dear Sir. Nothing I have done in my career to this point justifies further consideration for any promotions. A cursory review of my record will verify that fact." I pulled his record. He was correct. He was absolutely correct. He said, "You and I both know that

promotions in the Air Force are based on future potential. I have a helluva lot of that, yet untapped. Please keep that in mind (laughter) when you consider me for promotion." So we took another look at his record and it didn't change.

In another one, one of my favorites, an officer said, "Sir, three years ago I had an error in my records. I should have corrected it. I could have gone to the board of military records and had it fixed, but I did not do that. So, the fact that it is still in my records is my fault. I take full responsibility for that. I wanted you to be aware of the error before you consider me for promotion." He said, "Three years ago I got an officer performance report that said I did an outstanding job as a flight examiner-navigator. I want you and everyone in the Air Force to know I am not now, and never have been, a navigator. I am a respectable human being." (laughter)

I started to prepare a reply before the people at the personnel center said not to. I was tempted to send a note back saying thank you very much for your input, signed "Major General Ken Eickmann, navigator." (laughter). Of course, I couldn't sign it. I'm not a navigator, but I thought it would have probably gotten his attention.

Let me now talk about the issues and I'll be happy to answer any questions later.

**DEPOT MAINTENANCE
COMPETITION (DMC)**

- DEPSECDEF MEMORANDUM, 4 MAY 94, DEPOT MAINTENANCE OPERATIONS POLICY
- PUBLIC/PRIVATE COMPETITION DISCONTINUED
- PUBLIC/PUBLIC COMPETITION DISCONTINUED
- SAME EFFICIENCIES CAN BE GAINED THROUGH INTERSERVICING

We have a letter from the deputy secretary of defense, dated May 4, that says, public/private competitions and public/public competitions will cease for now. We've implemented that.

**DEPSECDEF 4 MAY 94 TASKING TO
AIR FORCE AND NAVY**

- JOINTLY DEVELOP A PLAN TO IMPROVE AVIATION DEPOT MAINTENANCE INTERSERVICING
- USE MOST PROFICIENT DEPOT TO PERFORM WORK
- RETAIN MILITARILY UNIQUE CAPABILITIES IN ONLY ONE SERVICE
- CONSOLIDATE WORKLOADS TO REDUCE EXCESS CAPACITY
- STRONGLY CONSIDER
 - JOINT DEPOT MANAGEMENT
 - JOINT OPERATIONS ALTERNATIVES
- DEPSECDEF WILL APPROVE PLAN
- PLAN USED AS BASIS FOR BRAC 95 PROCESS

We have a second letter from him, dated the same day, about interservicing. The letter went to the secretaries of the Air Force and Navy. It said, the fixed wing aviation area provides the greatest opportunity for consolidating the workload across the services and I want you to interservice more. You should use the most efficient DoD depots to perform depot maintenance that is done in DoD depots.

**DEPSECDEF MEMO
OTHER ISSUES**

- DOD CORE CONCEPT
 - CONSIDERS LEVEL OF RISK AND CAPABILITIES OF ALL DOD DEPOTS
- MAJOR MODIFICATIONS/UPGRADES SHOULD PRIMARILY BE ACCOMPLISHED IN PRIVATE SECTOR
- DECISION TREE ANALYSIS TO SUPPORT NEW WEAPON SYSTEMS
 - DOD DEPOT MAINTENANCE TASK FORCE TO COMPLETE REPORT IN 30 DAYS

We concur with that. We'll be working closely with the Navy to try and do more interservicing. We think it is key. We think there's a lot of duplication of effort and we agree there is big potential for savings. So, we will be pushing interservicing.

**OVERVIEW**

- DEPOT MAINTENANCE COMPETITION
- INTERSERVICING
- OTHER INITIATIVES TO "REENGINEER THE INDUSTRIAL BASE"
 - TWO LEVEL MAINTENANCE
 - LEAN LOGISTICS
- PROCESS IMPROVEMENTS
 - IPT'S
 - BANDING
- SUMMARY

What I thought I'd talk about for a little while is some other things we're doing to reengineer the industrial base. Things like two-level maintenance and lean logistics. I'll give you a quick update on where we're at with those things. I won't talk about Integrated Process Teams (IPT) because you've already had a session on them. I'll talk a little about weapon system banding and how we're trying to make sure we spend our dollars most appropriately to support the fleet. I'll sum it up and then answer any questions you may have.

