Implementing Acquisition Reform

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A Case Study

Implementing Acquisition Reform

A Case Study on
Joint Direct Attack Munitions
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JOINT DIRECT ATTACK MUNITION (JDAM)
Acquisition Reform in Action

The Department of Defense

It was 1995, a typically steamy late-August day at Florida's Eglin Air Force Base. Terry Little, Air Force program manager for Joint Direct Attack Munition (JDAM), grinned as he hung up the telephone. The two companies competing for the contract to produce JDAM (pronounced JAY-dam) a strap-on guidance tail kit for standard bombs, were nearing the end of an 18-month competitive proposal process. In April 1994, the Joint System Program Office selected McDonnell Douglas[1] in St. Louis, and Lockheed Martin in Orlando from five original competitors to design the tail kits and to submit proposals to win the development and follow-on production contracts, worth about $2 billion.

Both companies had a lot at stake. Because JDAM was a high-profile Defense Acquisition Pilot Project (DAPP), there was also a lot on the line for Terry Little and the Department of Defense.

Little was grinning because he had just received great news from Lieutenant Colonel Joe Shearer, leader of the McDonnell Douglas advisory team. Shearer said that McDonnell Douglas planned to submit a proposal for well under $20,000 per tail kit. The information was as exciting as it was unexpected. Only twelve months earlier McDonnell Douglas had proposed $28,000. Little knew that even that price had been a stretch for the company, which prided itself on producing "Cadillac"- quality products at high-end prices.

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Little was elated: his radical ideas had worked. He had ‘gone commercial’ with an unclassified joint weapons project -- something no one else in the history of the Department of Defense had so far been able to do. The cost reductions were startling. Little could not wait to see the looks on the faces at the Pentagon when he came in under $20,000. Little quickly did some calculations. With planned purchases of 40,000 tail kits, the savings could be over $1 billion[2]. JDAM accomplished these staggering savings in a fraction of the time and with fewer people than a traditionally run project (see Exhibit I - Streamline Summary). All those folks who said it could not be done would be running for cover.

Little sat back in his chair and recalled how it all began. In 1993, General McPeak, the Air Force Chief of Staff, insisted that the JDAM per-unit price could not exceed $40,000. At the time, Little had wondered how he could procure such a low cost weapon when cost estimates based on historical precedents placed the price at $68,000. Acquisition reform had been talked about but the ideas had never been successfully implemented. Little knew McPeak was prioritizing cost. What he didn’t know was how to keep control of costs in the bureaucratic maze of defense acquisitions.

Doing Business More like Business: A brief history of acquisition reform

When Vice President Al Gore took a hammer and smashed a government-specified ashtray on a September 1993 David Letterman show, he symbolized the frustration felt by employees and contractors when

dealing with the entrenched federal government bureaucracy. Over the last 50 years, there have been many attempts to reform and streamline the government acquisition process, all of which failed to effect systemic change[3]. The DoD was simply too vast and diverse a body to change quickly. With political administrations and government appointed positions changing every few years, there had never been sustained leadership for change.[4] In addition, while U.S. commercial industry downsized, the Pentagon benefited from the protracted cold war and the resultant inflow of tax dollars required to maintain a strong military.

It was not until the early 1990's that several factors aligned for change. The first was the end of the Cold War and the subsequent public demand for a 'peace dividend'.[5] Over the last seven years, the total Pentagon budget was slashed $100 billion, from over $350 billion in 1990 to roughly $250 billion in 1997 (see Exhibit II - Defense News Budget Forecast)[6]. In January 1993, the Clinton administration declared acquisition reform to be a major priority.[7] The Letterman appearance was part of the administration's attempt to win public support for its plan to downsize and streamline the government.

Also in January 1993, the Acquisition Law Advisory Panel (mandated in FY91 by Section 800 of the National Defense Authorization Act) reported its findings to Congress. These findings resulted in the Federal Acquisition Streamlining Act (FASA) of 1994.[8] This act: (1) facilitated the acquisition of commercial items and the use of commercial practices; (2) enabled the advent of electronic commerce in the federal government; (3) allowed for the use of more streamlined contract

processes; and (4) established the statutory basis for pilot programs. Concurrent with FASA, then-Defense Secretary William Perry issued a memo in June 1994 entitled Specifications and Standards - A New Way of Doing Business. The memo directed the DoD to replace Military Standards and Specifications with commercial specifications as the preferred way of conducting acquisitions.

The Pentagon's acquisition reform office believed that it needed successful Defense Acquisition Pilot Programs (DAPP's) to jump-start the initiatives outlined in FASA and to persuade the DoD bureaucracy to 'buy-in' to the change. Advocates for the reform movement wanted highly visible wins and wanted them quickly. The DAPP programs were provided legislative authority to implement the provisions of FASA before they were published in regulations, and authority to use the commercial item exemptions for non-commercial items. They were also provided expedited deviation authority from the FAR/DFARS and the DoD 5000 series regulations. This would allow JDAM to issue a "commercial-like" contract and authority to streamline the milestone review process and reporting procedures through expedited waivers.

Because of the pressure to succeed there was considerable debate about which projects to designate as DAPP's. Colleen Preston, the Deputy Under Secretary of Defense (Acquisition Reform), was charged with recommending DAPP candidates to the Under Secretary of Defense at the time, Mr. John Deutch.

According to Bill Mounts, Director of International and Commercial Systems Acquisition and a direct subordinate of Preston, there was resistance to using JDAM as a pilot project:

> The whole building was against using JDAM for a pilot program. I remember at one point Terry Little and I were the only ones pushing it. But we had to go for it, to “fall on our swords” on this one. I thought: if we couldn’t make reform work with JDAM -- with a real military weapon -- then reform just wasn’t worth doing.

Mounts and Terry Little lobbied with Preston to include JDAM. As Little recalled:

> Preston said that the direction they were trying to take with Congress was to use “semi-commercial” products first, things you could envision a commercial company would buy. I argued that if you stick to “semi-commercial” projects, then everybody else in the department that has a regular military program is going to say “Fine, but that only works for things that are almost commercial anyway. That won’t work for my airplane, my tank, my submarine, or my bomb because they’re ***not*** semi-commercial.”
>
> What I told Preston was that if you really want these programs to be pilot in the true sense, then you’ve got to have something that is military-unique. JDAM, because of what it is, is a perfect kind of vehicle. It has great potential for cost savings and it is military-unique.

These arguments convinced Preston and she put her recommendation forward for JDAM.

Origins of JDAM 1991 -- 1993

JDAM was initiated in late fiscal year 1991 and had its roots in Desert Storm. It was during that conflict that military leaders realized the need for all-weather, extremely accurate bombs capable of being dropped from a number of aircraft platforms (see Exhibit III - Genesis of the Requirement). The military arsenals were filled with hundreds of thousands of “dumb” gravity bombs. The military wanted to turn these unaided bombs into “smart” bombs using a strap-on kit. The kit would use satellite-guided signals and computer technology to drop the bomb

within 13 meters of its target, regardless of environmental conditions such as storms, darkness and high winds (see Exhibit IV, A & B - Graphic Depiction of JDAM and Notional Configuration).

In 1991, the Navy and Air Force programs, which had been working separately to produce the tail kits, were merged to form JDAM. The Air Force acted as lead program manager. Because the DoD planned to purchase 40,000 tail kits, the potential damage of cost overruns -- and conversely, the potential for substantial cost savings -- was high.

Terry Little takes over -- 1993

In early 1993, Terry Little, an Air Force civilian who was then attending classes at the Defense Systems Management College in Fort Belvoir, Virginia, received a call from General Joseph Ralston, the Air Force Deputy for Tactical Programs working for the Air Force acquisition executive. As Little recalls:

> Ralston and I had known each other in the black [classified defense project] world. He pretty much ordered me to take on JDAM. The project was important to him. He knew I would take risks and not follow all the rules. He'd supervised me on a couple tough projects that I straightened out. He was happy about my work, as anybody would be when they have a tough problem and they delegate it and it gets solved. There is no senior leader that I know of that doesn't want that.

Terry Little had considerable program management experience. He had spent about eight years on black programs, which were more streamlined than their unclassified counterparts. He was known for having top-level support for his radical methods because he had a track record for delivering on his promises. He also had a reputation for being a firebrand, an agitator for change, and for pushing entrenched government processes to the breaking point.

Diane Wright, JDAM action officer at the Office of the Secretary of Defense (OSD) in Washington described Little's reputation prior to working on JDAM:

> Terry had a reputation -- before he started the program -- of being a "throw it all out the window" kind of guy, of being arrogant and against the bureaucracy and the OSD in general. He was a rebel with a cause. He was the Air Force acquisition reform poster boy and he played that role. He was very defiant about complying with paperwork. That was the general perception of him.

Perceptions can -- and did -- change, as the IPT process matured and Little's reputation within the OSD improved.

Little returned to Eglin Air Force Base in Florida and joined JDAM as project manager in 1993, prior to its designation as a pilot program and well into its Request For Proposal (RFP) cycle. JDAM had started out as a traditional program. Little was soon exasperated with "business as usual":

> In the beginning, I was frustrated with the bureaucracy. In 1993, to get the project started, I gave 48 briefings to senior people who were not in my chain of command. Our program-approval documentation was literally six-feet high and took 10,000 man-hours to prepare. And this was for a program that was not a technological challenge, was a high priority and was uncontested. This was business as usual at the Department of Defense.
>
> It took two months for the Pentagon to review our document before it went out to the contractor. The contractors had their teams ready and were paying them. Because there were five contractor teams sitting there on go, that review -- which ended up changing some "mays" to "shalls" -- ended up costing $10 million. Our RFP was 1,000 pages. The contractors for JDAM -- this simple little thing -- had submitted, on average, 5,000 pages of stuff to evaluate (see Exhibit I - Streamline Summary).

Meeting with the Air Force Chief of Staff

Early in his tenure with JDAM, Little had a meeting with the Air Force Chief of Staff, General Merrill A. McPeak. Little's cost target for

each JDAM kit was $40,000, but the cost estimates for each kit were running higher, as much as $68,000 (see Exhibit V, JDAM Unit Cost Prediction). When Little came to discuss the project with McPeak, he was surprised to find cost as the general's top priority. As Little recalls:

> I told the General that each kit would cost $40,000. I remember his reaction like it was yesterday. He pounded his fist on the table and said, "By god, if it's one cent over, I don't want it."
>
> In all my past experience there had never been that much emphasis on cost; it had always been schedule or performance. [The General] had a clear message, one that I understood. He was holding me accountable for the number -- $40,000 -- that I gave him. That had never happened before, ever.

Little realized that he would never meet his cost target by doing things the traditional way. He began thinking about alternatives. While he was considering his options, he read about the acquisition reform pilot programs. As Little recalls:

> I knew that being designated as a pilot program would open up opportunities for me that otherwise would have been closed. I didn't have any historical evidence that the traditional way of doing things would work. I needed a better chance than the normal process in order to get this General what he wanted.

Assembling and training the team

In order to do business differently, Little wanted to assemble a group of people who were change agents and sponsors of change. As Little explained:

> The primary things I looked for were people who had energy and a zest for doing something different. I learned early on that when you go for somebody solely on the basis of experience -- because of the nature of our experience here -- you're going to have problems, big problems. I made plenty of mistakes in terms of who I hired. There were people I thought would work out that didn't and others who I didn't think would make it that did. The ones that made it had that energy and ability to think differently.

Once he assembled the team, Little conducted a two-week training on how to work in a more commercialized environment. During the off-site meeting, Little made it clear to his team that he would not tolerate the old way of doing business on this project. As Mike Tenzycki, a product test and integration engineer, described:

> The whole team had a two-week session in the summer of 1993. I was one of those folks, I guess, that thought that acquisition reform was just a buzzword. I figured that once a quarter or semi-annually we'd be required to write down "what I did today for acquisition reform". But during this training session Terry really made it clear that reform was going to be done and not just talked about. He said if you're not on the acquisition reform train, you'd better get off. He told us to throw out all of our old paradigms. I got all jazzed up at that point.

The Office of the Secretary of Defense (OSD) designated JDAM as a pilot program 11 days after the EMD I (engineering and manufacturing development phase 1)[9] contract award to Lockheed Martin and McDonnell Douglas in April 1994 (see Exhibit VI for JDAM Program Schedule).

Little soon realized that there were no formal rules to define how a pilot program should proceed. The FASA mandate, however, was clear: Do business more like commercial business. What Little needed to know was *how.* To get answers, Little sent out a team to learn the best practices from industry. His team visited Boeing Commercial Aviation, Motorola pagers, Apple Computers and Florida Power and Light, among others. The team came back with clear differences between the DoD way and commercial industry (see Exhibit VII, DoD and Commercial Comparison). Little used the commercial benchmarks as JDAM project goals. These became the origins of the implementation strategies he used on JDAM:

- government/supplier integrated product teams (IPTs),
- performance based, head-to-head competition,

- rolling down-select (three report cards during competitive phase),
- allowing the contractor control over the technical data package,
- requiring a contractor-supplied warranty,
- minimal paperwork and limited, streamlined oversight,
- negotiations based on supplier price, not cost,
- primary award criteria based on past performance and best value,
- allowing trade-offs of price for performance criteria (except for a few live-or-die criteria),
- firm, fixed price production contract, and
- use of commercial products.

