SWDC—A New Idea?

For 50 years Southwest bases have shared capabilities for full scale, "widely dispersed joint air, land, sea, and space forces."

The SWDC offers "high quality, realistic, and stressful training that amplifies and fully prepares our forces for joint operations." Joint Vision 2010.

Why Southwest Consolidation?

"...our combat forces are moving towards the 21st century, but our infrastructure is stuck in the past. We cannot afford this waste of resources..." Secretary of Defense William Cohen, Forward to Quadrennial Defense Review Report, May, 1997.

Consolidation of functions in the SWDC meets Joint Vision 2010 battlespace needs and divestiture of less capable infrastructure.

"We can start this initiative by linking the Service training and experimentation centers in the Southwest United States..." Gen. Dennis Reimer, U.S. Army Chief of Staff, June 1997.

SOUTHWEST DEFENSE COMPLEX

Holloman AFB
Fort Huachuca
SO CAL Offshore Range
Yuma Proving Ground
Edwards Air Force Base
Naval Air Station, Fallon
Nellis DoD/DOE Complex
Dugway Proving Ground
Fort Bliss McGregor Range
Kirtland DoD/DOE Complex
White Sands Missile Range
Cannon AFB Operating Areas
Utah Test and Training Range
Fort Irwin National Training Center
Naval Air Warfare Center, China Lake
Naval Air Warfare Center, Point Mugu
Air Ground Combat Ctr, 29 Palms MCAS
Western Test Range, Vandenberg AFB

Critical to future DoD needs–presently devoted to specific Service usage:

Chocolate Mountains Range
Goldwater Range

Southwest Defense Alliance
A nonprofit Corporation in the Southwestern States
P.O. Box 2494
Lancaster, CA 93539-2494
661-723-6103
FAX 661-723-5926
e-mail: colaero@qnet.com

SOUTHWEST DEFENSE COMPLEX

GLOBAL PROJECTION, FULL SPECTRUM–GEOGRAPHICAL & CLIMATOLOGICAL

JOINT RESEARCH DEVELOPMENT TESTING & TRAINING

A Concept for the Future

The Southwest Defense Alliance (SWDA)

A nonprofit Alliance of states, counties, communities, and businesses hosting DoD bases advocating the SW Defense Complex for necessary consolidations of DoD Research, Development, Testing & Training (RDT&T).

Why a Southwest Defense Complex (SWDC)?

Joint Vision 2010 states we must:

"train the way we will fight."

Joint, full-scale field deployments using SWDC global spectrum land, littoral, sea, air, and space testing and training resources can identify and solve problems.

"...in the Southwestern U.S. all four services have training, test and evaluation ranges that provide a land, airspace, sea area, and offshore supersonic operating domain that could accommodate a major portion of our joint test and evaluation needs." "...used to support joint training..." Gen. Colin Powell, Chairman Joint Chiefs of Staff, Feb. 1993.

SOUTHW

The SWDC has operating space with global spectrum-geographical & climatological features and freedom from encroachment pressures available:

SPACE

9000 mi. to Indian Ocean

Western Ballistic Missile Test Range

Polar Launch

LITTORAL

Over 70 mi. shore line w/islands, cliffs, mountains, and rock & sand transitions. Shallow & deep trench sub approaches, fleet maneuvering, sub/sea/air launch cruise missiles to full length live fire ranges w/threats.

SEA

334,259 sq. mi. of sea range

150 by 1300 mi. Off-shore Operating Area w/400 mi. sea level supersonic Test Corridor

Avoids air routes

SOUTHWEST DEFENSE COMPLEX

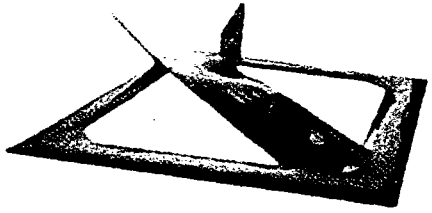
Littora

Air

Photo credits to U.S. Army, Navy, Marines or Air Force.

AIR FORCE RESEARCH LAB MULTI-DIRECTORATE VISION

SENSOR CRAFT



THE AIRBREATHER COMPONENT OF TOMORROW'S ISR ENTERPRISE

SENSOR TECHNOLOGICAL CHALLENGES

- Greatest challenge – affordability; reduce a $50-100 million RF sensor suite to $5-10 million.
- Performance improvement of at least 30 dB for AMTI and at least 12 dB improvement in GMTI from existing systems.
- Conformally integrated low frequency and high frequency apertures.
- **Beamforming over doubly curved surfaces.**
- **100X reduction in size and weight of today's receivers.**
- **Weight reduction of at least 100-1000X of all sensors systems from current aircraft configurations.**
- **Light weight, compact, and tunable lasers.**

AIR VEHICLE TECHNOLOGICAL CHALLENGES

- 360° aperture integration for resonance detection.
- Integrated high aspect ratio wing, sensor, passive cooling, power generation and distribution.
- Reliable and affordable sensor, propulsion, vehicle integrated design for overall unit flyaway cost 10X less than AWACS and JSTARS.
- **High aspect ratio joined wing.**
- **High altitude heat rejection, cooling system weight, volume improved 2-3X.**
- **Integrated structural sensor integrity, durability, damage tolerance increased 4X.**

PROPULSION / POWER TECHNOLOGICAL CHALLENGES

- Need to improve power generation capacity by 2-fold and reduced logistic footprint.
- Need to extend mission duration (goal — 80hrs; threshold — 60hrs).
- Increase fuel efficiency.
- **Reduce cost of engine / power system.**
- **Reduce maintenance cost.**
- **Light weight, high efficiency regenerative power.**

INFORMATION / EXPLOITATION TECHNOLOGICAL CHALLENGES

"Optimized" Resource Allocation, Synchronization, Tasking, Processing, Exploitation, and Dissemination (RASTPED)

- Air surveillance.
- Ballistic missile surveillance.
- Cruise missile surveillance.
- Surface surveillance and time critical targeting.
- Counter — CC&D.
- Urban warfare.

FOR ADDITIONAL INFORMATION, CONTACT:

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Sensors Directorate
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John McNamara
Information Directorate
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mcnamaraj@rl.af.mil

SENSOR CRAFT

"The Ever-Present Eyes and Ears of the Warfighter"

The Air Force Research Laboratory is formulating a program that holds high promise in providing revolutionary Intelligence, Surveillance, and Reconnaissance capabilities only dreamed of here-to-fore. This ingenious program blends a wide spectrum of emerging technologies to produce an aircraft configured and optimized to conduct advanced sensing capabilities integrated into an airframe that sustains a "continued presence". This is achieved through extremely long endurance, thus, giving the Warfighter the edge needed in extremely difficult targeting environments. It is the unique combination of advanced sensors and sustained presence that enables continuous and rapid reaction to the dynamic combat operations requirements confronting current and evolving military operations.

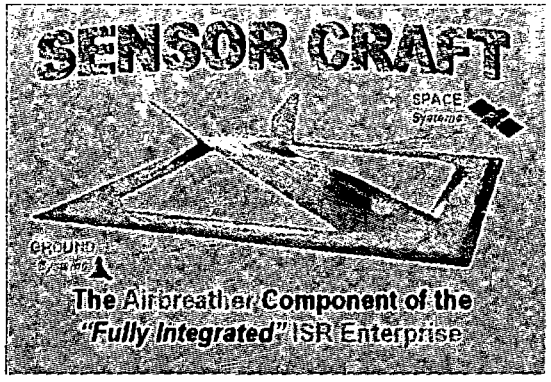

Figure 1: Sensor Craft Role in the ISR Enterprise

As Figure 1 depicts, the Sensor Craft is the Air Breather component of a fully integrated ISR Enterprise that cohesively integrates Space, Air and Ground components of the total ISR apparatus. The technological construct goes far beyond the mere concept of information merge (e.g., cross cueing) to a level of automated integration adapting the sensor management to extract needed phenomenology to identify extremely difficult Camouflaged, Concealed, and Deceived (CC&D) targets. This includes multistatic interoperability with Space assets and data exfiltration from "up close and personal" ground sensors. Several aircraft and propulsion candidate design / configurations are under study to determine the best trade between long endurance, altitude, engine efficiency, and power generation all driven by the advanced sensor payload and RF aperture requirements necessary for the new sensing capabilities resulting in continuous All-Weather, theater air and ground target acquisition, geo-positioning, and tracking through to and including time critical targets employing heavy CC&D. According to members of the design team, one of the most innovative aspects of this program is the integration, into the structural components of the aircraft, the large antenna apertures required for lower frequency operations. It is in these lower frequency bands of operation that the Sensor Craft will provide a foliage penetration radar capability; a key sensory mode aimed at negating an age old, and extensively practiced. CC&D capability.