I spent the day yesterday at Newark, working the closure of the Aerospace Guidance and Meteorology Center. I was talking to representatives of 13 different companies about data rights and how we can contract out the work at AGMC. I'll be happy to talk about that a little bit later if you would like.

**TWO LEVELS OF
MAINTENANCE**

- DIRECTED BY CHIEF OF STAFF IN JUNE 92
- TRANSFER OF REPAIR FUNCTIONS FROM INTERMEDIATE REPAIR FACILITIES TO DEPOTS
- FOUR PROTOTYPES WORKED THROUGH FY93
- SAVINGS TAKEN
 - \$385M REDUCTION IN MAINTENANCE BUDGET
 - 6500 FIELD PERSONNEL SLOTS ELIMINATED
 - 1500 AUTHORIZATIONS ADDED TO DEPOTS
- SUPPORT TO FIELD IMPROVED

First, let's talk about two-level maintenance. It is a significant change for our depots and our depot structure. Two-level maintenance was directed by the Air Force Chief of Staff. It's been discussed for a lot of years in terms of the pros and cons — the merits of two-level maintenance in the Air Force.

It had a lot to do with experiences out of Desert Storm. We looked at Desert Storm and found that some 63 percent of the Air Force personnel in the desert were logistics support personnel. We simply had too many people forward and it took a lot of support aircraft to get them all there. All those folks were then potential casualties. They needed food, housing, medical care — everything while they were in theater. How can we do this differently?

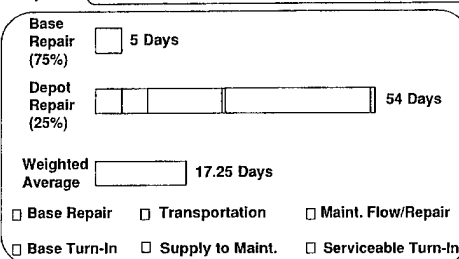
We went back and looked at some philosophies and some things that can be done and two-level maintenance was one way to reduce the deployment requirement. It reduces the presence in the forward theater. If we can make it work, and I'll show you our results that say we can, we can maintain or even improve support at lower costs, while dramatically reducing the mobility foot print.

In the past, if there was something we couldn't fix on an aircraft, we'd pull off the broken part and send it to the shop on the base, or to the depot if the repair was beyond the base's capability. This system — two-level maintenance — has made significant differences in the manning and the dollars to support base-level maintenance. Four prototypes have been worked. We've done three CORONET DEUCE tests of F-16 units. CORONET DEUCE I was a test of the F-16s of the 388th Tactical Fighter Wing at Hill Air Force Base, Utah, and the 366th Wing at Shaw. We did not allow them to do intermediate maintenance in the base shops and required them to send their avionics components to the depots. It worked very, very well. At the time, I was the PACAF/LG and had major concerns as did others in the logistics community. The test proved that parts could be moved quickly from the 388th to Ogden, Utah. They are on the same base, and Shaw is only a six hour truck drive away from Warner Robbins. So, although it worked well, we wanted a more extensive, challenging test. So, we devised a test with 10 wings.

I personally put CORONET DEUCE II, which we ran for a significant period of time, into Osan [Korea] and Eielson [AFB, Alaska]. I wanted to see if we could move assets from Osan and Eielson back and forth and repair them as rapidly as I was getting assets in the past. The USAFE/LG, Phil Messler, put in Ramstein [AB, Germany]. Seven bases in the states also participated in the test. The bases in the test were not allowed to get lateral support from any other base not in the test. So Osan could not do intermediate level maintenance on its avionics. They had to send them back to the depot. They were also not allowed to get lateral support from Kunsan, Misawa, Kadena or anyplace else, unless they were participating in the test. Lateral support from the Air Logistics Center or somebody testing TLM was okay, but not from any other bases. We thought we'd find out whether the depots could really turn assets or not and support us. In CORONET DEUCE III, we added aircraft from Homestead [AFB, Fla.], and Moody [AFB, Ga.].