Integrated Product Teams

> *The use of integrated product teams may have been mandated from the top, but it originated from the "grass roots" level of the organization. It evolved from previous use in DoD of concurrent engineering and process action teams used in Total Quality Management.* [10]

Little wanted to create a more commercial customer/supplier relationship between the competitors and the system program office (SPO) at Eglin. In order to change the mindset from adversarial to cooperative, Little formed teams made up of both government and supplier personnel (see Exhibit VIII A & B - Integrated Product Team descriptions). Little assessed the contractors' weaknesses and put together teams that would meet the contractors' needs. As Oscar Soler, Little's successor on the JDAM program described:

> What enabled us to make the change in behavior was the Integrated Product Teams. They were made up of Air Force and contractor people. We used them to form a partnership. We on the Air Force side became part of the team. Instead of being the auditor or the supervisor, we were a team member with the contractor. We were there day to day, shoulder to shoulder, hand to hand, as part of one team effort.
>
> We took the teaming seriously. Within our office we set it up structurally for the designing phase. We broke the office into three groups. A team was formed with each of the competing contractors. One team was charged with making Lockheed Martin win, the other with making McDonnell Douglas win. We told our people: instead of waiting for submissions and milestones, go out and be part of the team. Don't point out problems, instead solve them. We

> also had an Air Force core team to keep the two contractor teams objective on requirements.[11]

For the contractor and government counterparts, being on one of the combined teams was a new experience. The adversarial ways of doing business melted away as the urgency of the 18-month head-to-head competition took over.

The government team members spent more time with their industry counterparts than at the Eglin SPO (system program office). When they were at Eglin, government personnel were segregated from their co-workers on the other teams. They were in constant telephone and e-mail contact with their industry counterparts. Many government personnel described feeling like McDonnell Douglas or Lockheed employees. As Mike Tenzycki, a member of the McDonnell Douglas team, described:

> The industry guys were in a competitive mode, and we got caught up in that. We had a common goal; we knew what it was and what had to be done to get there. No one wanted to be the one who let the team down.
>
> We had 18 months -- no kidding. We knew the date when the decision would be made, and that was the prize. The [McDonnell Douglas] people would either be out of business or they were going to win the contract. We were very sympathetic to that. We wanted them to win. We thought they had a good product.
>
> At the SPO, government folks on the two teams [McDonnell Douglas and Lockheed] were segregated. I never thought that [the separation] would hold up -- but it did. Everyone [at the SPO] was very quiet about the successes and failures of their team. I was careful about what information I passed to the core team and when. In that regard I was acting more like a contractor.

Affordability as the Focus and Using Commercial Parts and Processes

One of the main themes of the JDAM procurement was to let the contractor manage his own costs. Typically, the government required extensive cost data as back up for a cost-plus award fee contract. With JDAM, the source-selection team determined the winner based on the

Average Unit Production Price # (AUPP) (see Exhibit IX - Average Unit Production Price) and how well the product met the live-or-die criteria (see Exhibit X - Key Performance Requirements).

The SPO also made a critical decision to allow the contractors control over the JDAM technical requirements (the Technical Data Package (TDP)). The contractors could modify the TDP as needed to control costs, and were not required to disclose trade secrets, as long as the live or die criteria were met.

Another innovative concept developed during EMD-I was the contractor warranty. The warranty saved the government money on the repair and maintenance of the future product and also ensured that the contractor built the systems with quality in mind, since it would pick up the cost of any defects.

This system allowed for more cost cutting, since it did not penalize the contractor for lowering costs. As Oscar Soler explained:

> We saw that being cost-based for us was not a smart way of doing business. It hurt us in that there were no drivers for cost reduction. We ended up having a massive amount of documentation showing that it cost for example, $1,000 to build something. The contractor got a profit of, say, 10%. So the total cost [to the government] was $1,100. Let's say the contractor, with experience, learned to do it for $900. Now the contractor made $90 and the total cost was $990. By being efficient the contractor lost money! The contractor had no incentive to cut costs.
>
> In our DoD culture the engineers on both sides were used to designing the best product regardless of cost. But in the private sector it's "affordability." {On JDAM, w]e asked the contractor to put a unit price into their specifications and manage to it. Now their engineers owned the unit cost. This was a new practice. They knew the cost structure well and they knew how everything affected it. They worked to bring it down. Giving the contractor's engineers a cost target to hit was new for them, although it is common in the commercial sector. We understand the transition was difficult.[12]

Because of the clear mandate from the Air Force chief of staff, Little was able to galvanize his team to work on affordability. At the same time, the acquisition reform office in Washington was promoting a concept called CAIV -- cost as an independent variable. To Little, what this meant was that, except for five absolutely essential criteria (see Exhibit X), anything else that went into the weapon could be changed to bring down costs. The IPTs analyzed each component of the weapon and engaged the entire supplier chain in the process. The focus of the IPTs was to identify the cost drivers and reduce or eliminate them without compromising the five critical performance criteria.

The IPTs found significant costs associated with using government-specified products instead of commercially available products or processes. An example of this surfaced when the Lockheed Martin team proposed using an injection molding process to produce the tail kit fin. The Navy wanted to use a metal fin, which would double the cost to produce. The Navy opposed an injection molded fin because they had had previous problems with a similar component that used the same base material, but the fabrication of that item used a lamination process versus the injection process.

The team conducted extensive tests that showed the injection molded part -- using a better process -- would exceed the specified performance requirements and be cheaper to manufacture. When the Navy personnel still objected, the team decided to continue with the injection molding, overriding the Navy’s objection. As Paul Alman, a member of the SPO’s Lockheed Martin team during EMD-I, explained:

> In some cases, you have “government experts” that were experts years ago and that have one perception on some specific issue. When they dig in and say, “I have the authority to derail this,” you have to ask, “What is the currency of this authority relative to technology?” Ultimately, you agree to disagree or you succumb. It was the program manager’s decision at Lockheed Martin at the time to say, “We’ve done enough tests to prove that this works, and we’re comfortable moving forward with it.” Then we gave our decision to the core team.
>
> If our minds hadn’t been on acquisition reform, if our priority hadn’t been affordability, the contractor probably would have said, “Ok, we’ll give you what you want, but it will cost you.” That’s how cost overruns happen. That didn’t happen here.

By relentlessly harping on cost and affordability and by looking at every major process and part for cost savings, the two competitors were able to submit proposals that were less than half the original cost target of $40,000. (See Exhibit XI, Current JDAM Cost Projections).

The Rolling Down-select

Another major difference in how Little conducted JDAM was the way the SPO gave feedback to the contractors and sub-contractors. Usually, the government gives the competing contractors little or no response to proposals until after the formal source selection process is concluded. It is common that losing bidders will protest the award, costing the government time and money, and driving the need for over-documentation.

JDAM, in contrast, gave the two competitors three report cards during the 18-month selection period. The source selection team graded the companies on performance criteria and how well they performed to their original plan. The meetings were open discussions and included color-coded grades. The report cards were binding -- how the companies fared during the reviews directly factored into the final decision. The rolling down-select was a way for the teams to get immediate feedback and set future goals.

In its 1997 report on pilot programs, the Pilot Program Consulting Group (part of the Pentagon's acquisition reform office) credited the rolling down-select for saving money and heading-off protests:

> Through open and frank discussions with the competing contractors and by employing clear selection criteria, the JDAM EMD contract was awarded with less than 30 percent of the traditionally expected in-house effort and at 50 percent of the B&P (bid and proposal)costs. Furthermore, the openness of the award process apparently dissuaded the losing contractor from protesting the award.[13]

At the OSD, Heading for Milestone II -- June 1995 through August 1995

As Terry Little's team ventured into unknown commercial territory, the Office of the Secretary of Defense (OSD) conducted an acquisition reform initiative of its own. The OSD is the primary oversight and decision authority for major projects such as JDAM, and as such had an even more defined role as "acquisition policeman" than the SPO. As Diane Wright, the OSD action officer for JDAM explained:

> In the past, the SPO put their acquisition strategy together and tossed it over the fence to the Pentagon for OSD review. Then we took three to five weeks to review it. We'd have a thick document and we didn't know how they reached conclusions or what thought processes went into them. So it was a very iterative process. Each functional area at the OSD -- logistics, test, contract, and so on -- every one of us was looking at those documents for what we were interested in. One at a time we would call the program manager and say, "What did you mean on page 3?"

The acquisition reform movement was attempting to change this inefficient process by using IPTs that worked with the SPO to draft a combined acquisition plan, called a SAMP (single acquisition management plan). On JDAM, all the OSD functionals worked together with the services' staff on an IPT to draft and review the SAMP. It was during this process that the OSD and SPO agreed on down-select strategies and granted waivers to allow the program office more latitude in conducting the acquisition. The working IPTs (WIPTs) then passed their recommendation to the overarching IPT (OIPT) for review and, finally,

to the Deputy Undersecretary of Defense and the Undersecretary of Defense (Acquisition and Technology), for approval to implement the plan (see Exhibit XII -- sample OIPT Memorandum).

The OSD was just beginning to understand how to use integrated product teams when JDAM's acquisition strategy came up for review. As Diane Wright describes:

> We decided -- for good or bad -- we couldn't afford to wait for somebody else to tell us what an IPT is. We sat down and made some assumptions about what our IPT would be.
>
> Terry Little was the head person of the working IPT. We staffed the IPT with every functional OSD office at the action officer level. We told Terry: "These people are on your team, acting as consultants. You bounce things off of us, and we'll tell you which things our bosses would agree to and which ones they won't." We tried to advise Terry on his acquisition plan. We tried to reach consensus, but it was not always possible. It was up to the overarching IPT to resolve the issues that we disagreed on. We found Terry to be very accommodating and willing to compromise.

Often, it was up to the action officers to take the compromises arrived at by the WIPT and sell them to their bosses. This process relied on strong interpersonal communication between levels and a willingness on the part of the action officers to take risks.

One of the issues identified early on was when the next OSD review of JDAM would take place. Traditionally, OSD reviewed programs both when they went into low-rate initial production (LRIP) and when they went into full production. Under acquisition reform, the OSD was directed to hold a formal review for only one production phase, usually for the LRIP phase. Wright and her counterparts on the WIPT realized that for various reasons, JDAM's LRIP would be low-risk. They thought it would make more sense to waive the review for LRIP and hold it before full-rate production. But Wright's superior -- Dr. George R. Schneiter,

Director of Strategic and Tactical Systems and chair of JDAM's Overarching IPT -- took the more conservative position of review before LRIP. It was up to Wright to convince him that the WIPTs position was valid. As Wright explained:

> I wanted to go back to the WIPT and tell them which way the decision would go, so I met with Dr. Schneiter as he was heading off to a meeting.
>
> Dr. Schneiter said he had to be at 4th corridor [of the Pentagon] in two minutes. I asked if I could walk with him and make my case along the way. Now, he's very tall, and I'm not -- I was taking ten steps to every four of his and talking the whole time! But by the time we got to corridor 4, he said, "Ok, I'm convinced." He went to the meeting, and I turned around and gasped for breath.

It was during the single acquisition management plan (SAMP) review that the OSD gave Terry Little broad authority, requiring him only to give prior notification in a few critical contracting areas. Otherwise, the OSD granted Little the ability to waive any Federal Acquisition Regulation (FAR) not codified in statute or executive order. Little's innovative implementation strategies were also drafted and raised through the IPT process. Although Little and Wright had to convince or override some of the other functional areas, most of the higher-level executives at the OSD were strongly behind the acquisition reform efforts and approved of Little's ideas. As Little explains:

> I had a strong sense of empowerment, both from the Air Force Chief of Staff who said basically "Do what you have to do to get the products under $40,000," to the OSD program office and the leadership there. My boss and my boss's boss gave me the freedom to innovate and experiment. I could not have been successful otherwise.

Still, a lot was on the line for all the people at the SPO and the OSD IPT that had drafted the JDAM systems acquisition management plan. Would the results prove that commercialism and streamlining worked?

The Final Down-select

In September 1995, the source selection team (made up mostly of core team members from the SPO) met for one last time at the source selection building at Eglin Air Force Base in Florida. The results were clear: both competing manufacturers had adhered to the five live-or-die criteria. The deciding factor now was price. To Little, the success of his acquisition strategy depended on how close the two competitors were in the final analysis:

> When you're spending millions of dollars for each company to compete, you want to have a real choice, you don't want one to be a runner-up. When we started, both companies had good proposals. But McDonnell Douglas was far behind Lockheed Martin in terms of price. The original bid for Lockheed was somewhere around $13,000 to $14,000. McDonnell Douglas's was $24,000. When McDonnell Douglas's final bid came in at $14,000, I knew we had won -- the experiment had been a success.