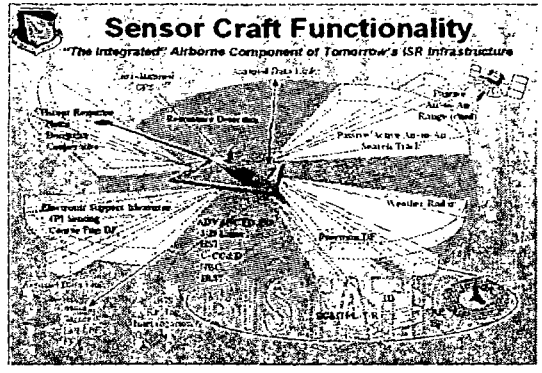

Figure 2: Sensor Craft's Advanced Sensor Multi-Modality and Diverse Functionality

Figure 2 illustrates the advanced sensor functionalities and modes being designed into the Sensor Craft vehicle. Advanced RF capabilities include radar and Electronic Support Measures (ESM) fully integrated into the aircraft structure. ESM will likely be split into a High Band and Low Band of operation with radar functions to include Air Moving Target Indication (AMTI), Ground Moving Target Indication (GMTI), Synthetic Aperture Radar (SAR), foliage penetration SAR with these functions operational in both monostatic and bistatic modes. Data exfiltration of the ground sensory component of the ISR infrastructure will be integrated into the RF system on-board the Sensor Craft. Non-lethal self-protection will be performed in a manner explicitly tailored to the threat including noise, deception, and cooperative countermeasures. Emerging Electronic Protection (EP) techniques will be integrated into Sensor Craft for providing new levels of sophisticated hardening against more advanced Electronic Warfare (EW) technologies that may be potentially developed by the more advanced adversaries. Assured data links to within theater elements with Laser communication up / cross links for reach back to CONUS are already defined with long lead technical elements under development. The EO sensory suite includes Infrared Search and Track (IRST), as an adjunct to long range AMTI; Hyper Spectral Imaging (HSI), as an emerging technology enabling exploitation of phenomenologicly derived, yet subtle attributes associated with the CC&D and Chemical-Biological sensing / targeting problem; and 3-D Laser imaging, an advanced sensing capability with extremely high resolution and precise 3-D information critical for Intelligence Preparation of the Battlefield (IPB) and advance target recognition and positioning capabilities. These advanced sensor functionalities, integrated into an aircraft explicitly developed to enable the persistence of these capabilities as an in-theater compliment to the Space component of the ISR Enterprise, provides the needed revolution in ISR for tomorrow's Warfighter.

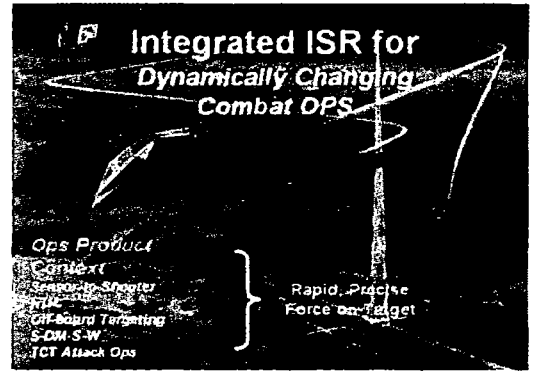

Figure 3: Product of the Integrated ISR Enterprise

In summary, the Sensor Craft concept represents a diverse, multi-directorate, shared vision to innovatively combine the emerging (and rather diverse) technologies associated with flight vehicles, propulsion, sensors, and information into a highly responsive thrust to provide revolutionary capabilities in ISR. Truly, the role of Sensor Craft, and it's functionality within the ISR Enterprise, represent the "Leading Edge" in providing the Warfighter the "Eyes and Ears" to flexibly respond to Dynamic Combat Operations with the right "Force on Target" (Figure 3).

MOONSPACE

A TECHNICAL SERVICES CORPORATION

PAT MOON-FRESH
President

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AIAA
REGIONS V / VI
ANNUAL PUBLIC POLICY COLLOQUIUM
AGENDA

"Air & Space Issues for the Year 2000"

Saturday, February 12, 2000
Summerfield Suites
810 S. Douglas Avenue, El Segundo, CA
(310) 725-0100
9:00am - 4:00pm

1.0	9:00 - 9:30	Continental Breakfast Self Introductions / Review of Agenda	All
2.0	9:30 - 9:50	Overview of AIAA Section Public Policy Process Public Policy Award Applications	Pat Fresh
3.0	9:50 - 12:00	Section Public Policy Reports	Section Officers

Antelope Valley	Phoenix	Tucson
Arrowhead	Point Lobos	Utah
China Lake	San Diego	Vandenberg
Los Angeles	San Fernando Valley	Ventura Pacific
Orange County	San Francisco	
Pacific Northwest	San Gabriel Valley	

12:00 - 1:00 LUNCH (on our own)

4.0	1:00 - 1:30	Colloquia Development & National Public Policy Communications Subcommittee Report	Norm Bergrun
5.0	1:30 - 1:50	AIAA Headquarters Overview Congressional Visits Day	Paul Looney & Ali de Jongh
6.0	1:50 - 2:00	Break / Snacks	
7.0	2:00 - 3:30	Introduction of AIAA Issues Panel	
		1) Engineering Education	Russell Shane
		2) Military Issues	Jim Atwater / Bob Wyckoff
		3) "Privatization of the Air Traffic Control System"	Bob Wyckoff
		4) Open Issues	TBD
8.0	3:30 - 4:00	Adjourn / Informal Discussions	

AIAA
REGION VI
ANNUAL PUBLIC POLICY COLLOQUIUM

"Air & Space Issues for the Year 2000"

Saturday
February 12, 2000
9:00 AM - 4:00 PM
Summerfield Suites
810 S. Douglas Ave.
El Segundo, CA 90245
Room Reservations: (310) 725-0100

Morning agenda:
Public Policy Reports

Noon: (Dutch Lunch)
Lunch on Our Own

Afternoon Agenda:
Getting ready for
Congressional Visits Day 2000

RSVP
on or before February 7th
Pat Fresh
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Lisa Lint
(310) 643-7510

the Shortfall in Science and Technology

By John T. Correll, Editor in Chief

The high-technology Air Force is falling behind in research and development.

Over the past 10 years, the Air Force has gone from first to last among the armed services in the amount it spends on Science and Technology.

Since Fiscal 1989, the Air Force budget for research and advanced development has fallen by more than half.

By 2005, the portion of Air Force total obligation authority that is allocated to Science and Technology drops almost 30 percent below its level in 1993.

These are alarming trends for a service that hangs its hat on technological superiority.

The situation was brought to public attention in January in a special report, "Shortchanging the Future: Air Force Research and Development Demands Investment," published by the Air Force Association's Science and Technology Committee.

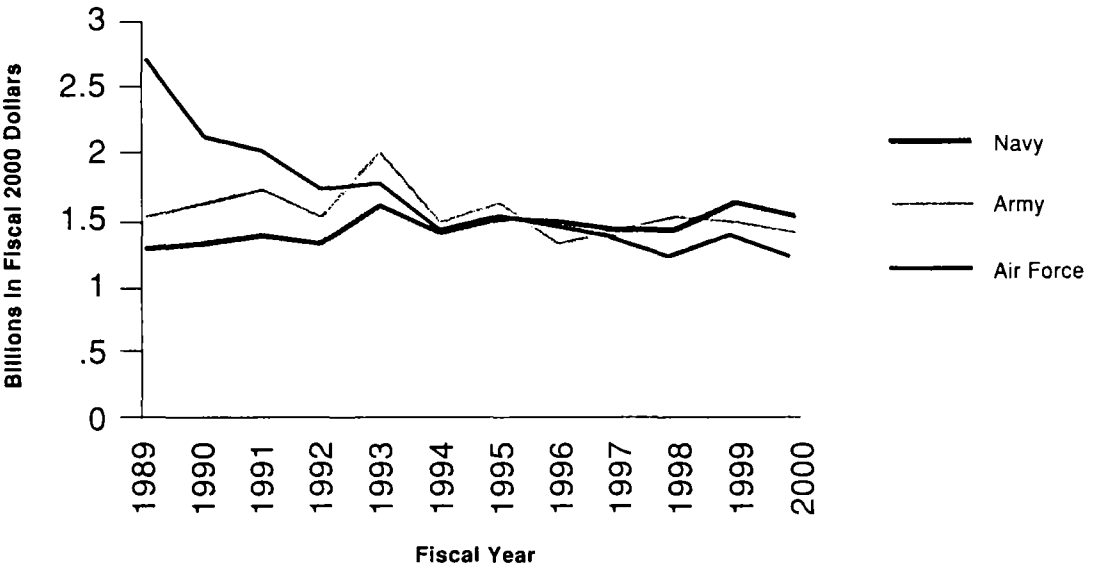
"Given a decade of declining S&T budgets," the report said, "the most promising technologies, such as directed energy, miniaturized munitions, new electronics countermeasures techniques, unmanned combat aerial vehicles, and improved materials for space power, may not be ready to be incorporated into Air Force systems to be fielded through 2020."

The findings were presented to

From First to Last

S&T Investment by Service

The Air Force came out of the Cold War as the unquestioned leader among the armed services in Science and Technology investment. It now trails both the Navy and the Army.



Source: Office of the Secretary of Defense

the news media, Congressional staff, and the defense industry Jan. 13 by two retired Air Force four-star generals, Lawrence A. Skantze, the committee chairman, and John Michael Loh.

"Technology as we know it today is not going to be anything we can hold to our own," Skantze said. Today's advantages, such as stealth, will disperse. Staying in the forefront of military preparedness, he said, demands "a robust investment in S&T" to "push the state of the art and the barriers to create technology leverage."

Loh said that technology is the "backbone" of the Air Force. "Among all of the services, the Air Force achieves its core competencies and its mission capability from advanced technology, not from manpower and mass."

In a statement issued shortly after the Jan. 13 briefing, the Air Force said it shared AFA's concern and agreed that the decline in Science and Technology spending must be reversed.

Short-Range Perspective

Time and again in recent years, the armed forces have pulled money out of their investment accounts to pay for the increased pace of everyday operations.

In such a budget environment, Skantze said, "your focus becomes more and more short term. Your vision becomes limited to, in some cases, weeks, as opposed to months or years, and so relevance of S&T expenditures tends to be skewed toward what would work in the near term."

Science and Technology initiatives, on the other hand, often take decades to explore, mature, and pay off.

For example, Skantze said, today's Airborne Laser program is the direct result of research in the 1960s and 1970s, when the Air Force "put money into things like algorithmic jitter to be able to compensate for atmospheric diffraction—and it took a long time to find a way to do that."

From stealth aircraft to precision guided munitions, the systems that won the Gulf War in 1991 so spectacularly were the product of investments in Science and Technology that in some cases stretched back for 30 years.

The Air Force Association has consistently rejected the argument, often heard, that the only possible way to fund Air Force S&T programs vital to the nation's interest is to shift money out of other critical programs.

"I don't view this as a trade-off," Loh said. "I think the Air Force has every right, based on its performance, commitments, and obligations over the past few years to request additional funding for this. It should not come at the expense of other programs."