TRADITIONAL AVIONICS PIPELINE

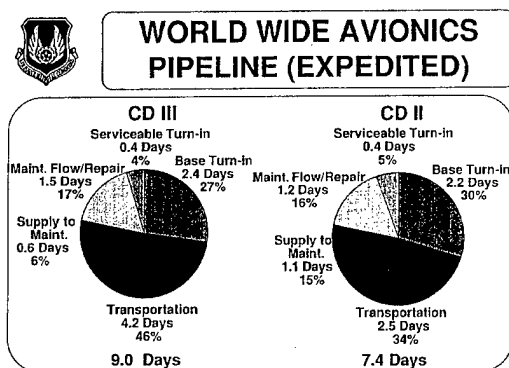


Under the traditional three-level maintenance concept, avionics units were repaired in field maintenance shops 75 percent of the time. It took an average of five days. When a part had to be sent back to the depot (25 percent of the time), it took an average of 54 days to get the serviceable asset back in the supply system. If you take a weighted average of these numbers, 75 percent of five, and 25 percent of 54, and calculate it all up, you get 17 and a quarter days. So if we pulled everything that came off an airplane, did not do local maintenance and sent it all to the depot,

Reengineering the Industrial Base

and could turn the assets in an average of 17 and a quarter days or less, we'd be providing equal or better support. If it took longer than that, then the support is degraded and we've got to look at what we were doing.

Do we still want to do two-level maintenance? Is it worth the degradation? How many additional spares do we have to put in the system to avoid the degradation? So we're looking at 17 and a quarter days as a break even point for support.



In CORONET DEUCE II it took an average of 7.4 days to get the parts back. We had a lot of people at high levels including the chief looking at these units, and we had significant constraints on them. They were units around the world and we didn't allow them lateral support and those kinds of things. So it was a significant test, but they did very, very well.

CORONET DEUCE III added some additional aircraft, and we had more shipments for whatever reason of line replaceable units (LRU) from overseas. It took longer to transport those parts. In CORONET DEUCE II, the average transportation time for the parts was 2.5 days. In CORONET DEUCE III the average transportation time was 4.2 days. That is a weighted average of 2.0 days for CONUS units and 8.8 days from overseas. To try and cut down on the transportation time, we are now using repair and return packaging and Federal Express shipping.

There were some other noticeable differences between the two tests. In CORONET DEUCE III the time to repair the parts locally also went up slightly as did maintenance flow days at the depot. What happened was not so

much a lack of attention, but rather, a lot more testing was being done at the base in an effort to resolve "can not duplicate" (CND) conditions. If the base simply sent the part back to the depot, they have to pay depot costs. None of us are interested in spending money if the items don't have anything wrong with them.

So what we've found is that they spend more time doing base level tests to make sure it is actually a bad unit before shipping it to the depot. A higher percentage of those we received at the depot were actually broken, severely damaged or inoperable in one way or another. It took longer to repair them, but the CND rate for F-16 avionics went from 25 percent to 8 percent. This is not bad. It is exactly what you want to happen.

So we're moving in the right direction, and nine day turnaround is still well within the 17 day pipeline that we had seen as an average pipeline. The field is seeing better support than they had before, and we took \$385 million out of the Program Objective Memorandum (POM) from '94 to '99 for depot level maintenance. That resulted from such things as reducing the amount of support equipment we're buying. It added money in the O&M budget for the bases for depot level repairables to be shipped back to the depot. It also added money for premium transportation. It took money out for manpower savings. We took 6,500 — actually 6,563 — slots out of the field units as we implemented two-level maintenance. We picked up 1,577 slots in the depot, but still had a net reduction of 5,000 people in the Air Force and the savings for those people go into those kind of dollar savings. We also did a two-level test at Tinker which repairs engines and avionics components from B-52s and KC-135s at Carswell Air Force Base [Texas] and common avionics off of B-1s. The test had similar results to CORONET DEUCE.