McDonnell Douglas

It was October 1994. Charlie Dillow, McDonnell Douglas program manager for JDAM, sat on a plane heading to his office in St. Louis. Over the past few weeks he had come to a decision that both excited and worried him. For six months, McDonnell Douglas -- along with rival Lockheed Martin -- had been competing head-to-head for the $1 billion Joint Direct Attack Munition (JDAM) contract. Although McDonnell Douglas had put together a proposal that combined a low-risk product with a relatively low price tag, Dillow's instincts told him it was not enough to win. He had just witnessed the loss of McDonnell Douglas's biggest missile program -- the $1.5 billion Tomahawk -- to Hughes after an 18-month competition. Dillow was convinced that McDonnell Douglas had lost the Tomahawk because its price was too high. He knew that if he did not take some drastic measures, JDAM was headed down the same path.

Dillow had spent the entire day in Shalimar, Florida. He brainstormed with Colonel Joe Shearer -- the government advocate assigned to help McDonnell Douglas win the contract. They had come up with a plan to refocus the team and drive down costs. Now the magnitude of the task before him started to sink in. He had to turn the team around, to implement a whole new strategy, and to redesign the system almost from the ground up. Above all, in only 12 months, he had to submit a proposal that was much lower than he ever expected.

Dillow thought of the thousands of personnel that had been laid off at McDonnell Douglas over the last six years due to de-militarization, lost competitions, and canceled programs. He knew that neither he nor the company could afford to lose JDAM -- one of the few new projects the Pentagon was willing to fund.

History of McDonnell Douglas

In 1994, McDonnell Douglas was recovering from one of the bleakest periods in its history. Founded in 1939, McDonnell merged with Douglas Aircraft in 1967 to form one of America's largest military contractors. The military aircraft division had a proud history of providing the Armed Forces with some of its most popular planes. In 1988, John Finney McDonnell -- son of founder James S. McDonnell Jr. -- took over as chairman and CEO for what he would come to call a "defining period" for the company.[14]

In 1989 the Berlin Wall fell. By 1992 the USSR no longer existed. In 1990, the Senate Armed Services Committee voted to make an unprecedented $18 billion cut in the defense budget. The cut affected

all three of McDonnell Douglas's top weapons programs: the C-17 cargo plane, the A-12 stealth attack aircraft, and the competitive development contract for the Advanced Tactical Fighter (ATF), the next generation fighter to follow McDonnell Douglas's F-15 Eagle -- the military's premier fighter plane. The budget also reduced production of McDonnell's F/A-18 Hornet fighter plane and the Tomahawk cruise missile.[15]

The Committee's actions opened the floodgates for future defense cuts. Military spending came under intense scrutiny in the media and in Congress. Cost overruns, schedule slips, and technical problems plagued DoD programs. Defense contractors panicked as the sand began to shift under their once-stable military programs. Stock prices and revenues plummeted. Earnings at McDonnell Douglas dropped from $350 million in 1988 to a loss of $781 million in 1992.[16] McDonnell Douglas responded by making drastic cuts in the workforce. During the six-year period from 1988 to 1994, employment dropped by more than 55,000 workers: from 121,400 to 65,800, according to company records (see Exhibit XIII).

In January 1991, as the country slipped into a recession, the sand shifted again -- this time directly under McDonnell Douglas. Defense Secretary Dick Cheney announced the cancellation of the A-12 attack stealth plane, a $4.78 billion development program that had been a top priority for both the Navy and McDonnell Douglas. Cheney blamed the contractors -- McDonnell Douglas and General Dynamics -- for $1.4 billion in cost overruns and an 18-month schedule slip. It was the largest contract cancellation ever made by the Pentagon and it sent a

shock-wave through the industry. Industry watchers saw Cheney's move as forecasting a new era of discipline in defense procurement.[17] However, on March 30, 1998 the United States Court of Federal Claims issued its final opinion and order finding that the termination was a termination for convenience, not a termination for default.

The Reorganization

In 1992, McDonnell Douglas -- hoping to be leaner in the wake of its shrinking market -- consolidated its six government aerospace divisions into two. Military aircraft was merged with the missile systems and helicopter divisions to form McDonnell Douglas, headquartered in St. Louis. McDonnell Douglas was placed under the direction of John Capellupo, a 32-year veteran of the company who had served as president of both the aircraft and missiles divisions[18]. The merger brought together two distinctly different cultures. McDonnell Douglas Missile Systems -- a small, 6,000-employee horizontal organization -- was known for its emphasis on research and development. Its Tomahawk and Standoff Land Attack Missile (SLAM) weapons programs were used successfully in the 1991 Gulf War. McDonnell Aircraft was a large, traditionally organized company that was suffering from recent layoffs and low morale.

Charles H. Davis III, a supplier manager with missiles systems and now with McDonnell Douglas, reflected:

> Missiles was the testing ground for new ideas and ways of doing business. Back in the mid-1980's, missiles made some sweeping changes [to their organizational structure]. They did away with the functional organization and put in place horizontal integration teams that attempted to eliminate the barriers between programs. Missiles also had 'informal' change agents as part of the teams who served as fertilizers for fostering and helping to implement change across the organization.
>
> Aircraft had much more of a traditional organizational structure. It was purely an engineering matrix organization with strong

> functional silos. When we merged, the organization of the larger aircraft division subsumed the missile structure and we went back to a functional organization.

The legacy of the innovative and smart risk-taking missiles culture was not lost completely. The merger broke up the entrenched traditional military aircraft culture and maintained some characteristics of the missiles organization. It was during this period that the company introduced change sponsors at the upper-management level and change agent at the mid-management level throughout the newly created organization. With Charlie Dillow acting as a change agent and Dillow's supervisor, Dave Swain acting as change sponsor, JDAM had the corporate leadership to break new ground.

The Beginning of JDAM -- 1992 to 1994

With new military programs evaporating and existing, traditionally run programs being cut, McDonnell Douglas needed some wins and had the opportunity to break from the old way of doing things. Although JDAM was somewhat outside McDonnell Douglas's area of expertise, the company wanted to pursue new business. As Charlie Dillow, then program manager for JDAM, explained:

> We needed new missile business and there weren't a lot of opportunities. Senior management saw that several of our programs were in decline. Our major programs at the time were Harpoon, Advanced Cruise Missile and Tomahawk. Those programs wouldn't be enough to sustain our business over the long term.
>
> We were used to high cost, technologically complex missiles. JDAM was at the other end of the spectrum -- it was high rate, low cost production. I mean, $40,000 in 1992 was very low cost, especially when compared to missile systems that were pushing a million dollars a copy. It was a big stretch. The volume was a stretch also: JDAM called for us to deliver 5,000 units per-year versus the 200 per-year rates we were used to. That had us scratching our heads, but still, we were interested in new business and this looked promising.

After a traditional government acquisition cycle in which Dillow's team submitted a 6,000 page proposal and went through a lengthy question and answer period, McDonnell Douglas was awarded one of two 18-month competitive design contracts. Rival Lockheed Martin was the other finalist.

Many of the JDAM team members had a background in the old missiles division and were used to working in cross-functional teams. Although McDonnell Douglas was organized along functional lines, JDAM used integrated product teams (IPTs). McDonnell Douglas had hired a consultant who designed JDAM's organizational structure to fit in with the Pentagon's IPT initiatives (see Exhibit XIV - JDAM Weapon System Organization). Team members described the program as being an island of innovation and creative thought that had limited contact with the rest of the company. Supplier manager, Charles Davis, recalled how JDAM transcended traditional functional barriers:

> JDAM was a phenomenon -- it truly was defined as a product team. Functional roles were blurred and we rarely saw functionality. We didn't throw things over the wall, we did a lot of working around a table to get the best product we could.

Dillow knew that acquisition reform and low cost were buzz words emanating from the military, but he still did not understand the effect these changes would have on JDAM. Although the JDAM team was designed to be flexible and creative, it was still marching to the old tune of "technical excellence regardless of cost." They were slow to react to JDAM Program Manager Terry Little's admonitions that this time things were different. Dillow recounted his first debriefing with Little:

> We had a debrief meeting shortly after our win. Terry came to St. Louis and made a couple of key points. First, he said we had an outstanding proposal, that it was a very low-risk technical approach. But he said it was the Cadillac approach. That was a tip that we were still hanging on to our old ways of providing the lowest risk at the highest cost. Our response to that was to maintain low-risk while beating the government's cost target of

> $40,000. Early on, we didn't think that beating that cost target by a lot was very important because the more you beat it the higher the risk you run.

Entering EMD - I -- April 1994 through July 1995

From the beginning of EMD-I (engineering and manufacturing development phase 1), it was clear that the government was treating this program differently. The most obvious evidence of change was the formation of government/industry teams. The presence of government personnel gave the contractor direct communication and insight to the government's needs and expectations. McDonnell Douglas team member Carl Miller described the teams:

> We had government people on our team working with us. It was great because we had insight into what the government wanted and didn't want. We had somebody here just about all the time. One or two people from McDonnell Douglas-SPO team were here on a one-week rotation. If we had questions about specifications they could answer them. They were careful not to tell us anything that was competition sensitive. We didn't know anything that we shouldn't know, but we did have a much better idea of what the customer wanted and what we had to do to win.

Although having McDonnell Douglas-SPO team members at McDonnell Douglas was helpful, working so closely with government people was a new experience for the McDonnell Douglas engineers. Both sides had trouble adjusting. As Miller described:

> There was some resistance at first. The typical relationship was full of mistrust. To actually be teamed with them was a whole new way of doing things. And the government had trouble working directly with us. Terry Little held a meeting. He told us how the program would run and he told the government team members that it would be in their best interest if we won. He also assured us that there would be no cross talk between teams. He was very forceful and dynamic. You believed him when he said something. We had a lot of trust in him.

With direction from Terry Little and the leadership of Charlie Dillow and Lt. Colonel Joe Shearer -- the leader of the government McDonnell Douglas team -- the two sides built trust and developed open communication. As Dillow recalled:

> The government/industry IPT -- that was something different on day one. We didn't know how to react to it. Now, I've always been big on teamwork. I'm intolerant of non-team players, so I directed our people to embrace the government folks and welcome them on our team. Even so, it took me about a month to feel comfortable talking about key strategies with Joe.
>
> The way we built trust was to assess each other's styles. Joe watched me and I watched him. We clearly had a common destiny, which was to win JDAM. I could see that he was as committed to winning as I was. So we tied our rafts together and set off on this thing. From then on we were arm in arm.

Another unique aspect of the program was the McDonnell Douglas reward system and the government's use of a "rolling down-select" to provide immediate feedback to the competitors. As Miller described:

> We had rolling down-select where we would present our design and our costs to the core team and end-users at Eglin. We were given down-select criteria, and we would present our case on how well we thought we met those criteria. They would give us a score, so we knew where we stood, not relative to the competition, but they told us what they thought of our product.
>
> They gave us colors: blue was "outstanding," green was "met expectations", yellow was "not met expectations but a chance to recover" and red was "bad news". This rolling down-select was completely new. It was very good at focusing us on what was important. The government gave us immediate feedback about things it thought were important.

Reward System

McDonnell Douglas tied the rolling down-select grades directly to team-member compensation. Under a program called the performance incentive program (PIP), team members earned bonuses based on the color grades received at the down-selects. The rolling down-select strongly motivated the McDonnell Douglas team. As team member Kerry Bush explained:

> The government did a good job making the award fee criteria very clear. We had a performance incentive program (PIP) that was tied directly to the award fee plan. That really focuses people. The PIP program was not there to incentivize people to work hard -- we were all going to work hard -- it's just that a lot of times we work hard on the wrong things. So what the PIP does is it focuses you. Boy, that was the way to do it. Our PIP was tied down to a small enough level that everyone could relate to it, and it really did work. We knew that those performance criteria were the things the customer was going to evaluate us on, and we knew that if we focused

> on them we were going to get our money. You can bet people really focused hard.

Winds of Change: August - November 1994

As the summer of 1994 wore on, Charlie Dillow saw more changes effect the JDAM competition. As Dillow recalled:

> By August the SPO was encouraging us to completely throw out our old 100-plus page statement of work and rewrite it to a streamlined contract, to a two-page "statement of objectives." Now we started to say, "hey, this is looking serious."
>
> We got rid of almost all the paper deliverables, we got rid of all the mil. standards and mil. specs -- every single one was deleted from our contract. So now we were starting to say -- "there's something here we don't understand -- the contract's changing, maybe we should think about changing too."
>
> The award fee criteria and the down-select criteria were evolving. The whole down-select plan was beginning to move from a traditional source selection to what Terry called a rolling down-select. So we were starting to see the evaluation process changing and the evaluation criteria themselves changing.
>
> In fact, production Lot one and Lot two AUPP (average unit production price) seemed the number one criteria replacing "perform to plan." Maybe I didn't hear Terry right in the beginning, but we had set off on "perform to plan." But now -- Aug and Sept - AUPP for lot one and lot two was becoming the number one criterion. So change was happening all around us.

The SPO also motivated McDonnell Douglas to control AUPP by the incentives and disincentive built into the contract (see Exhibit XV - Carrots and Sticks).