A complicating factor on priorities is that the Air Force Science and Technology program has not had a top-level advocate since the demise of Air Force Systems Command in 1992, Skantze said. "You have a major general who runs the Air Force labs, and he essentially puts together the basic S&T budget. But as it comes up through the system from there, you do not find what I would call card-carrying R&D–S&T advocates at the highest level."

In the fierce competition for resources in the Pentagon, Research and Development often loses out to other requirements that have stronger support.

In the days when he headed Air Force Systems Command, Skantze said, "the relationship between the user and developer was pull and push. We were in the business of identifying and pushing technology, and the user was in the business of pulling the technology he thought would pay off."

Speaking from the floor during the issue briefing, John J. Welch Jr.—former assistant secretary of the

The Air Force Association Science and Technology Committee

Gen. Lawrence A. Skantze, USAF (Ret.), chairman
Edward C. Aldridge Jr.
Krzysztof Burhardt
James W. Evatt
Marty Faga
Gen. John Michael Loh, USAF (Ret.)
Gen. Robert T. Marsh, USAF (Ret.)
Gen. Thomas S. Moorman Jr., USAF (Ret.)
Lt. Gen. George K. Muellner, USAF (Ret.)
George A. Paulikas
James M. Sinnett
Maj. Gen. Jasper A. Welch Jr., USAF (Ret.)
John J. Welch Jr.

Air Force for acquisition and a member of the AFA committee that produced the report—agreed that the valuable push–pull relationship had been lost. He also noted that the Air Force Research Laboratory has not hired a researcher since 1991.

Pattern of Decline

The report defined the Science and Technology program as the Air Force does, the total of program elements 6.1 (basic research), 6.2 (applied research), and 6.3 (advanced development) in the defense budget.

Among the main findings of the report were these.

- At the end of the Gulf War, the Air Force was the clear leader among the services in Science and Technology investment. Today, it is in last place, trailing not only the Navy and the Army but also the Defense Advanced Research Projects Agency.
- After the figures are adjusted to eliminate the effect of inflation, Air Force spending on S&T has declined from $2.69 billion in 1989 to $1.18 billion today, a drop of 56 percent.
- As recently as Fiscal 1993, the Air Force spent 2.3 percent of its total obligation authority on Science and Technology. It is down to 1.81 percent this year, headed toward 1.65 percent in Fiscal 2005.

"In prior fiscal years, the Air Force tried to cut R&D as much as 50 percent and only restored the funding when it was directed to do so by OSD [the Office of the Secretary of Defense]," the report said. It also said that "in FY 1997, the Air Force made a poorly coordinated attempt to eliminate graduate studies at the Air Force Institute of Technology."

The Future Years Defense Program projects that between 1999 and 2005 the Air Force will divert nearly $3 billion out of its Science and Technology accounts for other spending purposes, such as procurement and operations and maintenance of the force.

The report said that "in the latest episode of programmatic manipulation," the Air Force took Space Based Laser and Discoverer II programs out of the engineering development category and pulled them back into S&T status. This created "the impression that research into space was increasing, but [required] at the same time that the existing S&T budget cough up the funding—$94 million in FY 2000, $131 million in FY 2001, and more to follow—to keep the two programs going."

The pattern raises questions about how much of a priority Research and Development is for the Air Force.

Private Sector Doesn't Do It

"The Air Force is not alone," the report said. "The Department of Defense as a whole has also consciously reduced S&T funding in the mistaken belief that industry would fill in the gap."

Although total US investment in Research and Development continues to increase, little of it is of military use, the report said.

"A popular theme these days is that military S&T is not necessary because the private sector will invest and power the S&T engine," Loh said. Advancements in microelectronics and telecommunications are often cited to support that claim.

"In fact, other than those two areas of technology, microelectronics and telecommunications and the software associated with them, I find it hard to discover another technical area with military significance where the private sector is willing to undertake the investment to bring technology from birth to maturity."

Loh also recalled "a lot of excitement about the private sector being able to find a cheap way to orbit. Easy access to space, going from about $10,000 a pound to $1,000 a pound. You had all these venture capitalists pushing money into the space assets of the world and all these great ideas where we were going to get two or three stages into orbit. I don't see many of them hanging around much anymore."

The report cited a number of critical technologies that "are perceived as not being supported by industry." Among them are electronic hardening, ballistic missile protection, and defenses against chemical and biological warfare.

The level of overall federal funding for aerospace Research and Development today is about half what it was in 1987. Non-federal aerospace research over that same period has neither increased nor diminished significantly in the past 20 years.

Invest for the Long Term

The report said, "The Air Force needs to strengthen institutionally the role of technology advocacy within the service."

It called on senior Air Force leaders to "tolerate and even embrace failure as an integral part of the technology development process," noting that numerous R&D projects from the 1960s failed, but the ones that succeeded gave the Air Force the capabilities it has today.

The report cites hypersonic flight and supersonic combustion ramjet-(scramjet) engines as technologies that have been "pushed aside" in the squeeze between short-term relevance and long-term value.

It concluded that "senior Air Force leaders need to reverse the S&T funding decline and invest in a stable, robust, balanced R&D base that is not necessarily tied to emerging weapon system programs but that does include long-term S&T investment." ■

Note: The complete text of the report and a transcript of the issue briefing are available on the Air Force Association Web site, www.afa.org.

American Institute of Aeronautics and Astronautics

Annual Region VI, Public Policy Colloquium

Saturday - February 12, 2000
Manhattan Beach, CA

MILITARY ISSUES

Bob Wyckoff and Jim Atwater
Council Members, AIAA's Vandenberg Section and
Weapon System Effectiveness Technical Committee

It is a pleasure for us to again address the Military Issues at this years AIAA Region IV Public Policy Colloquium. We have identified several legislative topics for your consideration as candidates for this years Congressional visits day.

Last year we tried to convey the complexity of supporting multiple kinds of operations at Vandenberg. We spoke of the fact that one single test range does not have all the assets to test today's modern military operations. We showed the possibility of one option being proposed which was the Southwest Test Range. All this translates to very complex testing challenges at our major test ranges.

Testing is multi-service. Vandenberg's future lies in the conduct of space and missile launches. Some of this will be the commercial sector although military space lift continues to have a major role as well as ballistic missile testing including theater and national missile defense.

Military Issues
AIAA Public Policy Meeting, February 12. 2000

Encourage Legislation Supporting

- **Military Budgets**
- **Science and Technology**
- **Research Facilities**
- **Low Cost Space Transportation System**
- **Launch Facility Privatization**
- **Operational Live Fire Test & Evaluation**
- **Test Range Instrumentation Modernization**

Correct the Funding Practice of Taxing Science & Technology Budgets to Pay for Unplanned Military Conflicts

We recommend encouraging legislation to support issues shown on this chart. We chose budgets because that is the one area where politician's can relate. It could have been manpower, resources, schedules, or facilities, but all relate back to budgets.

All the services can capitalize on obtaining low cost space transportation. The defense communication role, for example. The Air Force with their access to space role. The Army TMD/NMD and the Navy Theater Wide roles. The space station and its impact on our space knowledge is just good scientific work. And there is public support for science and engineering research.

Operational and livefire testing funds must be initiated early in a test program and the funds must be sufficient and maintained to complete the job. We at Vandenberg have learned this the hard way. We need to get past the point of never having enough money to finish the job. There must be sufficient planning and responsible budgeting.

As you may recall, this list has not changed much from last year. We wonder if that is because of the unplanned military conflict expenses.

Military Issues
AIAA Public Policy Meeting, February 12. 2000

National Defense Concerns Need Political Leadership to Address Defense Issues:

- **Pentagon Budget Down - Now 3% GNP, Was 6 % 10 Years Ago**
- **Aging Defense Equipment Equates to Higher Maintenance $ Costs**
- **Weapon System Development Cycle to Long**
- **Trained & Skilled Work Force Loss- Best and Brightest Migrate to Growth Industries**
- **Loss of Citizen Concern - Defense Does Not Make Top 10**

Taken as a Whole, These Defense Issues Equate to National Security Issues

The references provide a number of thought provoking issues. Some of which we have bulleted here. It is very important that our political leadership understand that we are spending less GNP for defense than we did 10 years ago.

Leadership is needed to address a number of these issues. For example equipment modernization takes time and planning. If not corrected soon we pay in higher maintenance costs.

Weapons development time is well known to all of us. Our skilled work force is dependent on keeping the brightest talent. The competition is high with full employment. We must continue to strive to provide a positive role if we wish to attract the young and talented leaders so necessary to our technology.

Reference,

AIAA Aerospace America editorial, *Taking a Step Backwards*, January 2000 issue by editor Elaine Camhi.

NDIA National Defense Presidents Perspective, *Troubling Trends, Why America Should Be Concerned About National Security*, January 2000 issue by Larry Skibbie

Topic: Professional/Scientific Technical Employment Practices

- **Issue: Develop Contract Re-bid Protocols, Reward Government Contractors Displaying Employee Compassion**
- **Goal: Obtain DOD Pressure, Thus Improving Government / Contr Sensitivity During Downsizing. Result: Level Technical Talent Employment Highs and Lows**
- **Example: Corporation Re-Bids Contract, Offering Government Large Reduction In Professional Manpower, Requiring Technical Staff Dumping**
- **Challenge: To Re-Introduce Corporate responsibility Such That A Trusted Employee at 8 AM Is Still One At 9 AM**

Congressional Visits Day (CVD) to be held March 15 and 16 in Washington, D.C.

The Employer/Employee relationship has changed. Employee trust is a thing of the past. When the downsize, early retire, corporate restructure, or whatever it is called, takes place, the corporate entity has no other choice than to act quickly. One wonders whether this is a negative fallout of the PC network. We don't know yet.

There has been too much sabotage in the work place for management to tolerate the exposure. Some of us, who are dinosaurs can still remember when integrity and personal responsibility were common and sought out behaviors.