In addition, we ran two engine tests, one for TF33s on C-141s and B-52s and one for F100-220 engines on F-15s and F-16s. We ran those engines through two-level maintenance at Oklahoma City in a test called CORAL THRUST. Then we ran a test called CORAL STAR on F100-220s at San Antonio from selected F-16 and F-15 units.



TF33-7A (C-141) PIPELINE REQUIREMENT

	Base	Depot	Wtd Ave
3LM	83% @ 41.2	17% @ 129	56.1 Days
2LM	38% @ 2.0	62% @ <u>89.2</u> *	56.1 Days

* Computed Depot Repair Time to Provide Support Equal to 3LM

When an engine came off the wing under three-level maintenance, 83 percent of the time it was repaired at base level in an average of 41 days. When it came back to the depot (17 percent of the time), it took an average of 129 days to fix it. The weighted average was 56.1 days. The field kept some maintenance capability to do engine work on the aircraft — residual capability to do trims and things like that. Thirty eight percent of the time they are still able to fix the engine and do it within two days. If you back the computation with an objective of insuring to meet the 56.1 weighted average, the depot has to lower their 129 day flow time to something like 89 days. We're looking at the 89 day standard and how can meet or beat that standard to provide the same or better level of support.

We've made some improvements in repair times, but not dramatic ones. The dramatic reductions are in eliminating waiting times. We are well under the 89 day target. In fact, General Yates asked me the other day to be careful here, let's not spend any overtime or anything to drive this further down if we don't need to. If the spares levels are based on the 89 days, or the equal support, make sure we have the right mix here on what we want to do.



1 OCT 93 IMPLEMENTATION

AVIONICS

A-10
B-1
B-52
C-5
C-130
C/KC-135

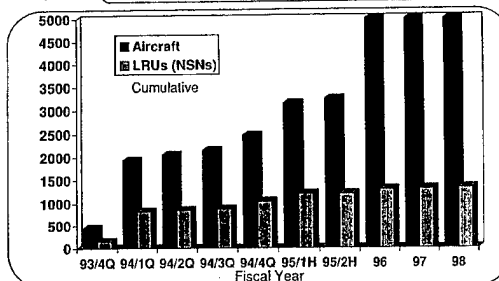
ENGINES

TF33-103 (B-52)
TF33-7A (C-141)
TF33-100 (E-3)
F100-220 (F-15, F-16)
F108 (KC-135)
TF30-109 (F-111)

On 1 October 1993, we implemented a variety of avionics and engine systems. Let me give you a feel for the quantities of these systems that are being cycled through our ALC.



AVIONICS IMPLEMENTATION

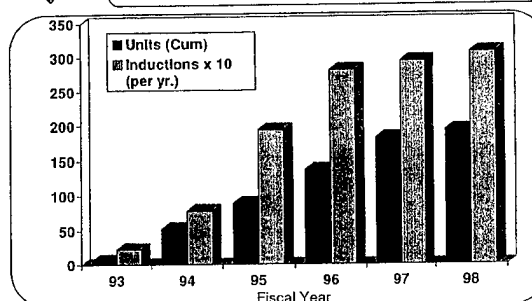


For avionics, you can see the impact of our test programs on the end of the fourth quarter of '93 and the first quarter of '94.

In CORONET DEUCE III we, had 460 aircraft and some 154 LRUs involved. By October, we went to 1,937 aircraft in two-level maintenance and some 825 LRUs — a majority of the LRUs in the system. In '95 we'll pick up the remainder of the Reserve and the special operations forces. In '96 we pick up all the Guard units.



ENGINE IMPLEMENTATION



We had 228 engines from six units generate to the depot during '93. This year, we have some 54 units in the program and we expect over 800 engines to generate. We expect, as we get the Guard into TLM, to be looking at 3,000 engines a year generated under two-level maintenance.