In the midst of all these changes, McDonnell Douglas lost the competition to be the sole producer of the Tomahawk missile, a program McDonnell Douglas had shared with GM/Hughes for the last 10 years. The Tomahawk was McDonnell Douglas's largest missile program, and its loss could mean the layoff of 1,200 people. The word was that McDonnell Douglas lost Tomahawk because its price tag was too high. Loss of

Tomahawk shattered Dillow's confidence in his "perform to plan" strategy. He realized that from this time forward, contracts would be won and lost on price.

Dillow met with Joe Shearer at the McDonnell Douglas office near Eglin Air Force Base, where they spent the entire day hammering our implementation strategies designed to get the team focused on reducing costs. It was during this time that Dillow developed an innovative proposal strategy based on commercial business practices. According to Dillow:

> After the Tomahawk loss, I tried to figure out a new path forward. I had come up with a commercial pricing approach. Commercial was the word of the day. I figured -- rather than bid a traditional learning curve approach -- bid a commercial approach, where we offer the product recognizing a loss in the first few lots, making up the profits in subsequent lots. I wanted to get the product out to the market -- like a commercial guy does -- get it out at a price the customer can afford, and at a price that will enable -- and encourage -- him to buy more. As he buys more of them, we maintain the price and start to make earnings.

Dillow realized that for the proposal strategy to work, he had to lower the internal costs on the product. He and Shearer drafted a plan to reduce costs:

> What we had to do first was get the cost down, because if we used the commercial bid strategy, we would lose money with the current cost we had on the product.
>
> It took me a week or so to figure out how to implement it. I came back from the meeting with Shearer and told everybody we were changing our approach and that everyone had to start looking for ways to get cost out of their product. I said it at staff meetings, personal interactions, every opportunity I got to start preaching the gospel. But I knew that unless we had some more formal way of doing this that it wasn't going to happen, that everyone would continue to operate in their comfort zone.
>
> We began with a real focus on *how* to reduce costs. We developed a whole new process for getting affordability into our product. Within a month or two we had a new approach in place, we had teams working to develop a new plan, we completely changed the design of the product. We took almost all the constraints off our engineers.

> Most importantly we got our suppliers involved in this. Suppliers provided 80 percent of our product. I realized that if suppliers weren't successful in getting costs out, then we wouldn't have a prayer. So we got the suppliers involved through the IPT organization (see Exhibit XVI - JDAM Component and Supplier Breakdown).

Throughout this process, Dillow and his team had the unswerving support and guidance of Dave Swain, deputy general manager of New Aircraft and Missile Products. Swain had been transferred from California soon after the reorganization. Both Swain and his General Manager, Jim Sinnett, were active change sponsors and fully supported the innovations pioneered in JDAM. According to Dillow, Swain took over much of the operational oversight of JDAM, giving strong executive attention to the program. Swain was an able manager and spent time coaching Dillow. He also provided invaluable upper-level support for the program. As Dillow explained:

> JDAM was an Alice in Wonderland -- it was the only major product competition in the new aircraft and missiles products division at that time. So we really got a lot of focused management assistance out of Dave. Any barrier we had in the organization, Dave would take personal responsibility for. All he wanted me to do was to lead the team and manage the program and not have to fight all the battles. There were battles, because it is very hard for one program to change when the rest of the infrastructure around it wasn't changing as quickly.
>
> JDAM wasn't changing in an evolutionary way -- we were picked up and set all the way over into a different world. We went through a radical change in almost a single point in time, it put us out of step with the rest of the company. Dave worked all those obstacles and interfaces for us. If we needed people, or assistance because we were no longer compliant with a company practice -- any of those things -- Dave took on and worked for us. I felt that anything we needed Dave would make sure we'd get.
>
> Dave was also one of the best program managers I had ever seen and I had his almost undivided attention to learn program management from him. So I could learn program management and he waged all the wars for us, made sure we had everything we needed, and that we weren't being inhibited in any way. That was very important to our success.

With Swain's high-level backing, Dillow was free to implement his "commercial" strategies. One of the central pieces to the new plan was

the flow-down of cost goals to every component of the product, not just internally but to suppliers and sub-suppliers as well. JDAM had an affordability team whose job was to track and coordinate the cost goals throughout the organization.

Dillow drafted a cost-goal chart that he gave to each of the team leaders (see Exhibit XVII - McDonnell Douglas Road to Affordability). The product team leaders, with support from the affordability team, broke the overall cost goals into sub-goals. They then passed them down to the manager or supplier in charge of each component (see Exhibit XVIII - JDAM AUPP Status - IPTs). As Richard Heerdt, supplier manager for the guidance and control unit, explained:

> The goals were flowed to the people who could affect them. We'd flow these cost goals to the very lowest IPTs; we decomposed the cost objectives down to the lowest level of the organization. We used tracking charts and posted them on people's doors. At first people thought the goals were too aggressive. The suppliers all joked about it at the first few meetings. But we kept saying: "Why can't you do this?" We challenged them, we questioned them. We generated ideas and started removing all the design barriers; then we tracked the ideas and held the suppliers to them.

Suppliers began to act as full team members in the IPTs, freely exchanging information and ideas as though they were part of the same organization.

The Low-cost Guidance and Control Unit

The team was slow to understand that they needed to drastically reduce the procurement price in order to win the competition. It was a major cost reduction on the GCU -- the biggest component of the system -- that finally "broke the log jam" and turned around the team. The GCU contributed roughly 60 percent of the cost to the product. As Richard Heerdt explained:

> The GCU had the largest proportion of the cost, so when the GCU went low-cost, it broke the “perform-to-plan” mentality. There was all this “go do something radical to reduce the cost” talk, but at the same time there was “perform-to-plan, perform-to-plan”. When the low-cost GCU was approved, the rest of the team realized the program would modify the existing plan or make a new plan. Now everybody felt like the shackles were off, and that strict performance to plan wasn’t so important anymore - the really important thing now was getting the costs out.

The GCU was made up of the Inertial Measurement Unit (IMU) provided by Honeywell; the (Global Positioning System) GPS receiver provided by Rockwell Collins; and the Mission Computer provided by Loral.

Terry Little’s creative approach to the JDAM acquisition and the strong motivation supplied by the competition and incentive program inspired McDonnell Douglas to come up with innovative ways to engage their supplier chain in the affordability initiative. Executive IPTs oversaw the efforts of the working IPTs. Vice presidents from the major suppliers met monthly with Charlie Dillow and Dave Swain. The Executive IPT (EIPT) streamlined information flow and decision-making, created upper-level support for the working IPT and allowed members of the Executive IPT to effectively problem-solve and voice their support for the common goal -- to win the contract[19]. Heerdt explained the positive impact the Executive IPT had on the teaming process:

> Dave Swain and the executive IPT really drove this thing from the top. They worked so well together that the lower levels had no excuse for not getting together. We were having a lot of problems with Collins early on in the program. Things weren’t getting done, we were behind schedule, and we didn’t even have a contract. So we went to Dave Swain. Dave called us together with Collins. He had a private meeting with the Collins VP and then a meeting with everybody in the room. He said this team isn’t working and it's the fault of everyone in this room. He said there was too much distrust here. He told us to make every decision as if we were wearing the same badge. In the end, Collins got the Spirit of Excellence award for JDAM -- the highest supplier award you can get from McDonnell Douglas. The whole spirit of change was unbelievable.

Communication played a key role. McDonnell Douglas signed non-disclosure agreements with all of its subcontractors, and each subcontractor signed non-disclosure agreements with each other, allowing for a “total open communication” flow between the team members. Mary Shutt, program manager with Loral, described the impact the non-disclosure agreements had on the product team:

> We signed non-disclosure agreements between all of the team members. We were free to discuss our approach to things. Our engineers could talk to the Honeywell engineers and the Collins engineers. We could figure out what the problems were and together come up with a solution that worked for all of us. Then we made a decision and continued to press on to the next issue.

Some subcontractors shared more fully than others. There were instances when company strategy -- for example, the need to keep trade secrets -- prevented total communication. However, both the WIPT and EIPTs were forums to voice these conflicts and reach concessions[20]. McDonnell Douglas’s willingness to share information also built trust with the subcontractors. As Heerdt described:

> During program reviews we would review their progress and show them our progress. Charlie would show them the program financials. He would even show them our management reserves. That was tough. But we did it.
>
> Since we were sharing all this information we expected them to share information too. We realized that they had other business commitments that were using resources. But knowing this and understanding it helped. And once they got the cost goals and tracking charts, it started to open eyes.

Monthly EIPT meetings and WIPTs meetings, as well as weekly teleconferences and daily telephone and e-mail contact facilitated the team building experience. McDonnell Douglas also invited second and third tier contractors to participate in the rolling down-select. Each company could interact with the customer and gain a first-hand understanding of the critical issues.

During this process, the recognition of a shared destiny galvanized all the organizations involved – from the government to the lowest sub-contractor – to work toward the shared goal. The government's willingness to enter into a stable long-term contract motivated each company to work as a team member and to build trust[21]. McDonnell Douglas stepped-up their preferred supplier program with JDAM suppliers. McDonnell Douglas had a tiered system of gold, silver and bronze preferred suppliers, building in incentives for each tier. The goal for JDAM was to have each supplier at least on the bronze level.[22]

As the organizations grew to understand and trust the other and agreed to a common goal, the traditional "arm's-length" relationships between them matured to a fully integrated partnership. There were instances when a company would agree to a solution that furthered the common goal, even though it meant less business for the company itself.[23]

The IPT meetings, the free flow of communication, the shared goal and trust allowed suppliers and the prime to brainstorm affordability ideas. The team created processes, which led to innovations in the way they assembled the components. This not only reduced costs, but also improved the efficiency of the design and the performance of the product.[24]

Heerdt related one example of how communication and a shared goal resulted in lower costs and better performance:

> Collins was the supplier of the global positioning system (GPS) receiver, which interfaced with the antenna designed by McDonnell Douglas and produced by yet another contractor. Collins kept telling us that our antenna design was requiring more components on their GPS board, driving up the cost of the board. They wanted us to change the antenna specification to lower the combined subsystem cost, but we were concerned about the combined subsystem performance

> and scared to relinquish that design control. So we were stuck. Then Collins said if they could specify the antenna and select the manufacturer, they would qualify it with the receiver to the combined subsystem requirements. We then could procure the antenna directly from the supplier at much lower procurement cost. They offered to do this at no extra cost to us. It was enough incentive for them to get the board cost down. When we agreed late in the program, the Collins representative said "fine, then we'll meet our cost objective and we'll quit whining about it". There's a number of examples like that.

The Winning Team: the story is not finished

When Charlie Dillow received word that his team had won, he sat back in his chair and breathed a huge sigh of relief. It had been a grueling 18 months. The rewards had been great, he was already in line to receive a promotion, and everyone on the team had enhanced their careers by being part of JDAM. Dillow reflected on what the win meant for the company and for the defense industry:

> Affordability will be with us forever now. Once the genie's out of the bottle, you can't put it back in. Now everybody wants to reduce the cost of everything. In the defense industry today it's "either reduce costs or become extinct". So affordability is something that we can't turn around on. Those that drag their feet might get their feet cut off.

The JDAM team's perseverance paid off. Both Boeing and the DoD have heralded the success of the JDAM initiative. There are many parameters by which to judge this success: McDonnell Douglas team's final proposal included an AUPP between $14,000 and $15,000 (from an original cost target of $40,000 and original cost estimate of $68,000). The JDAM team reduced their research and development costs from $380 million to $310 million, and shortened the development program length from 46 months to 30 months. The total procurement cycle length was reduced from 15 years to 10 years, while the product actually improved on original accuracy requirements.[25]

Although the initial design phase (EMD-I) was a clear success, the JDAM project now faced its acid test: the EMD-II phase. During EMD-II, JDAM would undergo fabrication, extensive testing and evaluation in preparation for low-rate initial production.

During EMD-II, it has become apparent that the systemic issues characterizing the two larger organizations are still in flux. As the EMD-II program wears on, external forces have mitigated JDAM's success. For example, both military and civilian personnel at the DoD were never monetarily rewarded for the new behaviors they exhibited during EMD-I. The relationships that were built during the competitive phase have -- to a certain extent -- reverted to arm's length. JDAM is also feeling pressure to continue the kind of extraordinary results that were seen during EMD-I.

While his people were celebrating at the conclusion of EMD-I, Dillow knew that the work was far from complete. As he explained:

> Everyone's proclaimed us as a success, but we won't be a success until the product that satisfies the users is rolling off the production line with the right price tag and when my management is happy with the profit we're making. We still have a long way to go.

---

[1] McDonnell Douglas merged with Boeing in August, 1997.
[2] The original order was for 40,000, based on $40,000. When the unit price dropped, the order was increased to 87,000 units.
[3] Lt. Col. Charles L. Beck, Lt. Col. Nina L. Brokaw, Com. Brian A. Kelmar, *A Model for Leading Change: Making Acquisition Reform Work* (Defense Systems Management College Press),1-4.
[4] Ibid., 4-4.
[5] Ibid., 2-2.
[6] Defense News, 1997.