Consideration needs to be given to determine what might be worked into government contracts as a requirement for contractors to make a good faith effort to place former employees in a similar job. Clearly, any laid-off worker should be treated with dignity. At the present time, with poorly trained management the opposite occurs.

It would be very desirable to foster employee / employer education to correct inadequacies and inconsistencies in communication and training.

RECOMMENDATION

- Implementing legislation preventing piecemeal approach to RDT&E/Training facility consolidation or closures in the Southwest Defense Complex

CONCLUSIONS

- Consider the Southwest Defense Complex as a unit
  - Best technical solution
  - Cost effective
  - Optimizes RDT&E and joint training
  - Existing DoD, NASA, commercial and academic uses
  - Minimizes impact on civilian air, sea and land useage

CONCLUSIONS

Consolidation of RDT&E facilities will continue

- Piecemeal consideration of Southwest Defense Complex
- Overlooks synergisms
  - Existing interlinking test and training facilities
  - Appropriate environment
  - Inter-service training and testing operations

SOUTHWEST DEFENSE COMPLEX

PROVIDES:

- 17,072,449 acres of DoD land buffered by 341,997,000 acres of non-DoD federal Land
- 334,295 square miles of instrumented sea ranges remote from commercial traffic
- 366,259 square miles of controlled air space with minimal conflict with commercial traffic

SOUTHWEST DEFENSE COMPLEX

New Mexico:

- Kirtland Air Force Base DoD/DoE Complex and Phillips Laboratories
- White Sands Missile Range
- Cannon Air Force Base
- Holloman Air Force Base
- Fort Bliss – McGregor Range

Nevada:

- Nellis Air Force Base DoD/DoE Complex
- Fallon Naval Air Station

Utah:

- Dugway Proving Grounds
- Utah Test and Training Range

SOUTHWEST DEFENSE COMPLEX

Arizona:

- Fort Huachuca
- Yuma Proving Grounds
- Barry Goldwater Range

California:

- Edwards Air Force Base
- Vandenberg Airforce Base – Western Range
- Point Mugu Naval Air Warfare Center
- China Lake Naval Air Warfare Center
- Twenty-nine Palms Marine Corps Air-Ground Combat Center
- Fort Irwin National Training Center
- Chocolate Mountain Range

BASE REALIGNMENTS AND CLOSURES

Vision 2010:

- Train the way we fight
- Joint service operations
- Consolidate into a current synergistic complex

BASE REALIGNMENTS AND CLOSURES

ECONOMIES REQUIRED

- Defense budget reduced as a percentage of Gross National Product
- RDT&E funds diverted for expeditionary deployments
- Personnel costs rising despite reductions in force
- New weapons needed to meet new challenges (do not fight the next war with the last war's weapons)

AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS

REGION VI

PUBLIC POLICY POSITION

MARCH 2000

THE SOUTHWEST DEFENSE COMPLEX

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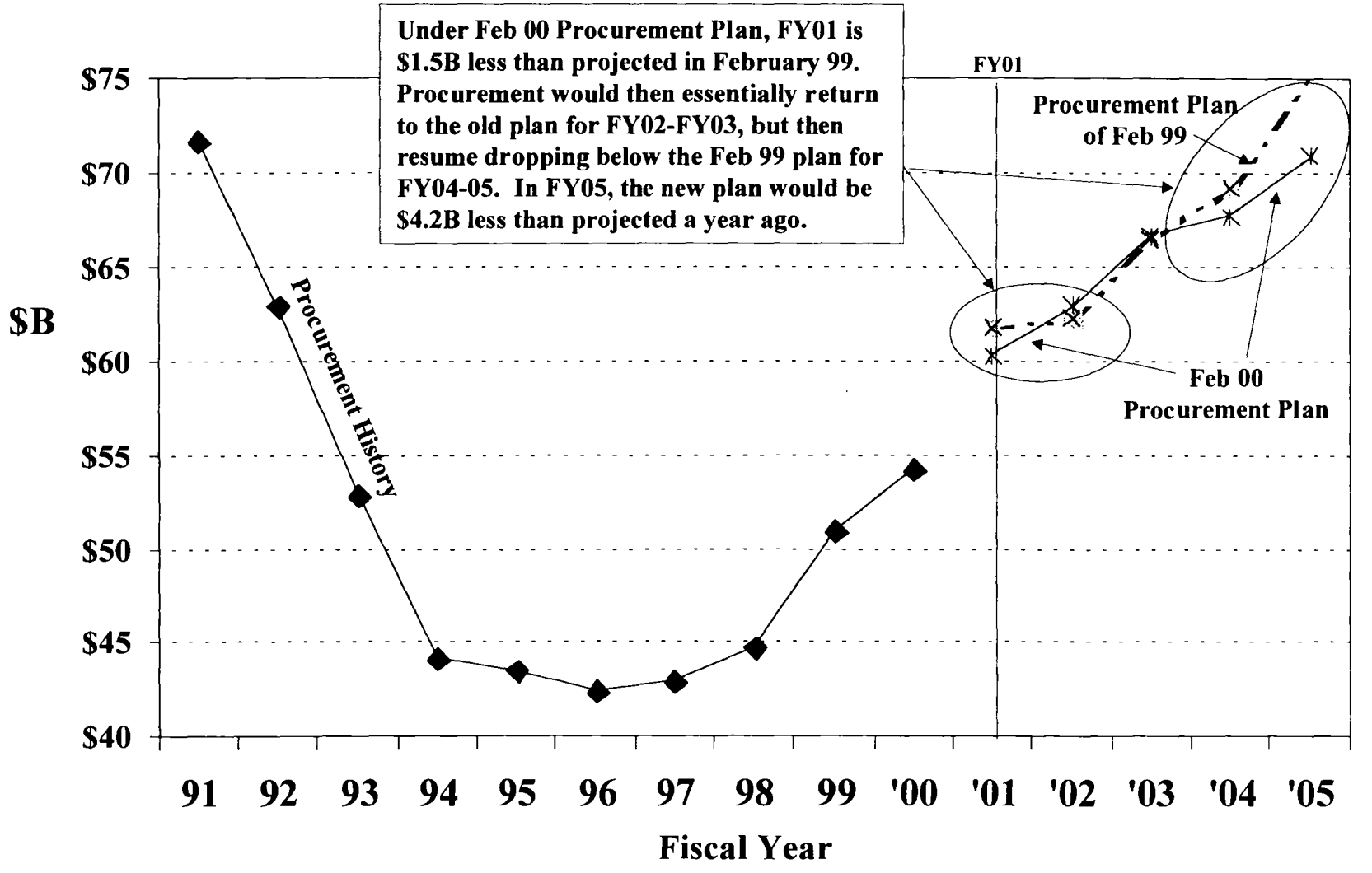
Changes in Procurement by Component

Appropriation ($M)		FY00 Actual Appn	Old FY01 Request	New FY01 Request	Change: FY00 to New FY01	Change: Old 01 to New 01
Army	Aircraft	1,452.2	1,311.8	1,323.3	-128.9	11.5
	Missile	1,309.5	1,413.3	1,295.7	-13.8	-117.6
	All Other	7,558.0	7,793.1	7,805.3	247.3	12.2
Navy/ USMC	Aircraft	8,823.1	8,010.9	7,963.9	-859.2	-47.0
	Weapons	1,401.8	1,559.2	1,434.3	32.5	-124.9
	Shipbuilding	7,017.4	12,225.7	12,296.9	5,279.5	71.2
	All Other	6,183.6	5,249.8	4,936.1	-1,247.5	-313.7
USAF	Aircraft	8,606.5	9,923.1	9,539.6	933.1	-383.5
	Missile	2,200.1	3,337.2	3,061.7	861.6	-275.5
	All Other	7,805.1	8,047.4	8,338.0	532.9	290.6
Defensewide		2,510.9	2,911.6	2,275.3	-235.6	-636.3
DoD Total		54,868.2	61,783.0	60,270.1	5,401.9	-1,512.9

Procurement Growth Is Dampened



Component Budgets

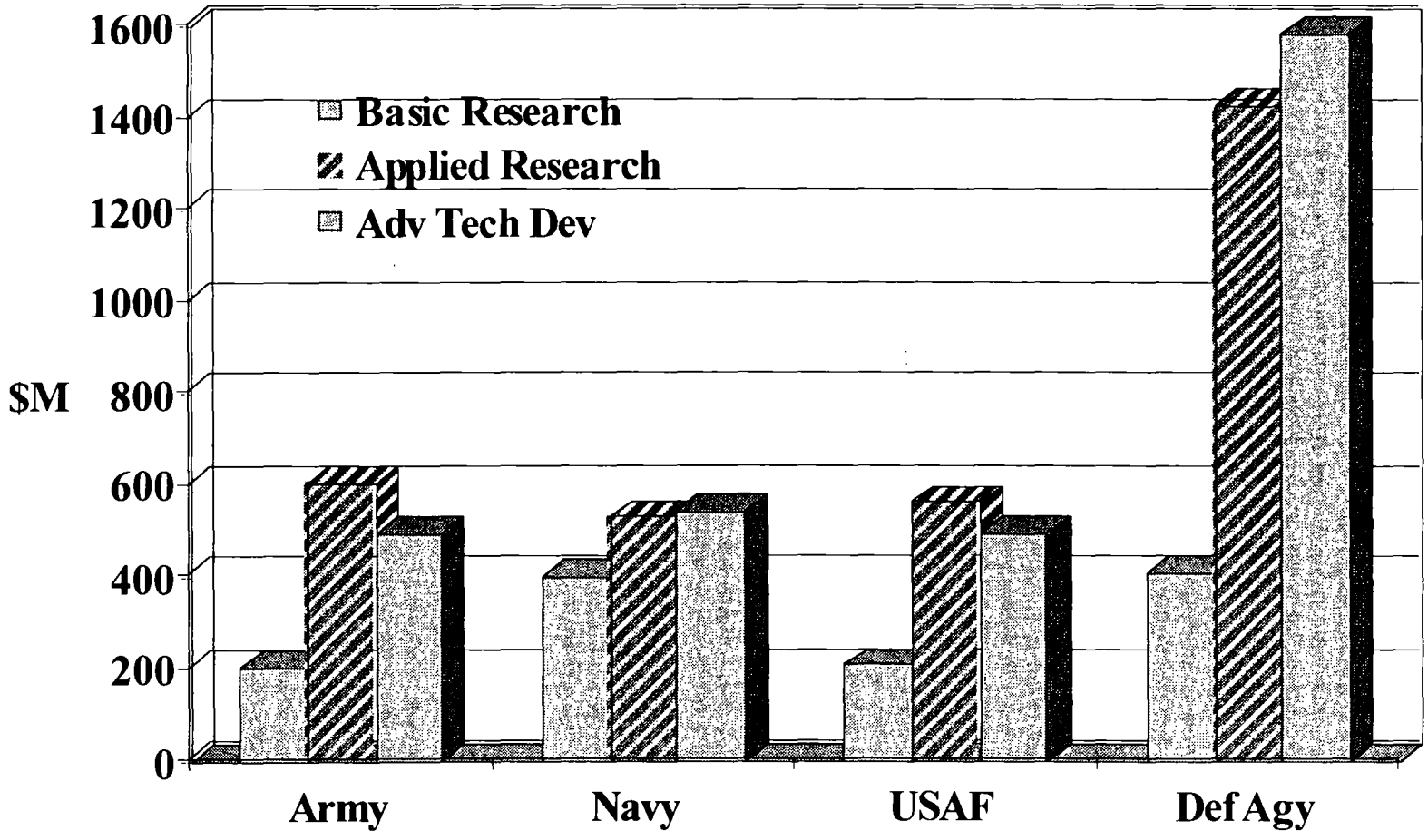
This Year's Plan ($B)