LEAN LOGISTICS

- APPLIES LESSONS LEARNED FROM TLM
 - EXPRESS TRANSPORTATION
 - DIRECT INDUCTION INTO REPAIR
- INCORPORATES NEW INVENTORY METHODOLOGY
 - REDUCED BASE STOCK LEVELS
 - CONSOLIDATED INVENTORY
 - MAJCOMS ASSUME LARGER ROLE IN DETERMINING REPAIR PRIORITY AND SERVICEABLE ASSET DISTRIBUTION

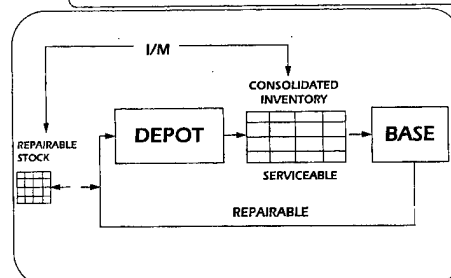
Let me talk just for a minute about lean logistics. This is really nothing exotic. It applies what we learned from two-level maintenance to a broader scale and incorporates new inventory methodologies. It involves those same lessons in terms of express transportation and the direct inductions, and also the new inventory methodology to reduce the base stock levels to what they need for a short period of time and consolidate the remainder of inventory at a central location. Those inventories freed up from direct inductions and rapid repair times at the depots over and above what might be authorized at field level will be kept in a consolidated inventory which will feed the field when they need an asset. It makes a lot of sense and does a lot of what industry has been doing with just-in-time inventories. Where we will keep that consolidated inventory has been an interesting debate. It is still going on.

We've got some tests going on now on the C-5. The consolidated inventory is at Dover. There are debates about whether that is the right place to keep it. It is certainly a viable alternative and we're looking at that. We're measuring a lot of things. There are people who think it ought to be at a depot. There are others who think, no, not at either one of those. It ought to be at a transportation hub like Memphis for Federal Express so when you get a requisition it can be out in a matter of hours and gone — it doesn't have to go through the hub, it is already there. We're looking at where we keep these consolidated inventories. Wherever it happens, the major command has a larger role in determining the repair priority and the serviceable asset distribution because they own the consolidated

inventory. They direct shipments out of the inventory and where they go, rather than the depot.



CONSOLIDATED INVENTORY



Under this system, when they generate a repairable, it goes back and straight into maintenance. They will use an asset coming out of the depot to fill the consolidated inventory back up to authorized level. If we have more assets than the computed levels need to be in this consolidated inventory, you wouldn't buy more until condemnations drive a buy. If there is more in the system today because of the long repair times and long transportation times we've been having, and we've stocked to a higher level, we will pull some assets out and stick them over in a repairable stock. As we have condemnations, we'll pull these repairables back into the flow. When they are all gone, we will buy to replace condemnations as required.

In addition to the changes in our business, we've also made significant process improvements. You've just had a whole session on IPTs. We use them throughout the command in almost everything we do and I endorse that. I'm not going to talk about that anymore right now. I want to talk about banding, a new concept that we've used to distribute our funding and how it is helping us get the maximum aircraft availability we can with the dollars that we have.

What we've done in the past is determine our spare parts requirements by depot. Each depot ran their computations for DO41 for repairable spares and DO62 for the consumable items. That computation was based on flow days, condemnations, ordering, ship times, etc. All of those things went into the computation and it said you need to buy so

many assets. We racked that up for all the items in San Antonio and San Antonio came up with a requirement. Oklahoma City came up with the same thing as did Warner Robins, Ogden, and Sacramento. We then consolidated all of that into the command's requirement for spare parts to support the customers. That went forward. We received funding back and say we received 75 percent funding. We then took that money and we gave San Antonio 75 percent of their requirement, Oklahoma City 75 percent of their requirement, Warner Robins 75 percent and on through the command. Then the commander's responsibility or the depot's responsibility was to take that money and distribute it to the weapons systems in the manner in which it needed to be distributed to maximize the support of those weapons systems.

However, as our spares funding has gone down — and this year it is substantially lower than that 75 percent — we've realized some things we probably should have realized a long time ago. For example, take the F-15. The airframe to the F-15 is managed at Warner Robbins. Warner Robins may actually fund the F-15 airframe at a different level, higher or lower than San Antonio does the engine for the F-15 or Ogden does the landing gear for the F-15, or Sacramento does the flight control system for the F-15. That doesn't maximize the availability of the aircraft. If you have good funding, it doesn't make much of an impact. In fact, if you have 100 percent funding, there is no impact. Everybody is fully funded and it all matches up. But as your funding gets less, it is more and more of an impact of how you want to do that and how best to match that.