[7] Beck, et al. 2-2.
[8] Ibid.
[9] According to Malee V. Lucas, Supplier Management Practices of the Joint Direct Attack Munition Program, 1994: The first phase of development, EMD-1, could be compared to the Demonstration and Validation phase of traditional acquisition processes (with design and development), while EMD-2 includes fabrication, Development Test and Evaluation (DT&E), and Initial Operational Test and Evaluation (IOT&E).
[10] Ibid., p. 6.
[11] Soler, Oscar; Air Force, Joint Direct Attack Munitions, June 1996, pg. 6.
[12] Ibid.
[13] Department of Defense, Pilot Program Consulting Group, 1997 Report Celebrating Success: Forging the Future, p. 3-3.
[14] Flannery, William, "McDonnell's CEO Gives Inside Look at What's Ahead", St. Louis Post-Dispatch, Feb. 7, 1994.
[15] Sawyer, Jon, "Senate Panel Supports $18 Billion Defense Cut", St. Louis Post-Dispatch, July 14, 1990.
[16] The 1992 loss included a one-time $1.536 billion charge against revenues, reflecting the cumulative effect of the initial application of a new accounting standard for post retirement benefits.
[17] Kaplan, Fred, "Cheney Cancels Stealth Jet after Huge Cost Overruns", The Boston Globe, January 8, 1991.
[18] Goodman, Adam, "McDonnell to Cut Jobs, 6 Divisions will be Consolidated into Two; Ohio Plant to be Closed", St. Louis Post-Dispatch, August 11, 1992.
[19] Lucas, Malee.
[20] Ibid.
[21] Ibid.
[22] Ibid.
[23] Ibid.
[24] Ibid.
[25] Ibid.

Exhibits
I-XVIII

Streamline Summary

Measure	Pre EMD	Pre MS II DAB	Now (ORD II)
SOW Pages	137	2	2
MIL SPEC/STDS	87	0	0
CDRLs	243	29	22
SPO Size	86	73	60
FAR Waivers	22	47	88 (33 In Process)
DoD 5000.1/2 Waivers	0	15	16
Dev Period	64 Months	48 Months	48 Months
Dev Cost	$547.9M(TY$)	$382.0M(TY$)	$378.9M(TY$)
AUPP	$42K(BY93$)	$23.6K(BY93$)	$14K(BY93$)
# OF KPPs Met (6)	0	All (2 Exceeded)	All (2 Exceeded)
# OF Thresholds Met (42/64)	0	All (11 Exceeded)	All (14 Exceeded)
# OF Objectives Met (40/35)	0	31	24

Exhibit I

Exhibit II Defense News Budget Forecast

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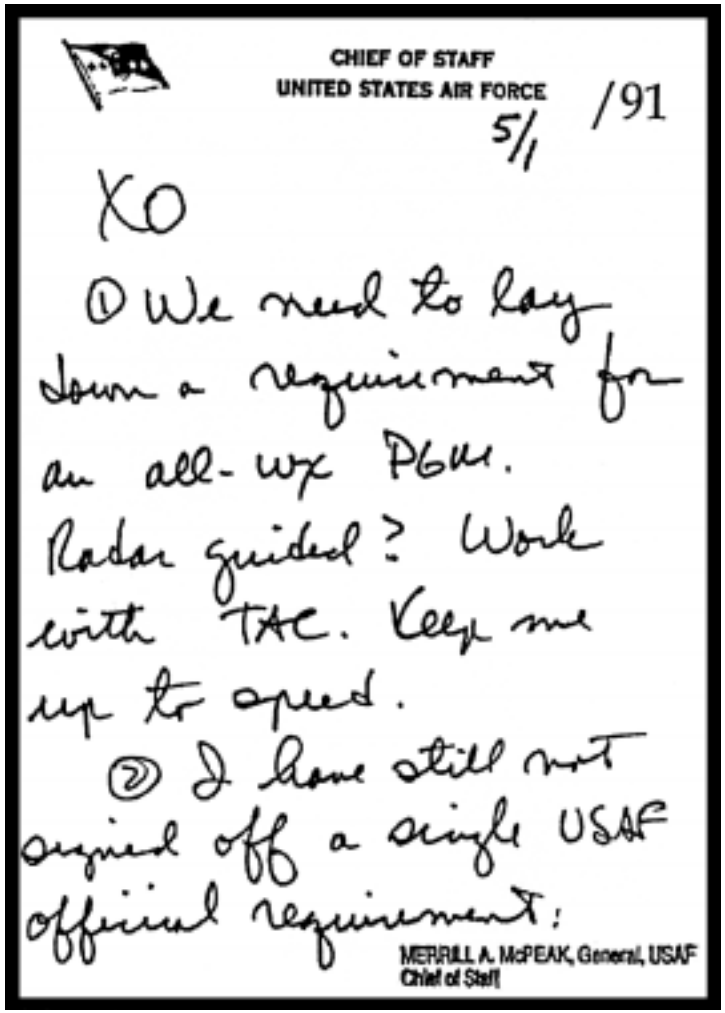
Genesis of the Requirement



CHIEF OF STAFF
UNITED STATES AIR FORCE

/91

5/1

XO

① We need to lay down a requirement for an all-wx PGM. Radar guided? Work with TAC. Keep me up to speed.

② I have still not signed off a single USAF official requirement:

MERRILL A. McPEAK, General, USAF
Chief of Staff

- **Capability Shortfall Identified during Operation Desert Storm**
  - Environment Restrictions
  - Lack of Clear Line-of-Sight
  - No Laser Designations
  - Data Link Weapons Won't Fit
- **Need Exists for an Autonomous Weapon to Attack Broad Spectrum of Fixed and Relocatable Targets**
  - All weather
  - Accurate
  - Low Cost

Exhibit III

Joint Direct Attack Munition (JDAM)

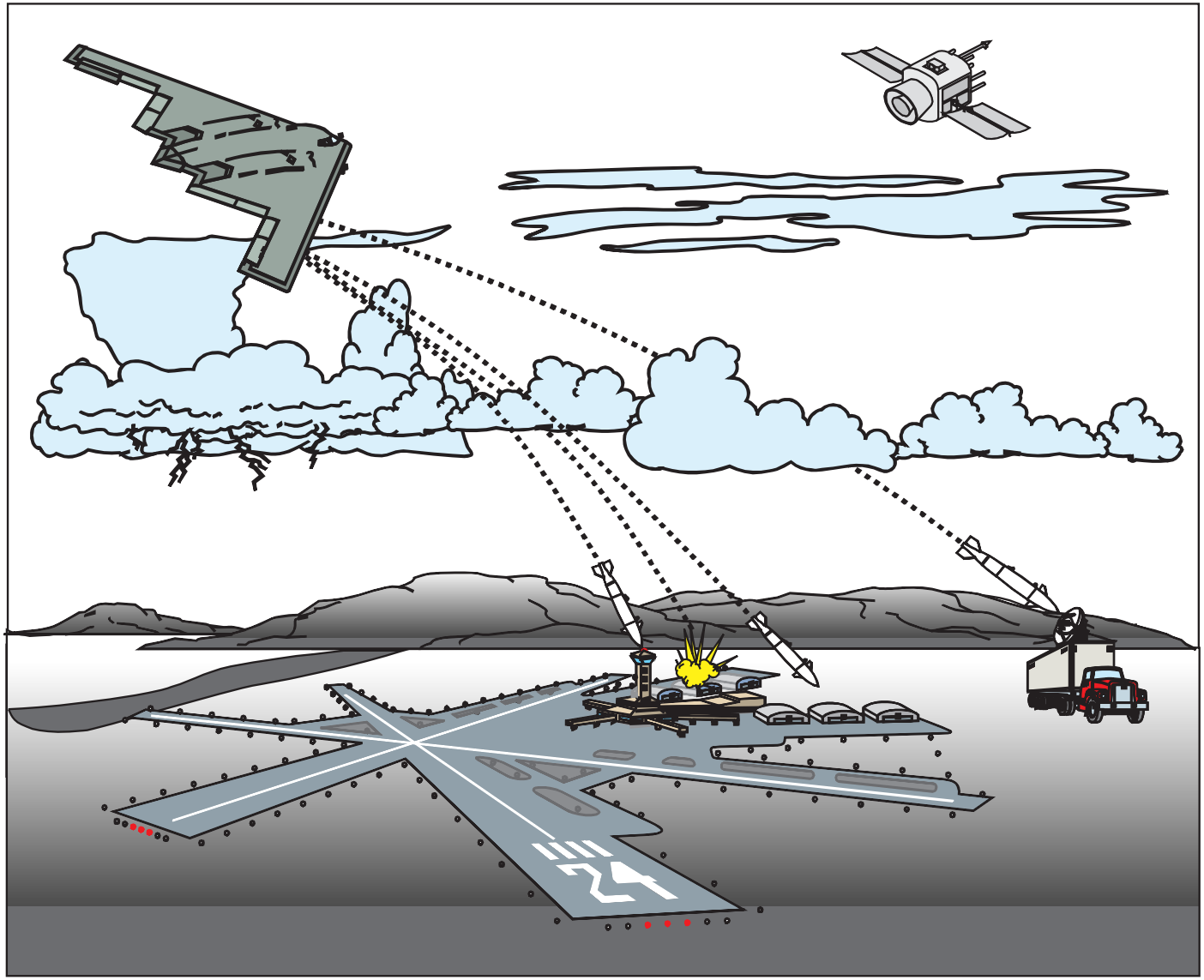


Exhibit IVa

JDAM Kit
(Notional Configuration

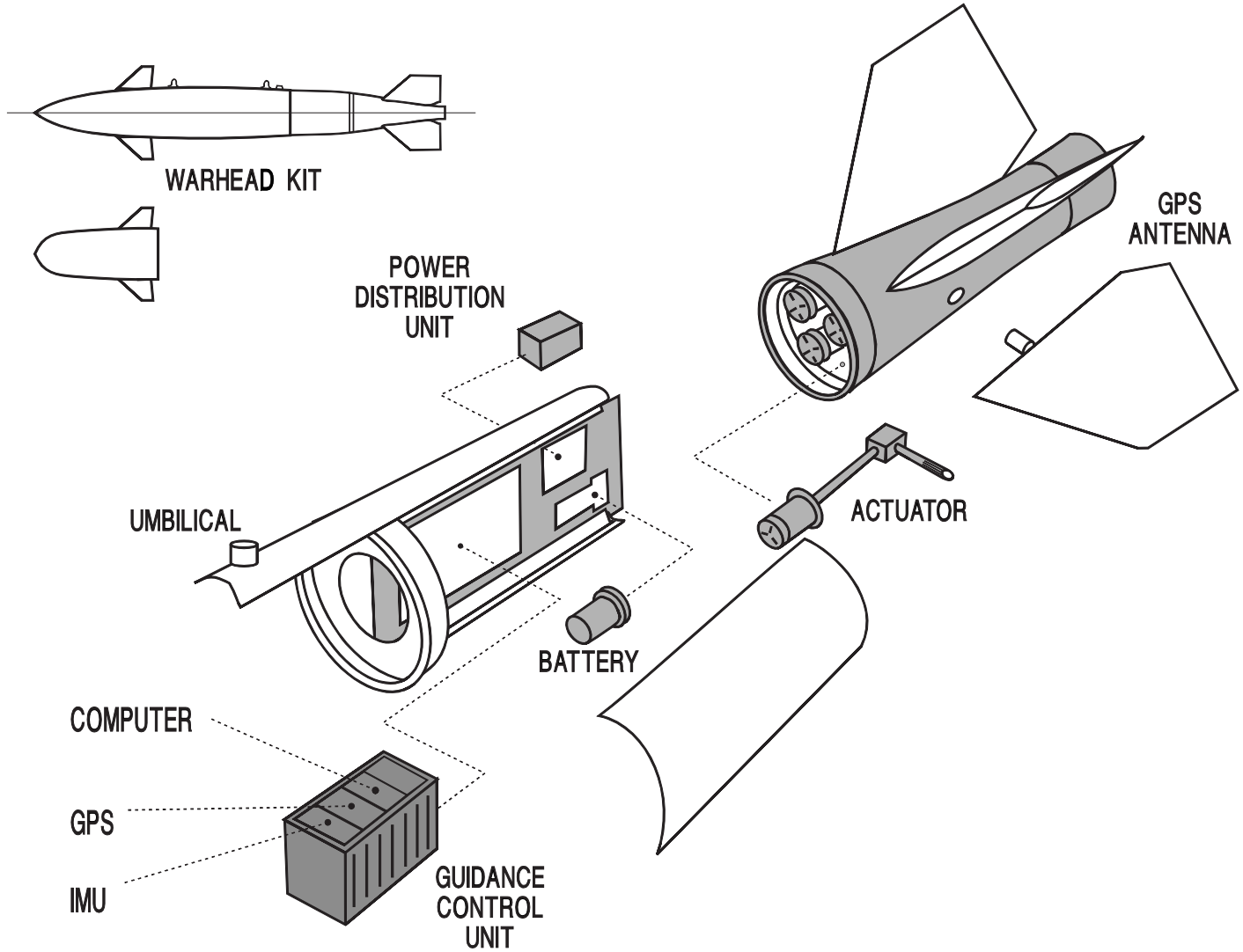


Exhibit IVb

Milestone I JDAM Cost Projections (FY91$)