Title	FY00	FY01	FY02	FY03	FY04	FY05
Army	69.5	70.6	74.4	76.1	78.0	79.9
Navy/Marine Corps	87.2	91.7	90.8	94.1	96.4	98.7
Air Force	81.2	85.3	88.3	89.3	90.9	93.3
Defensewide	41.9	43.5	41.4	41.5	43.1	44.5
Total DOD (051)	279.9	291.1	294.8	300.9	308.3	316.4

Changes From Last Year's Plan ($B)

Title	FY00	FY01	FY02	FY03	FY04	FY05
Army		- 0.7	+ 0.8	- 0.3	- 0.9	- 2.4
Navy/Marine Corps		+ 0.3	+ 1.6	+ 1.0	+ 0.2	- 1.6
Air Force		+ 0.5	+ 1.6	+ 0.1	- 1.4	- 1.8
Defensewide		+ 4.6	+ 2.6	+ 1.5	+ 2.8	+ 3.3
Total DOD (051)		+ 4.7	+ 6.5	+ 2.2	+ 0.7	- 2.5

S&T Funding By Budget Activity

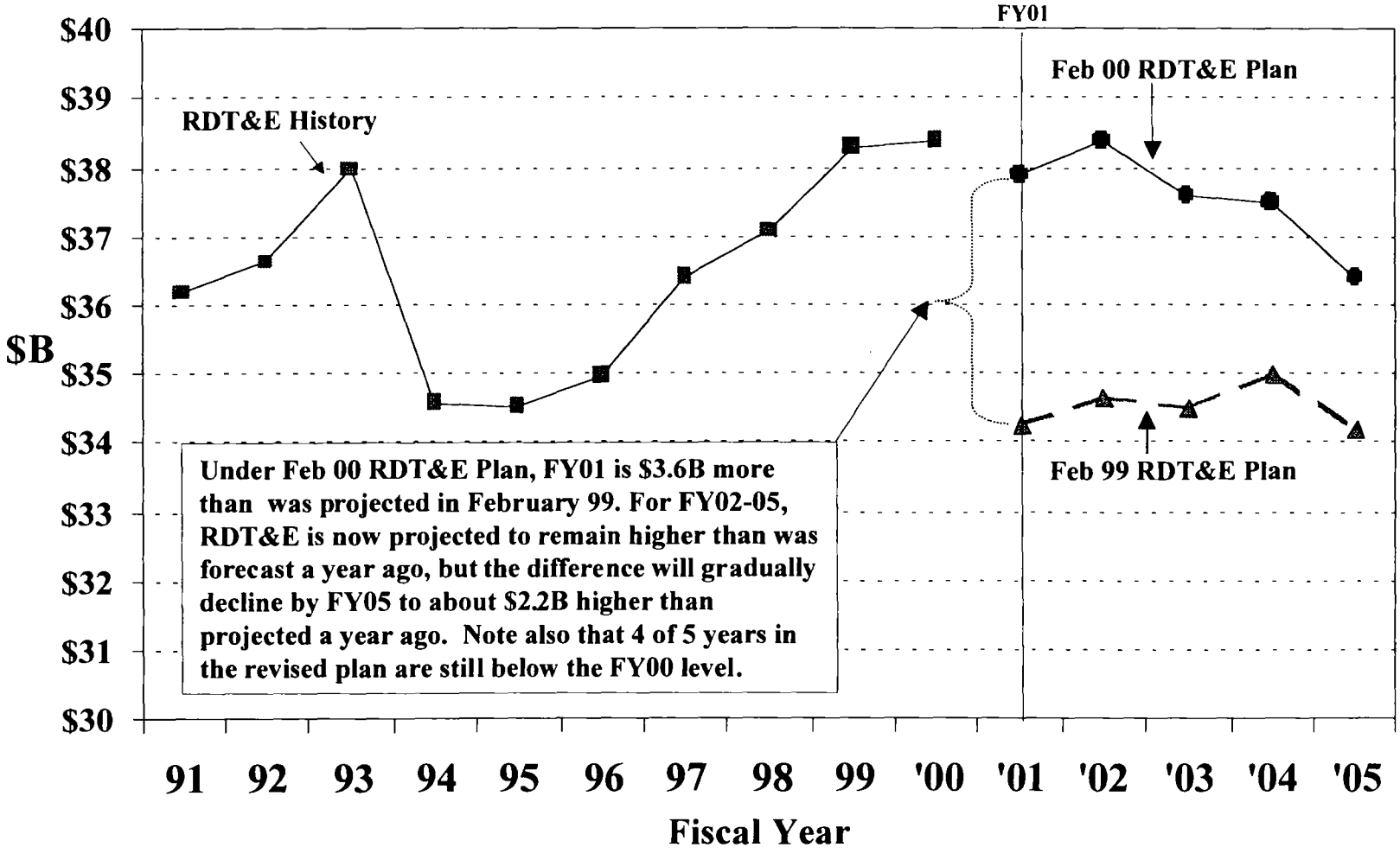


Changes in RDT&E by Component

Appropriation ($M)		FY00 Actual Appn	Old FY01 Request	New FY01 Request	Change: FY00 to New FY01	Change: Old 01 to New 01
Army	S&T	1,679.7	1,248.6	1,294.4	-385.3	45.8
	Dem Val/EMD	1,978.8	2,175.3	2,431.8	453.0	256.5
	Mgt Spt	739.3	739.8	696.9	-42.4	-42.9
	Op Sys Dev	827.4	586.9	837.2	9.8	250.3
Navy/ USMC	S&T	1,750.3	1,465.9	1,463.1	-287.2	-2.8
	Dem Val/EMD	4,668.6	3,977.6	4,382.1	-286.6	404.5
	Mgt Spt	641.0	652.3	631.5	-9.5	-20.8
	Op Sys Dev	1,996.7	1,879.1	2,000.0	3.3	120.9
USAF	S&T	1,387.3	1,223.4	1,291.3	-96.0	68.0
	Dem Val/EMD	4,998.7	4,125.7	4,442.1	-556.7	316.3
	Mgt Spt	584.9	596.9	590.1	5.2	-6.9
	Op Sys Dev	7,315.4	6,810.1	7,362.1	46.7	552.0
Defense-wide	S&T	3,579.8	3,376.2	3,494.4	-85.4	118.2
	Dem Val/EMD	3,556.9	3,059.8	4,214.8	657.9	1,155.1
	Mgt Spt	586.9	512.2	515.2	-71.7	2.9
	Op Sys Dev	1,997.3	1,859.0	2,215.4	218.0	356.4
DoD Total		38,289.1	34,288.8	37,862.4	-426.7	3,573.6

Note: S&T lines above include Basic and Applied Research as well as Advanced Technology Development

RDT&E Is Higher Than Last Year's Plan, But Will Still Decline From FY00 Level



Changes in DoD Topline

Changes From Last Year's Plan ($B)

Title	FY00	FY01	FY02	FY03	FY04	FY05
Military Personnel		- 0.5	0.0	0.0	- 0.6	- 1.1
Operation & Maintenance		+ 5.5	+ 2.5	+ 1.3	+ 1.0	+ 0.4
Procurement		- 1.5	+ 0.7	+ 0.1	- 1.5	- 4.2
RDT&E		+ 3.6	+ 3.7	+ 3.1	+ 2.5	+ 2.2
Military Construction		-2.6	+ 0.1	- 0.5	+ 0.1	+ 0.6
Family Housing		- 0.3	+ 0.1	+ 0.2	+ 0.1	+ 0.2
Funds, Receipts & Other		+ 0.5	- 0.5	- 1.4	- 0.6	- 0.4
Total DOD (051)		+ 4.7	+ 6.5	+ 2.2	+ 0.7	- 2.5