So we've gone to something that we call banding, where we put all of the subsystems of an aircraft together and we fund them at a comparable level of aircraft availability. What's the next part I need to buy to get the next aircraft available? The additional thing you do is include the weapons systems — not just aircraft, but ground systems, missiles, everything into the priority bands. The higher priority systems get funded at a higher level than do the lower priority systems. Not to say we haven't been doing that, we have been doing that. The centers have been doing that. But they may not have had an exact match or priorities across centers. We now give them that priority.

When we received our funding for spares on 1 October this year, we did that using six bands that we developed out of the logistics support priorities, which were using the FAD and precedence ratings, UMIP priorities, to determine which aircraft and which weapons systems were in which bands. Some of the major commands said wait a minute, you've got this weapons system ahead of that one. I'm not sure that I agree with that. We said, peace. We don't want to get into this discussion. We're support and we're trying to support you. We're using the FAD and precedence ratings. If those need to be reviewed, let's go review them.

So we wrote a letter to General Carns [General Michael P. C. Carns, Vice Chief of Staff]. We asked the Vice Chief to get with the Air Staff and the major commands and go through all of the weapons systems in the U.S. Air Force and place them in priority bands. He called and said thank you very much. That's not an easy task, but they did it. In fact, I went up and briefed a meeting where General Carns had invited representatives from all the major commands. We stayed there and came up with the bands. We have those priority bands and we received some additional funding later in the year. In fact, in March, we distributed that money, using those bands. We took money away from some of the centers.

As we ran the weapon system availability model, some systems actually lost funding, others received substantial increases. After this reallocation, however, our weapons sys-



BANDING

- ALLOCATES FUNDING TO WEAPON SYSTEM BASED ON PRIORITY LEVELS
- PROVIDE BETTER SUPPORT TO WEAPON SYSTEMS WITH LIMITED DOLLARS
 - ENSURE CONSISTENT FUNDING TO A WEAPON SYSTEM ACROSS DEPOTS
 - CONSISTENT SET OF PRIORITIES
 - DECISIONS BASED ON USER DIRECTED PRIORITIES
- MECHANISM FOR DETERMINING THE MOST EFFECTIVE ALLOCATION OF LIMITED FUNDS

Reengineering the Industrial Base

tem program assessment reviews have had the ratings for all of the weapons systems either go up or stay the same. Nothing has gotten worse. Even if we moved money away from some weapons system, they did not fail to meet their commitments. Their mission capable (MC) rate may have decreased because they have fewer spares, but it is still at or above the goal that was set for them. If we have an MC goal of 85 and somebody's at 87, they may lose some money that may drive them to 85.

Now we can't continue to under-fund, and I briefed General Carns last Tuesday on this subject. We made the point that this is a methodology for distributing shortfalls. You can't continue to do this for a long period or the shortages will accumulate and you get in serious trouble. Banding will help us distribute the dollars to the priority systems in accordance with the priorities set by the major commands. That is what we have done. It does work well.



WEAPON SYSTEM BANDING

- BANDING MAKES SENSE
- MAXIMIZES WEAPON SYSTEM AVAILABILITY
- COORDINATED EFFORT WITH AIR STAFF AND THE MAJOR COMMANDS

Banding provides a list of items to each system program director, each single manager, which suggests what should be stocked. It tells him/her to buy three of these, two of those, seven of these, one of these, one more of that top item and in what sequence the parts should be purchased to maximize their availability. The SPOs are cautioned not to go blindly off and buy exactly what is on that listing because things change. You have to cut off the computer data at a period of time, force structure changes, flying hours change, depot experience in terms of condemnation rates change, our flow days are changing dramatically as we do two-level maintenance, etc.