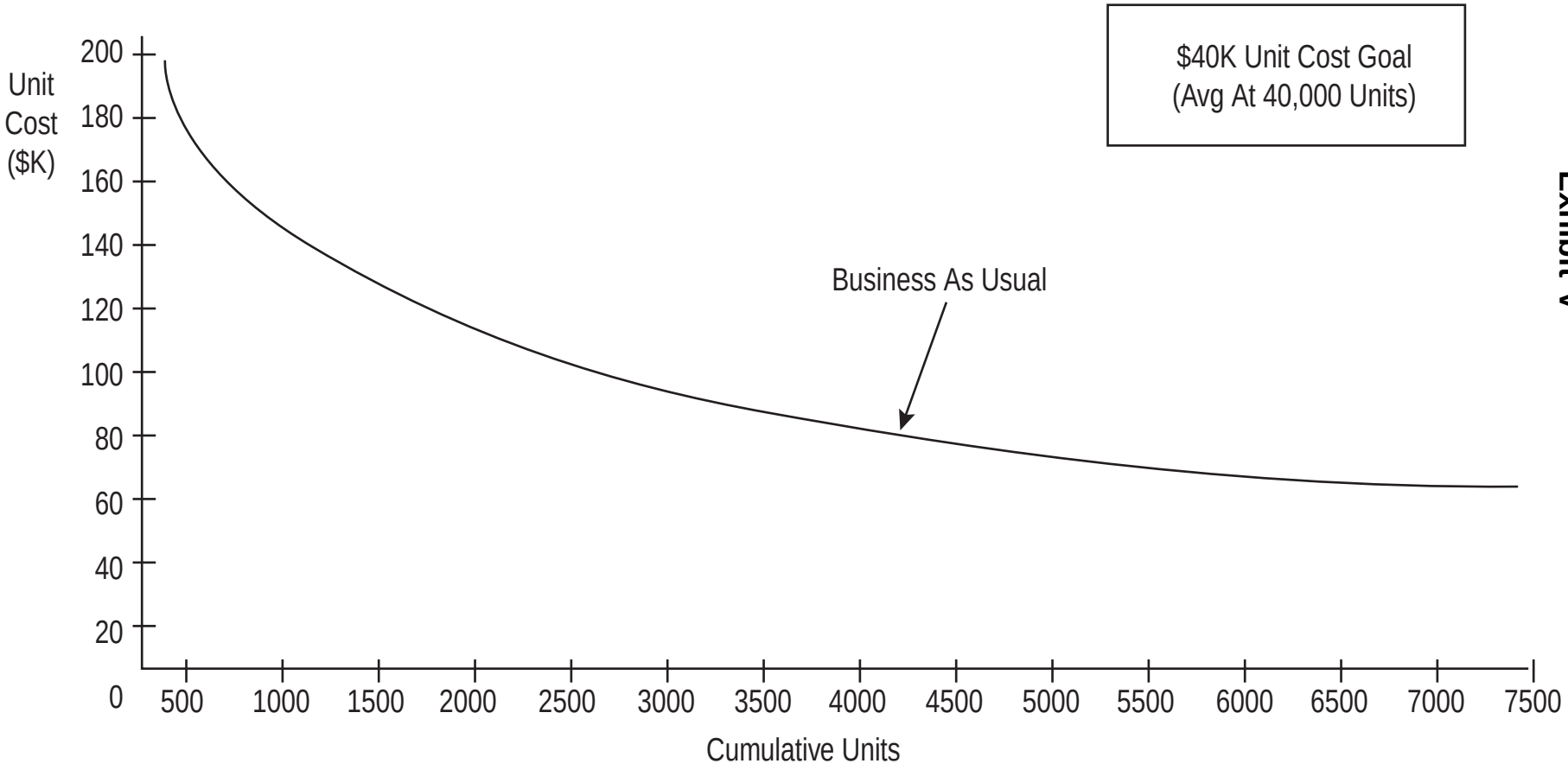


Exhibit V

JDAM Schedule Program

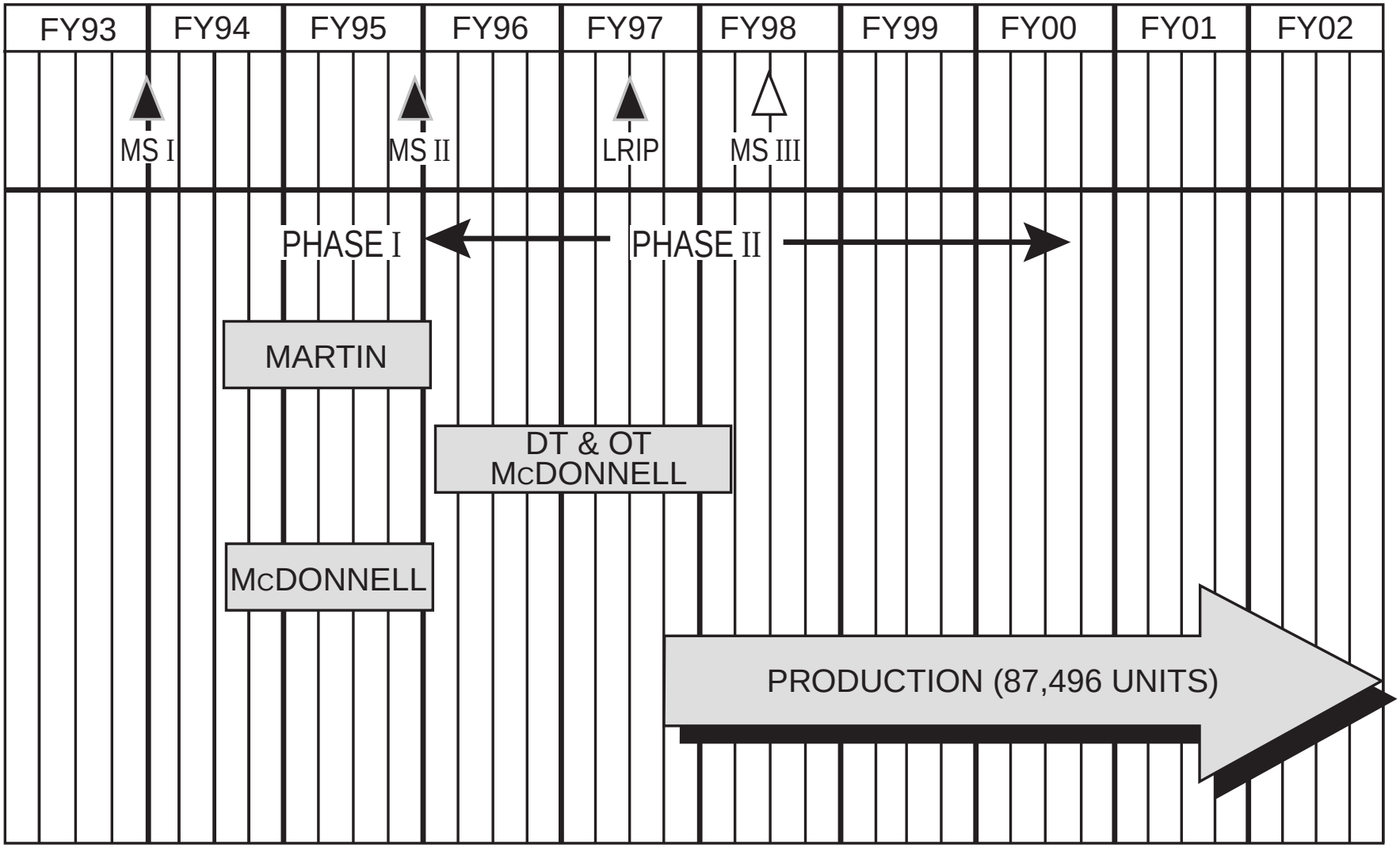


Exhibit VI

DoD and Commercial Comparison

	DoD Historical	Commercial
Buyer/Seller Relationships	Adversarial, Opportunistic	Collaborative, Long Term
Buyer Specification	Detailed “How-Tos”	End-Item Performance
Buyer In-Process Oversight	Lots (With Flow Down)	Little (Without Flow Down)
Primary Award Criteria	Technical Promises and Lowest Cost	Past Performace and Best Value
Data and Reporting	Extensive and Formal	Minimal, by Exception and Informal
Basic for Negotiation	Costs	Price
Development Contracts	Cost Type	Fixed Price

Exhibit VII

Integrated Product Teams (IPTs)

- **Government Contractor Collaborative Arrangement**
- **Government Team Members**
  - Work the Interfaces with Government Organizations
  - Have Delegated Decision-Making Authority
  - Identify and Destroy Barriers to Getting Product Better, Cheaper and/or Faster
  - Participate in Day-to-Day Decision Making with Contractor
  - Advocate for the Contractor Goals
  - Are Accountable for Performance as Team Members
- **<u>No</u> Oversight Responsibility**

Exhibit VIIIa

JDAM Integrated Gov't/Contractor Teams

- **Collaborative Govt-Contractor Arrangement**
  - Focus on Common Goal
  - Win-Win
- **Govt Members Selected to Bolster Contractor Weakness**
- **Responsibilities as Team Members**
  - Work Interfaces with Other Govt Organizations and Core Team
  - Identify and Destroy Barriers to Getting Product Cheaper, Faster, Better
  - Advocate for Team Goals and Positions
  - Respond to Contractor Program Manager
- **Authority and Accountability**
  - Delegated SPD Decision Authority
  - Accountable to Contractor PM for Performance

Exhibit VIIIb

Average Unit Production Price (AUPP)

- **Price for that Part of Production Cost within Contractor Control**
  - Includes ECPs, *Unamortized* Tooling/Test Equipment, Long Lead, Warranty, etc.
  - Calculated by Dividing Contract Cost by Number of Units (Inside-the-Beltway Cost)
- **Contractor - Proposed as Part of System Specification (i.e., Requirement)**

PRICE BECOMES AN INDEPENDENT VARIABLE DURING DESIGN PHASE

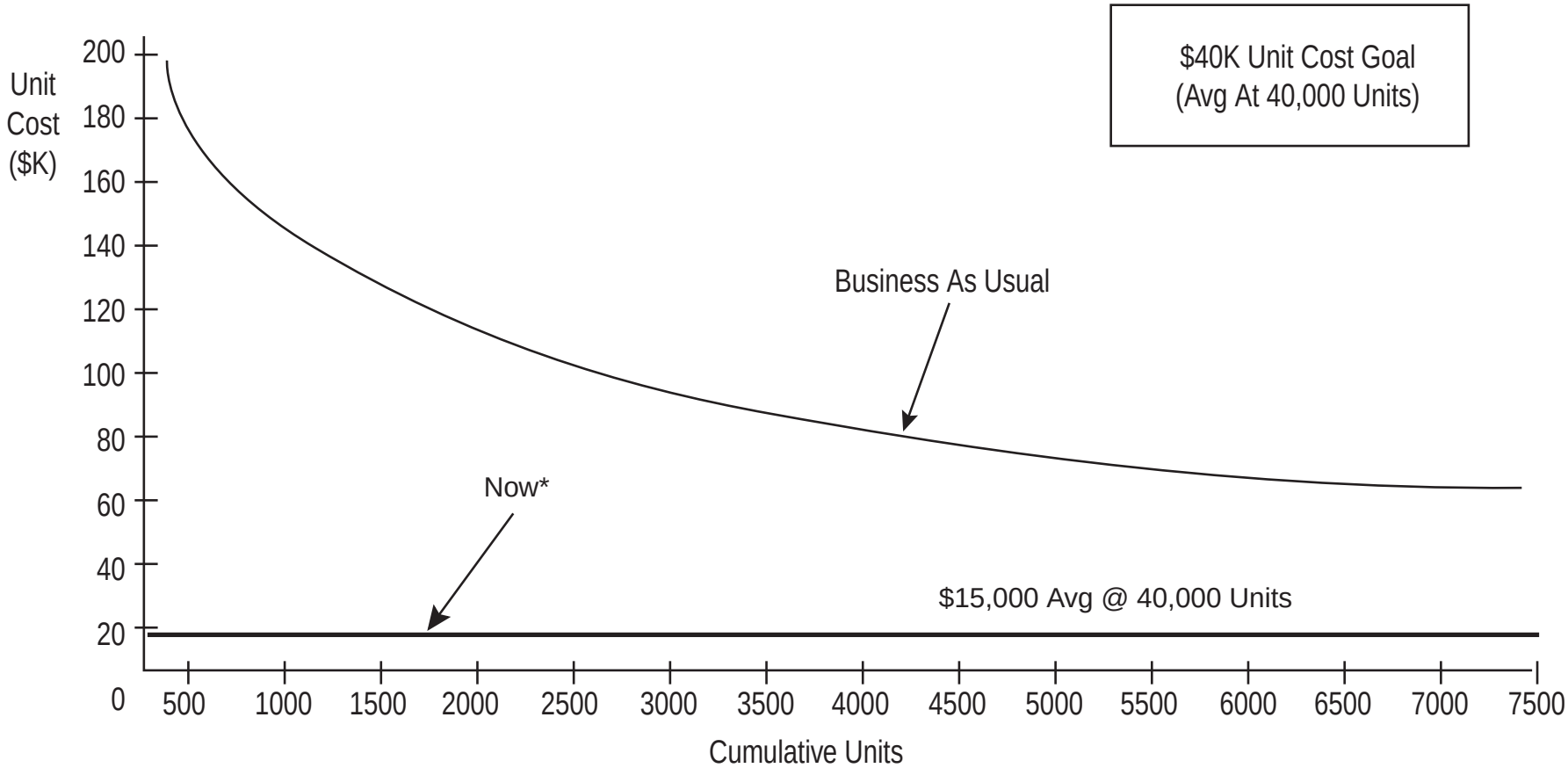
Exhibit IX

Key Performance Requirements

- **Low Unit Cost ($40K/Weapon)**
- **Adverse WX Accuracy (13m CEP)**
- **Aircraft Compatibility**
  - (B- 1, B-2, B-52, F-22, FA-18C/D Threshold)
  - (F-16, F-15, F-117, FA-18E/F, AV-8, F-14, P-3, S-3 Objective)
- **Aircraft Carrier Suitability**
- **Captive In-Flight Retargeting**
- **Warhead Compatibility**
  - MK-84, BLU-109, MK-83, BLU-110

Exhibit X

Current JDAM Cost Projections



*McDonnell Bid for First Five Lots

Exhibit XI

Exhibit XIIa

JDAM OIPT issues and associated recommendations/rationale

• Waiver Authority Delegation. The Program Director proposes that the SECDEF delegate to the JDAM Program Director blanket waiver authority for any regulation and policy not required by statute. This is the sole issue that the members of the IPT were unable to agree upon and it will be raised as an unresolved issue for OIPT attention and resolution (if possible).