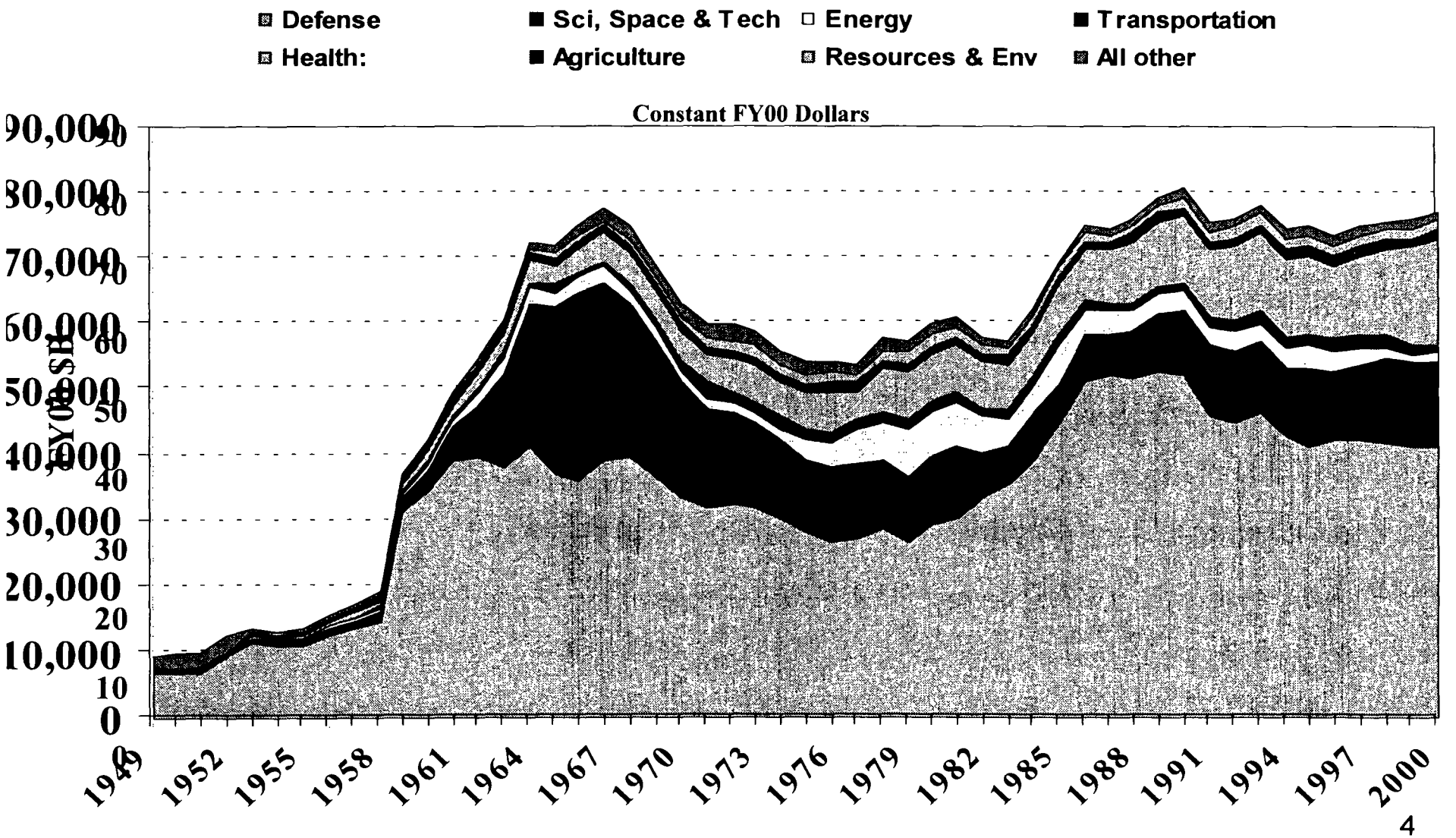
- Cumulative FY01-FY05 procurement is now projected to be $6.4B less than shown in last year's plan.
- Cumulative FY01-05 RDT&E is now projected to be $15.1B greater than shown in last year's plan.

DoD Topline

This Year's Plan ($B)

Title	FY00	FY01	FY02	FY03	FY04	FY05
Military Personnel	73.7	75.8	78.4	80.4	83.1	85.6
Operation & Maintenance	104.9	109.3	107.5	109.1	112.2	114.8
Procurement	54.2	60.3	63.0	66.7	67.7	70.9
RDT&E	38.4	37.9	38.4	37.6	37.5	36.4
Military Construction	4.8	4.5	4.3	3.8	4.6	5.4
Family Housing	3.6	3.5	3.7	3.9	4.0	4.1
Funds, Receipts & Other	0.4	-0.2	-0.5	-0.5	-0.7	-0.7
Total DOD (051)	279.9	291.1	294.8	300.9	308.3	316.4

History of Federal RDT&E Spending

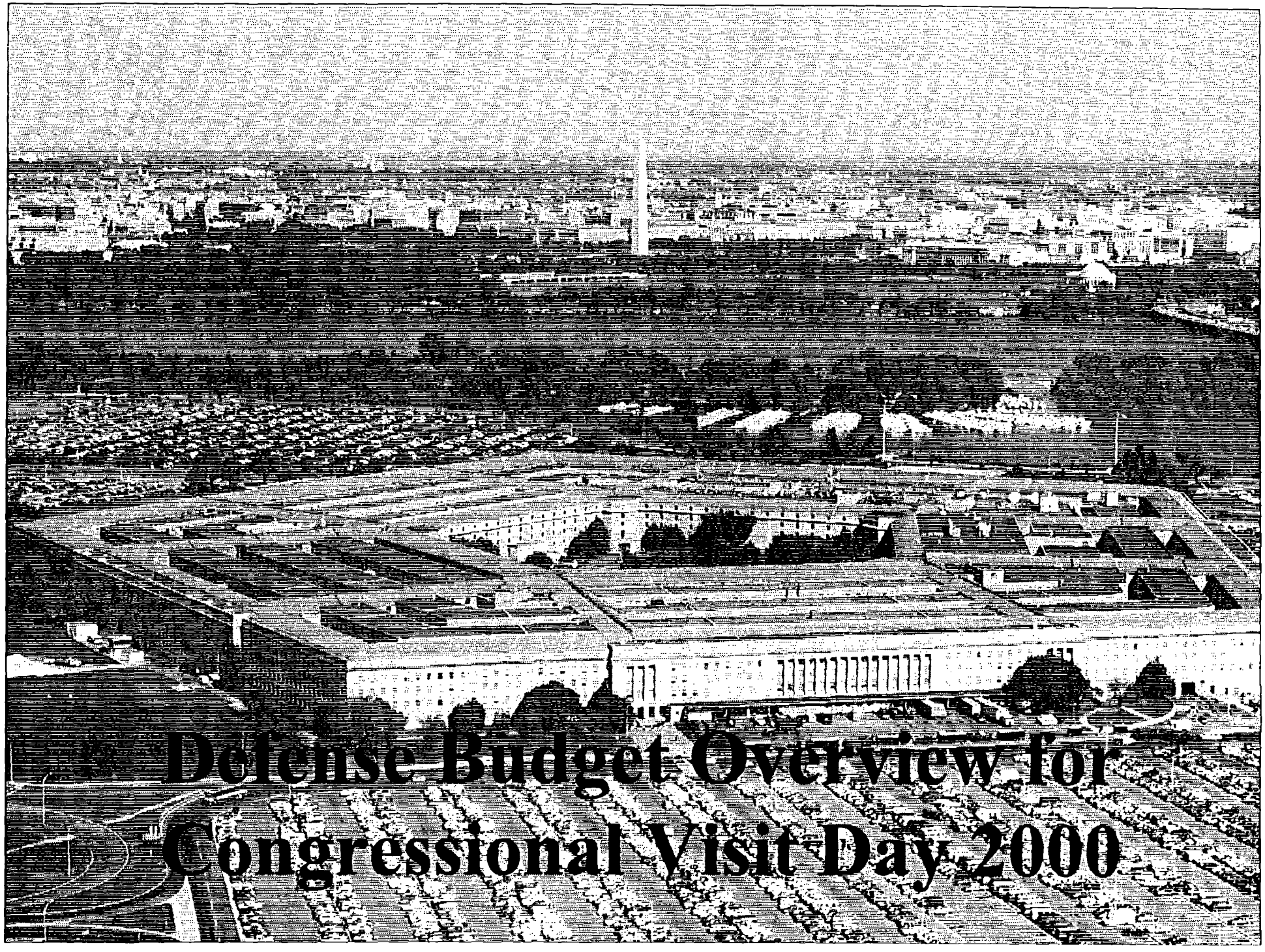


Overview (continued)

- **~$3.6B to address lessons learned in Kosovo, primarily for:**
  - Munitions
  - Improved intelligence, surveillance, and reconnaissance (ISR)
  - EW capabilities (additional EA-6B squadron)
  - Kosovo complimentary initiatives:
    - EA-6B enhancements
    - Comm upgrades
    - Tactical Tomahawk
    - JASSM
- **>$1B for Information Assurance**
- **BRACs requested for FY03 and FY05**
- **$2.3B supplemental for FY00**

Overview

- **For FY2001, the President requests:**
  - $305.4B for National Defense (+ $4.8B versus 1999 plan)
  - $291.1B for DoD (+ $4.7B versus 1999 plan)
- **DoD Budget Authority real growth > 1%, but the increase primarily goes to operations in Bosnia and Kosovo and to cover higher fuel costs.**
- **Key features are:**
  - 3.7% pay raise.
  - Boost in Housing Allowance.
  - Health care improvements.
  - Nominal achievement of the $60B procurement level.
  - Projected funding to deploy a limited NMD by 2005.



Defense Budget Overview for Congressional Visit Day 2000

The Southwest Defense Complex

American Institute of Aeronautics and Astronautics

Region VI

Public Policy Position

March 2000

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The Southwest Defense Complex

Robert A. Wyckoff
Associate Fellow
American Institute of Aeronautics and Astronautics

March 2000

The Southwest Defense Complex is an impressive array of DoD and NASA Research Development Test and Evaluation (RDT&E) facilities comprised of test ranges, proving grounds training installations and laboratories spread over the states of California, Nevada, Arizona, New Mexico and Utah. These facilities produce prodigious amounts of data supporting military, civil government, commercial and academic scientific inquiries. Over the years a symbiotic relationship among them has evolved resulting in significant economies of scale benefiting the taxpayer in ways that have not been adequately recognized. Of lesser, but not inconsequential, importance these missions have been conducted with a minimum impact to unrelated activities, such as civil aviation and maritime movements. It is critical that any changes to one constituent of the complex be considered only with understanding of the impact to the whole of the complex.