SUMMARY

- PUBLIC/PRIVATE AND PUBLIC/PUBLIC COMPETITION ELIMINATED
- IMPLEMENTATION UNDERWAY
- INTERSERVICING REMAINS A HIGH PRIORITY
- MANY OTHER INITIATIVES UNDERWAY TO IMPROVE LOGISTICS SUPPORT AND SAVE DEFENSE DOLLARS

So, what is the right mix of parts? You need also to look at preferred spares, for example. What is the value of items that fail often, but are seldom condemned? I can buy more of those spares and put them in the system so I have more of them available, but I may not want to do that. I may want to buy a preferred spare which is a better item, which isn't going improve my availability a lot today, but in the long term is a much smarter decision for me. What we want the system managers to do is to take this list of items that the computer says to buy and apply their common sense and knowledge of the weapons system to make the appropriate buy. We provide the listing to them as a guideline to do that with. It works well.

It makes a lot of sense. It maximizes weapons system availability with the dollars available. And perhaps the biggest thing is, it is a coordinated effort with the Air Staff and the major commands.

Let me summarize my comments by saying what I said about competition at the beginning. Competition has been eliminated. Implementation is underway. Interservicing is a high priority for us and for DoD and the other services. So we will be working that hard. We have many other initiatives underway. I've talked about a few of them for you and with that I'll be happy to answer any questions or I can address what I did yesterday at Newark if you would like.

Question and Answer Session

Depots and Private Competition

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Major General Kenneth E. Eickmann
Director of Logistics, AFMC

GENERAL HATCH: *Thank you very much, Ken. Let me start with a combination question. For privatization efforts, has AFMC essentially stopped the competitive efforts that are now underway? Are you planning to privatize the efforts that were formally depot work by implementing the new DoD guidance and moving out with it?*

MAJ. GEN. EICKMANN: We are certainly moving out with it. We have stopped the competitive efforts we had underway. We have canceled all the RFPs that were on the street.

As far as deciding what will be privatized and what will not, we've got some other issues to work. We are certainly working all of those things. We still have the legislative requirements for the 60/40 contract split, which we were advocating eliminating and using competition to determine where to put the work to get the best value for the Air Force and the taxpayers. We understand the issues involved and the direction we have been given. We have stopped all competitions and are working hard to reduce our costs through other initiatives.

GENERAL HATCH: *Thank you, General Eickmann. The second question involves two related issues. What are your expectations on how interservicing discussions with the Navy will progress? And, also more explicitly, what is being done with the Navy workload for Navy Depots identified for closure in BRAC '93? Will the Air Force get any of these workloads, or is the Navy loading up with their remaining depots?*

MAJ. GEN. EICKMANN: We think we need to interservice more. In fact, we have guidance to do just that from the two service secretaries. We're still looking at how to decide which of the depots is the best location

to provide the required support. We want it to go to whoever can provide quality support for the least cost. We're driven more and more by the dollars. If the Navy can do it cheaper and we can save some dollars and provide better support to the major commands, we will go to them for maintenance support. If an Air Force depot can provide better support, we will push for consolidation there. We need to determine the best way to do that — quality support, at the lowest cost, with the best value to the customer.

How well this is going to work with the Navy is yet to be seen. We have not done the amount of interservicing in the past we should have. We hope this will drive more and we are trying to do that.

We're very interested in increasing the amount of interservicing work we're doing and where work is going from closing depots. I will tell you that, for example, we've had significant discussions on where work should be done on the TF34 engine used in the A-10 and the Navy's S-3s. Those engines have all been maintained at Alameda for a number of years. It made sense. We'd buy one set of support equipment. We consolidate spare parts. We put them together and they maintained all the TF34s. The Air Force has never done depot-level maintenance on TF34 engines. It's not that we couldn't. It made sense to put them together. But Alameda is on the closure list. Those engines will be overhauled some place else. We would like a chance to participate in the determination of where those engines will go. Mainly because two thirds of them are ours.

The Navy plan, which was briefed to the Defense Depot Maintenance Council, was to transfer those engines to Jacksonville, Florida. They have a plan for the transition. They are

working to see how many people will move from Alameda to Jacksonville. They have told us, we have a depot maintenance interservice support agreement — DMISA — with you. We're willing to live up to our DMISA. We don't understand your concern. We are working to minimize any disruption in the move and we'll do the engines for the same cost.