- The Program Director's request is proposed to replace the current cumbersome and time-consuming request-for-waiver process. The Program Director's proposal includes a legal review and notification to USDA&T) via the Monthly Acquisition Report prior to waiving. Some special programs have been granted this authority in the past.
- Several OSD offices (API, AR, DP, and S&TS/AW) are not in agreement with this request. They are concerned about the magnitude of this authority (i.e. the FAR and 5000.2 could be waived, just to name a few). This authority is not consistent with an ACAT-1D program which requires OSD oversight and participation. Making improvements to the current request-for-waiver process would seem to be a more suitable approach to relieving the Program Director's concern.

• LRIP and MS-III Decision Authority. The IPT recommends that the JDAM LRIP be delegated to the SAE. The IPT recommends that MS-III remain a DAE-level DAB (including all necessary documentation). The DAB documentation will include SAMP, TEMP, ICE, JORD, APB, STAR, and Beyond LRIP Report.

- The DAE should be the decision authority for the major production milestone. For JDAM, the major production milestone which represent the substantial commitment from the DOD is MS-III; not LRIP.
- LRIP, scheduled for mid FY97, is a single lot ($26M, FY97 funding). The LRIP quantity, 425 units, represents less units than the contractor will produce during E&MD. All LRIP units will be expended in follow-on aircraft testing.
- The JDAM LRIP decision does not initiate a large investment in tooling or productionization since the contractor's commercial practices and production tooling are being used during the E&MD phase (well before the LRIP decision).
- Concurrent with the 2000-lb MS-III full rate production decision, there will be a supplemental LRIP decision for the 1000-lb variant. Therefore, the DAB will serve as a review point for both variants. Exit criteria recommended by the IPT for these future reviews are at Tab E.

• MS-I Exit Criteria Status. The MS-I exit criteria are at Tab F. The program office has fully satisfied all exit criteria

with the exception of the Interface Control Document (ICD) criterion. The program office has signed ICDs with all primary aircraft. The F/A-18C/D aircraft hand-off errors for transfer alignment, as recently revised by the aircraft prime contractor, may not satisfy the JDAM accuracy requirement. Two software options are being evaluated to correct the problem. Closure of this F/A-18C/D ICD issue is projected in October. The IPT recommends acceptance of the MS-I exit criteria as fully satisfied given the F/A-18C/D ICD software mitigation plan.

• Buy-to-Budget. The IPT recommends a buy-to-budget strategy. The OSD and AF comptroller positions on this issue are unknown. This strategy is characterized by a budget which remains constant and independent of unit cost; thus allowing the program office to procure the maximum amount of JDAM kits that the budget can support. This strategy will provide program stability, a long-term commitment to JDAM procurement, and meet the warfighter's needs.

Several other JDAM items will be specifically highlighted at the OIPT

• Early Foreign Military Sales (FMS). The IPT recommends approval of early FMS. Early FMS will allow the US to benefit from economies of scale. Additionally, the IPT recommends a waiver of the policy requiring FMS customers to share in R&D recoupment costs. This waiver will encourage foreign procurement of JDAM kits and allow time to work aircraft integration, mission planning, and crypto key issues early.

• SASC Language - Targeting Support. Tab G is the FY95 SASC language (language only; not law) that addressed JDAM targeting support. In response to this SASC language, the IPT recommends a letter to the committee indicating that the JDAM intelligence support has been defined (in the Intelligence Support Plan) and that the Department will continue the focus on Command, Control, Communication, Computers and Intelligence (C4I) for JDAM and other precision-guided munitions to understand the impacts to and limitations of our intelligence support architecture. If necessary, we can list the studies and initiatives that are on-going which specifically address the C4I support system.

• Pay-for-Performance. The Program Director may discuss the authorization to implement a pay-for-performance program. This incentive program, which authorizes bonuses to the Government team (civilian, military and support contractor) for meeting cost, schedule, and technical objectives, was apparently mandated in the 1994 FASA. However, several problems still seem to be unsettled with respect to the program and its implementation.

Sales and Head Count
1988-1995

FILE NAME=RVHD8895 2/18/98

EMPLOYEES	1988	1989	1990	1991	1992	1993	1994	1995
McDONNELL AIRCRAFT COMPANY	33,620	35,189	33,761	28,119	24,927			
McDONNELL DOUGLAS ASTRONAUTICS/ MDA-TAMS/MDA-S&DS-HB	21,813	23,365	23,831	23,010	20,012	40,082	38,333	37,081
McDONNELL DOUGLAS HELICOPTER	6,969	6,922	5,845	4,982	4,218	3,399	2,814	2,975
DOUGLAS AIRCRAFT	43,456	51,028	48,049	45,983	21,572	12,540	12,551	12,734
MILITARY TRANSPORT AIRCRAFT					11,434	11,274	9,771	8,256
INFORMATION SYSTEMS COMPANY/ AEROSPACE INFORMATION SYSTEMS/ MD FINANCE CORPORATION/OTHER	15,563	11,422	9,704	7,029	5,214	2,721	2,291	2,566
TOTAL	121,421	127,926	121,190	109,123	87,377	70,016	65,760	63,612

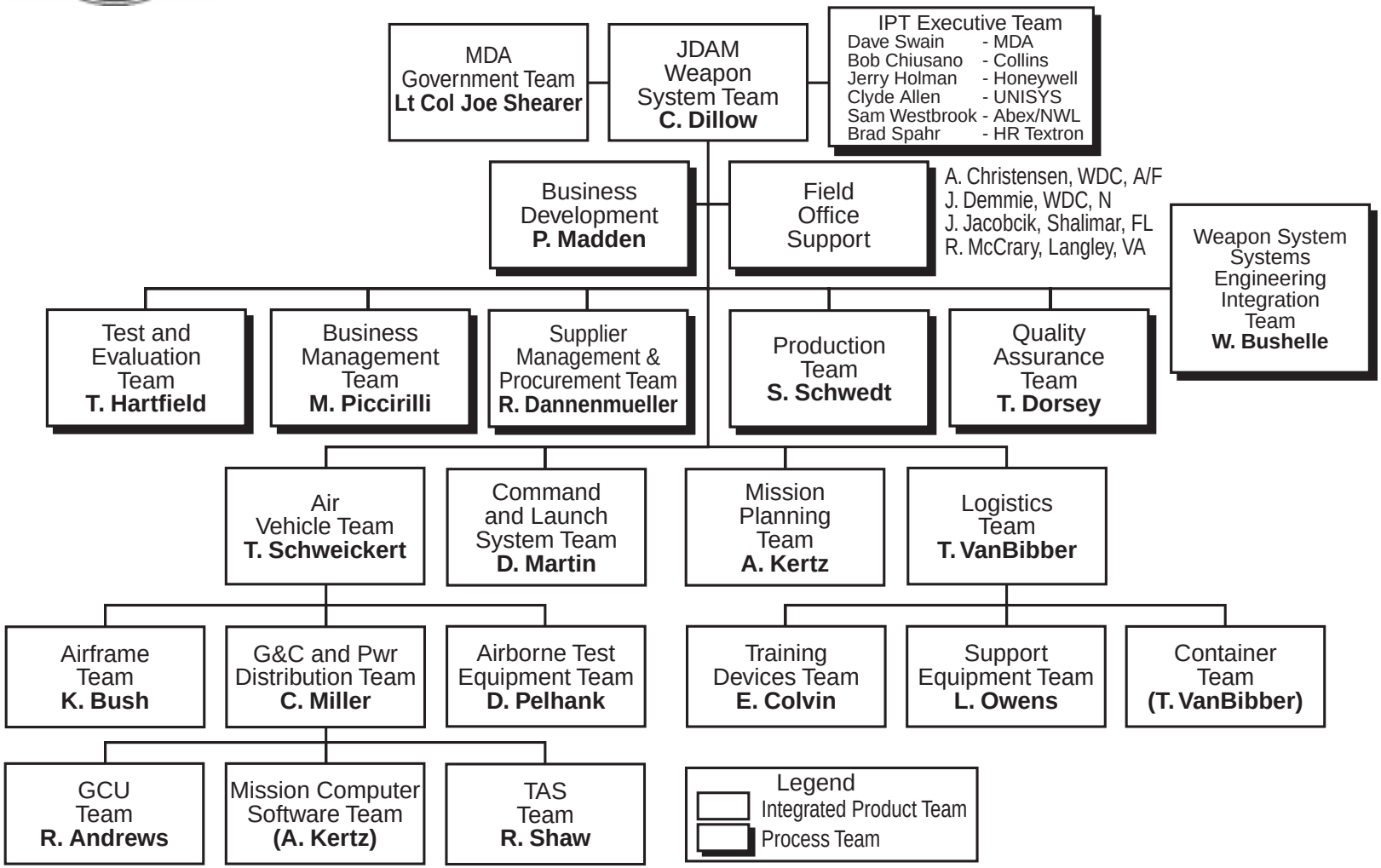
IN LATER YEARS, 1991 ON, OTHER IS PRINCIPALLY CONTRACT HIRES

SOURCE: AL TOCYZLOWSKI
MANAGER, FINANCIAL STATEMENTS—ST. LOUIS
THE BOEING COMPANY
(314) 233-2050

Exhibit XIII

Source Selection Information - See FAR 3.104

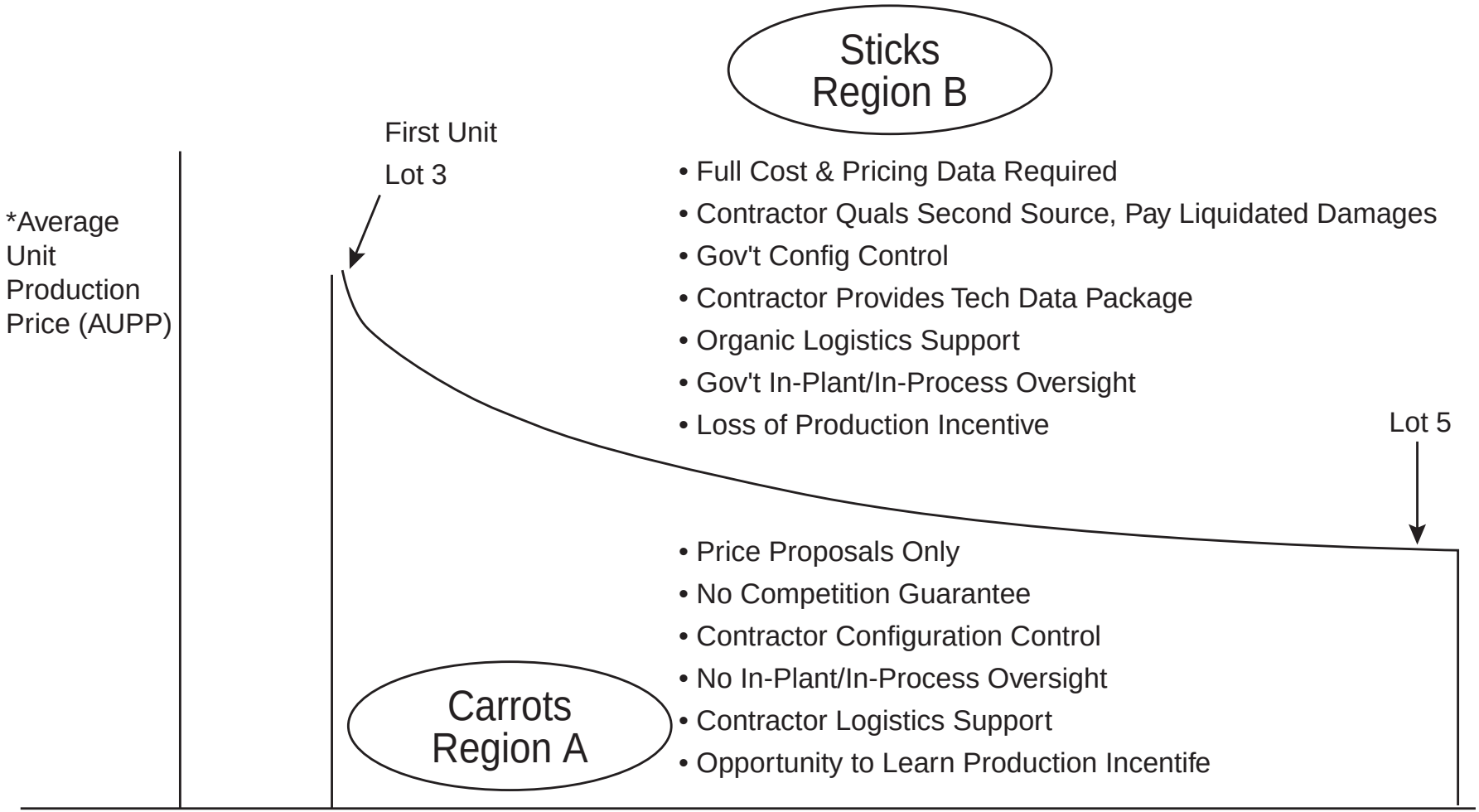
MDA JDAM Weapon System Organization



Our IPT organization minimizes EMD cost and schedule risks while maintaining focus on reducint AUPP.