The Cold War has been over for a decade and we have experienced significant draw-downs in defense spending with the predictable reduction in the civilian aerospace support industry, reduction in military personnel and wrenching base closures resulting from the take-it-or-leave-it recommendations of the first Base Realignment and Closure Commission (BRAC). Although this syndrome has been with us long enough to become a cliche, we can expect further reductions, closures and consolidations in the future. Consolidations may well be the practice in coming reductions, since Congress has been sensitized to outright closures and environmental clean-up requirements have severely reduced the near-term savings from previous closures. In the future we may see that the Department of Defense will consolidate a base down to a guard at the gate. Thus the Federal government will avoid both the cost of clean up and the bad press of closing a popular installation.

Diversion of RDT&E funds to support post-Cold War expeditionary deployments to the Mid East, the Balkans and the Caribbean has enhanced the necessity to discover economies in the development community. While these peacekeeping efforts are commendable, we must also be careful that we do not again find ourselves fighting the next war with the last war's weapons – they may not be appropriate. Personnel costs are also rising, despite draconian reductions in force, due to well deserved pay increases for those who remain aboard. Room must be found in the budget for hardware improvements to off-set a smaller standing force. Thus energetic and focused RDT&E must continue in the most economic means possible.

In February 1993, General Colin Powell agreed that "in the southwestern United States all four services have training, test and evaluation ranges that provide a land, airspace, sea area, and off-shore supersonic operating domain that could accommodate a major portion of our joint test and evaluation needs." Other DoD ranking sources have echoed this sentiment. The

Southwest Defense Complex integrates multi-service operations and joint development, testing and training to provide an affordable, effective national development capacity.

As a result of current budget and geo-political exigencies, the services must train jointly and develop complementary weapons so they can fight jointly. "Joint Vision 2010" states that "We must train the way we fight". The Southwest Defense Complex is central to that concept – only in the southwest can we find the needed land, littoral, sea, air and space access to accommodate the full range of testing and training required to meet the demands for economical support of our military warfighting capabilities.

The military RDT&E and training resources in the southwest have available space, climate and terrain, free from encroachment, to permit large-scale operations without disrupting civilian communities. This includes:

- 17,072,449 acres of DoD lands buffered by 341,997,000 acres of non-DoD federal land.
- 334,295 square miles of instrumented sea ranges located remotely from commercial air traffic.
- 366,259 square miles of controlled air space with minimal conflict with commercial air traffic.

Consolidation of the nation's development, testing and training capabilities should be made in the area that best meets DoD's combined future requirements as called for in "Joint Vision 2010" - the southwestern United States. The Southwest Defense Complex offers the opportunity for increased inter-service cooperation in research, development, test and joint training, as well as infrastructure reductions. This Complex includes the following bases, ranges and training resources:

Arizona

Fort Huachuca
Yuma Proving Grounds
Barry Goldwater Range

California

Edwards Air Force Base
Vandenberg Air Force Base – Western Range
West Coast Offshore Operating Area
Point Mugu Naval Air Warfare Center
Southern California Offshore Range
Port Hueneme Naval Surface Warfare Center
China Lake Naval Air Warfare Center
Twenty-nine Palms Marine Corps Air-Ground Combat Center
Fort Irwin National Training Center
Chocolate Mountain Range

New Mexico

Kirtland Air Force Base DoD/DoE Complex

Phillips Laboratories

White Sands Missile Range

Cannon Air Force Base

Fort Bliss

McGregor Range

Holloman Air Force Base

Nevada

Nellis Air Force Base

DoD/DoE Complex

Fallon Naval Air Station

Utah

Dugway Proving Grounds

Utah Test and Training Range

And support from:

Marshall Islands

Kwajalein Missile Range

The Southwest Defense Complex encompasses these vast air and sea space areas which are controlled for test and training purposes and are collectively an interrelated complex serving mutual needs. Large-scale operations are conducted in remote areas of the country previously recognized as being particularly appropriate to the mission and providing requisite safety buffers from population centers and areas of concentrated civilian usage. Consider that the United States has a "concave" east coast and a "convex" west coast. Thus there is concentrated air route usage of off-shore air space between population centers in the New York/New England areas and the popular destinations in Florida and the airline interchange hub in Atlanta. This is the same air space in which eastward consolidation of aircraft and missile development will ordain intense competition. The same scenario applies to consolidation of installations in the southeast that will need the Gulf of Mexico airspace in competition with heavy civilian demand. On the other hand (or coast, in this case), geography has created over land civil air usage in a narrow corridor between San Diego, Los Angeles, San Francisco and the Seattle area. Thus off-shore airspace has low levels of civilian demand and inland remote areas have little pressure from civilian encroachment. The West Coast Offshore Operating Area, used jointly by both the Air Force and the Navy, has little competition from civilian demand and poses the least safety hazard resulting from incompatible airspace usage. The relative proximity of these facilities, and such training installations as Fort Irwin and Twenty-nine Palms has generated a synergism of operations that has provided a significant savings which will be lost to an eastward consolidation of test operations.

Recognizing that continued searches for economies are necessary, not only to meet current exigencies, but also to prepare systems for future challenges, consolidations are certainly necessary. The means by which we conduct these searches will impact the results for many years to come and probably in ways we do not now comprehend. We need to consider the roles of

commercial applications and academic access to developing capacities. It is imperative that coming consolidation decisions consider the Southwest Defense Complex as a whole with realization and understanding of the interrelationships of its constituent parts. Piecemeal treatment of each of the listed organizations does not serve the end of finding the most efficient and cost effective solution to the reorganization of national RDT&E operations. Our competitive position in the global technological market place, as well as our military position, will be impacted by the way in which we achieve the necessary economies. The Southwest Defense Complex optimizes the melding of RDT&E efforts with joint training exercises in appropriate environments using existing DoD and NASA facilities for government, commercial and academic purposes. Any closures or consolidations must consider the synergism uniquely available in the southwest.

Legislation requiring such an integrated approach is now appropriate to prevent further irreversible mischief.

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original

AIAA Dayton-Cincinnati Aerospace Science Symposium

March 30, 2000

SENSOR CRAFT

A Vision for Global Intelligence, Surveillance, & Reconnaissance (ISR)

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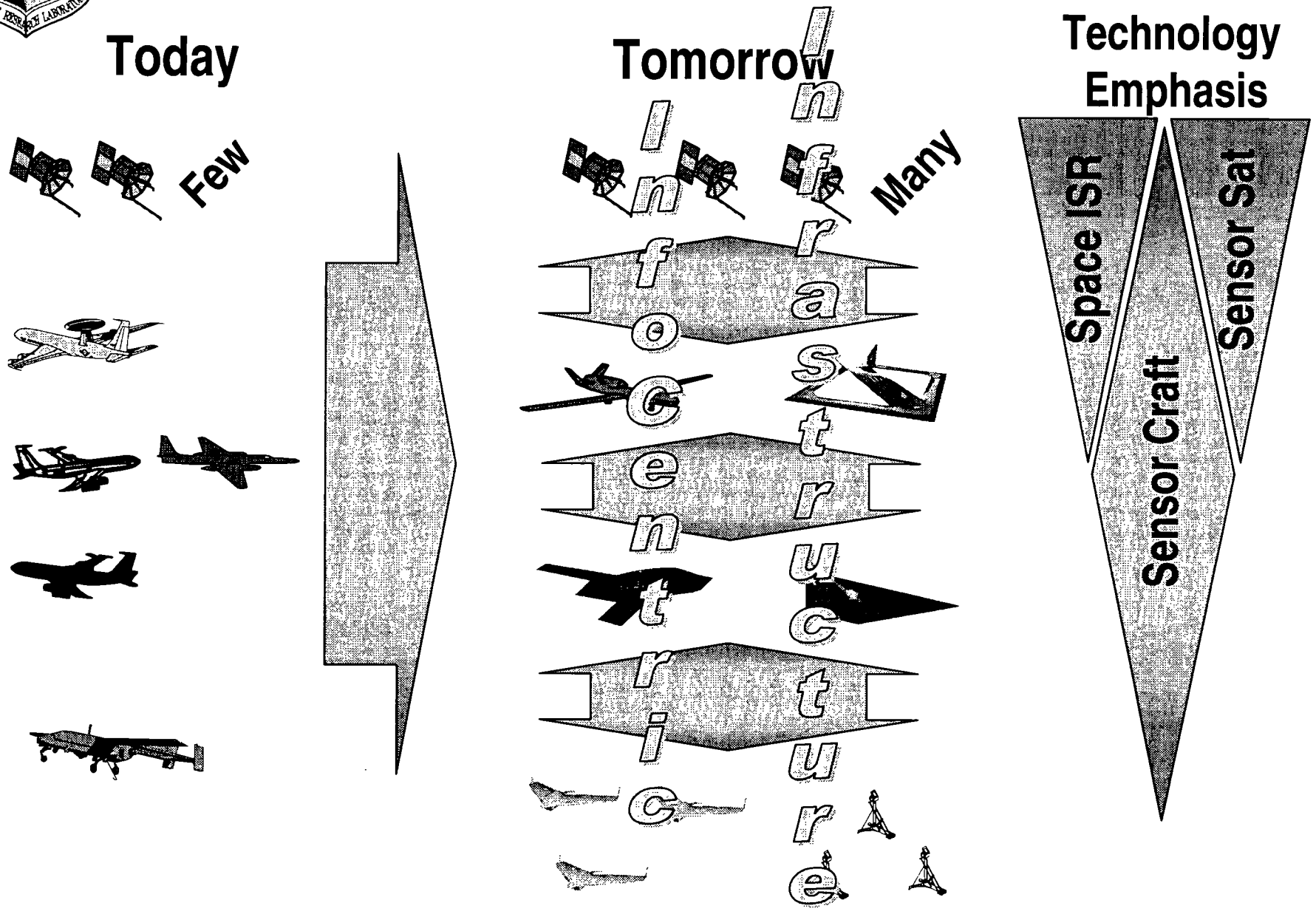
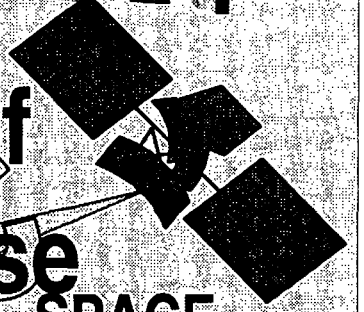
The ISR Sensory Apparatus