Our problem is we're not willing to pay the same cost. I do not want to pay San Francisco labor rates in Jacksonville, Florida. So we want to renegotiate that DMISA and do an interservicing discussion on where those engines will be done. That is the type of thing we're trying to get into. This is not easy. And it is not that we're right and the Navy is wrong. We both have legitimate arguments here. They are looking at what they can do with their remaining depots and how to best use them. So how can we do this quickly? How can we compare them and make the best decision? We're trying to do that.

GENERAL HATCH: *Clearly, there are complex issues there, Ken. For two-level maintenance, when you look at requirements from General Fogleman's Air Mobility Command perspective, there is an increased need for airlift support. On the other hand, if you are deploying under a two-level system, AMC doesn't have to deploy back shops. Is there a net increase in demand for airlift if we implement two-level maintenance, or does it save?*

MAJ. GEN. EICKMANN: We think there is a net reduction in airlift. In fact, the reduction for F-16 avionics, for initial deployment, is about 70 percent. Now you've obviously got an increase in retrograde in terms of parts going back and forth, and transportation is key. We have to have the *Desert Express* type transportation early. We have to move that back and forth and keep the assets flowing or it's not going to work.

There is more airlift required there, but the up-front airlift to get to the war or conflict, is down dramatically. We think there is enough airlift later to make this other move. You don't have to move all of the support for the troops over. We believe there is a net reduction in airlift, how much depends upon where you go and how you set this up, but there is a reduction.

The key to this whole thing, as I said, is moving assets. There are other savings we have not yet calculated. For example, RSP kits — reparable spares packages. The RSP needs to change. Do we need a 30-day kit anymore? I contend we don't. You have a 30-day kit because the deployment plans require you to. The intermediate level maintenance support doesn't show up in the deployment plan until Day 30. Under two-level maintenance, a 15-day kit, a 20-day, or an eight-day kit might be more appropriate? We need to evaluate that. But then the composition of the kit changes as well. You take SRUs out of the kit and you put LRUs in. It may be a smaller kit in terms of number of items, but a more valuable kit in terms of dollars that are in the kit. We need to discuss the kit composition, how much it costs us, and whether there are savings or not? We think there is potential for an airlift savings. We're not sure about kit savings, but that's still being worked. There are a lot of implications.

GENERAL HATCH: *Thank you, Ken. You mentioned some controlled tests in the CORONET series of exercises. Did you learn anything from Desert Storm experience that might not show up under these controlled conditions?*

MAJ. GEN. EICKMANN: Yes, we did. We looked at a lot of things. The mission capable rates and things in the desert were very, very good. I always caution people to be careful what conclusions you draw because we not only had the RSP kits on day one, but we had intermediate level maintenance (ILM) on Day One. We also had Follow-on Spares Kits from the depot available on Day One. We didn't have 30 days of spares and no intermediate level maintenance. We had 60 days of spares and intermediate level maintenance when we started the war. We did very well. We should have done very well.

We gathered a lot of data in terms of the actual requisitions for parts from the flight line to support the war effort, and looked at it as if we had only the 30 day kit and no ILM. What would have generated? What would have come back to the depot had we not had ILM? What would be the impact on airlift? Yes, we examined all of that and it is influencing our decision process on two-level maintenance.

nance.

GENERAL HATCH: *Here is a final written question. Can you give an update on the B-1B readiness test? How is that progressing?*

MAJ. GEN. EICKMANN: I don't have a lot of details. It is doing very, very well. I know that. I know there has been significant improvement in the MC rates of the B-1, but I don't have a lot of details. Roy might be able to help a little bit more. I have some data, but it is a few weeks old. I've been on the road and I just don't have the latest information.

GENERAL HATCH: *Roy?*

MAJ. GEN. BRIDGES: They will run this thing for about six months.

MAJ. GEN. EICKMANN: Some of things they've already done have improved that rate substantially, but I guess the formal test has not yet begun.

GENERAL HATCH: *Ken, thanks for being with us and congratulations on your new command responsibilities¹ and we looking forward to seeing more of you in the future. Thanks for being with AFA.*

¹. Maj. Gen. Eickmann was recently appointed to become Commander, Oklahoma City Air Logistics Center, Tinker AFB, Okla.



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