Exhibit XIV

Carrots and Sticks



(* Includes Warranty)

Exhibit XV

JDAM Component Breakdown

Think Lean!!

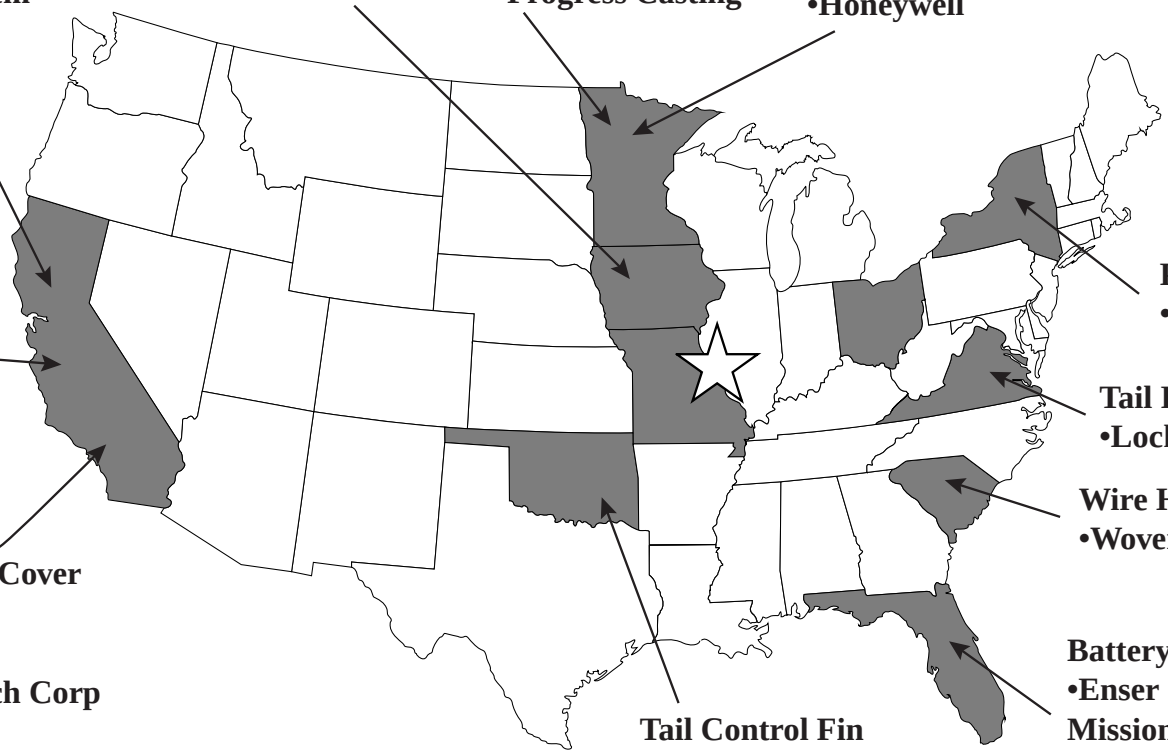


Exhibit XVI

MDA Road to Affordability

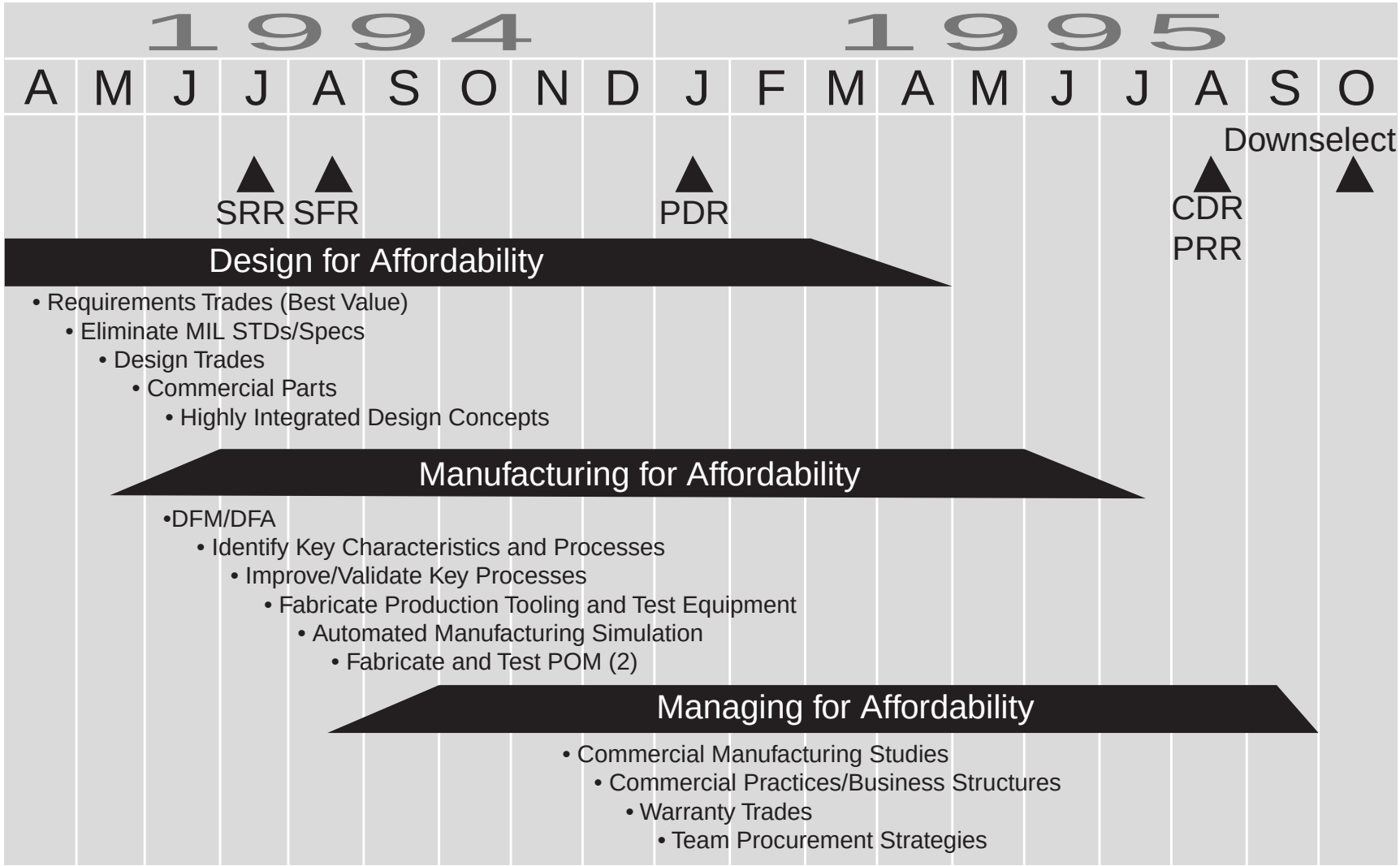


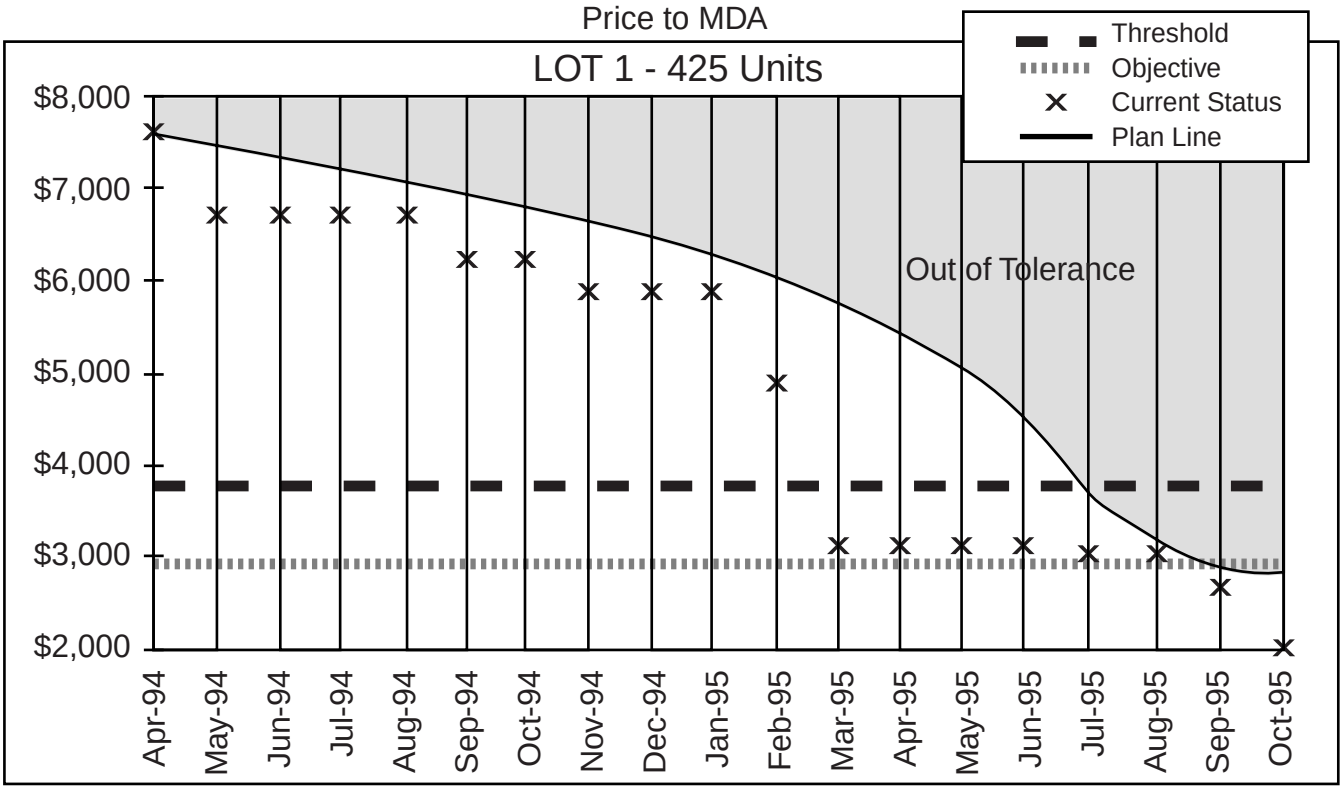
Exhibit XVII

Exhibit XVIII

JDAM AUPP TP Status - IPTs

Product Team: Integrated Mission Computer Team — WBS: 1113

Status Date: — IPT: Bob Andrews



Near Term AUPP Reduction Initiatives

Item	Description & Status		Delta ($)
1	Utilize Industrial Grade (rather than full-Mil) Components		$1,600
	-68040 Processor	$690	
	-68360 Microcontroller	$400	
	-PAL	$100	
	-SRAM	$120	
	-Transceivers	$200	
	-EEPROM	$50	
	-Drivers/Receivers	$40	
2	Low Cost GCU Design (mechanical)		$192
	-Wedge Lock & Frame	$62	
	-Motherboard Connector	$20	
	-1 Printer Circuit Board	$100	
	-Crossovers	$10	
3	Commercial Acquisition Reform (component savings above)		$140
	-Commercial Production Practices (20% of labor)	$70	
	-Commercial Business Practices (20% of labor)	$70	

Future AUPP Reduction Ideas

A Strategic Business Alliance

B Piece Part Procurement Strategies