SENSOR CRAFT VISION

The Airbreather Component of *"Fully Integrated"* ISR Enterprise



SPACE

"Profoundly" based on Needs for ISR to support Dynamically Changing Combat Ops

"Profoundly" exploits and integrates key emerging technologies

Multi-Int
Multi-Static
Multi-Function
Multi-Phenomena
Multi-Incarnation

Joint Agency
Joint Service
Joint Organization
Joint Directorate

Artificial Intelligence

GROUND

Exfiltration

Globally Project & Sustain

Eyes & Ears for the Warfighter

In Kosovo

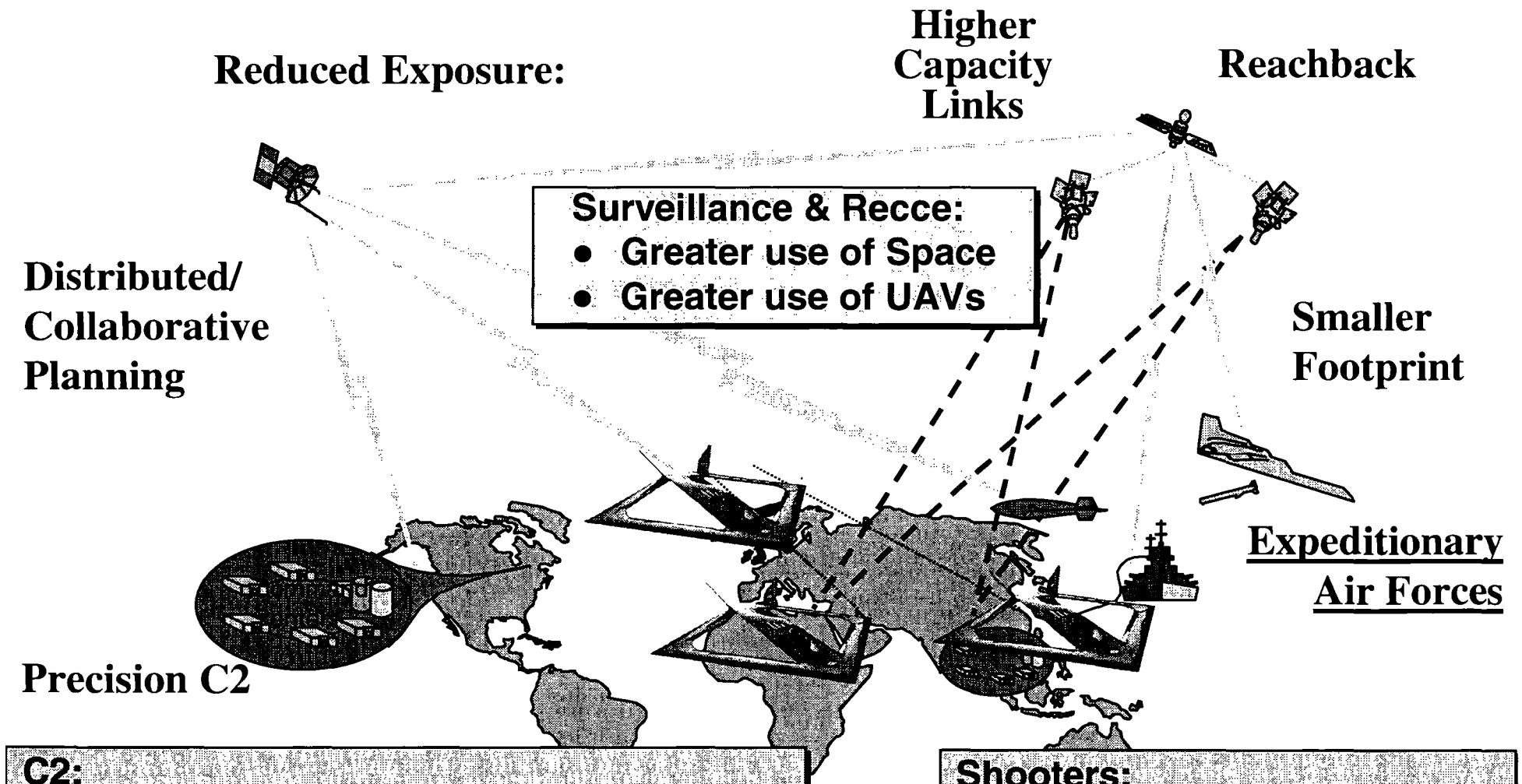
[redacted]

- UAVs quickly became a routine part of the air operation
- UAVs provided real-time links to the C2 infrastructure
- UAVs successfully operated in pairs--one as a communications relay, the other as a sensor platform
- UAVs are capable of loitering for up to 20 hours a day performing reconnaissance missions (in good weather)

[redacted]

- Need laser designator capability to identify targets for fighters / bombers
- Mobile targets effectively hidden by enemy use of camouflage, concealment, and deception (decoys) -- CC&D
  - **Need sensors to penetrate foliage and identify targets (from decoys) in the presence of CC&D *(Under attention of the Chief, Air Force {ref: Tanks Under Trees})***

AC2ISR: What the Future Will Bring



Future Games 99 "Hot Wash to CSAF"

- Many surveillance / comm UAVs lost; low-orbit satellites vulnerable to ASAT
  - Harden and defend space assets
  - Develop quick reconstitution of lost ISR capabilities
  - ➡ Develop "smart sensing" strategies for ISR assets to plug holes in coverage
  - ➡ Must defeat enemy CC&D--little progress in 60 years
  - ➡ AFRL Wargaming Workshop (Jul 99) "netted ISR" concept is right on track!!!

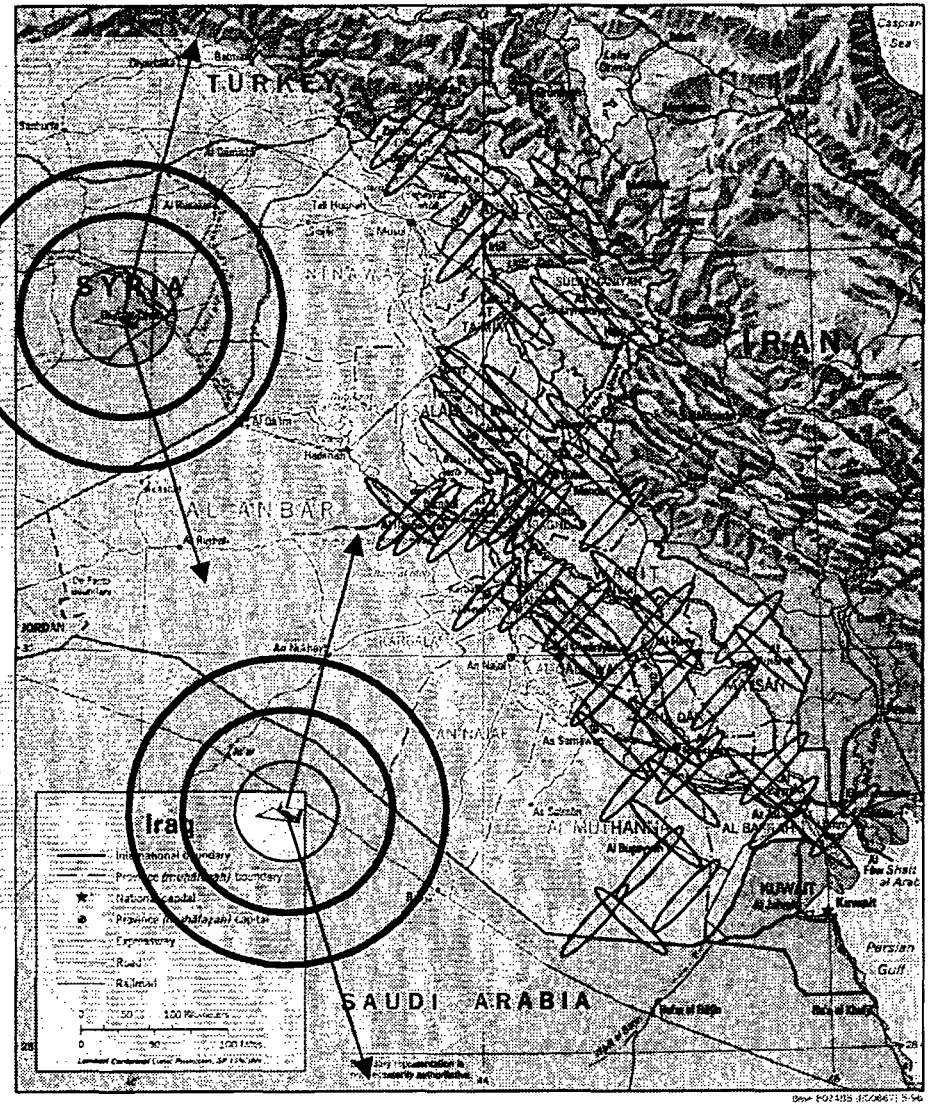
- TAC-AIR strike strategy from "sanctuary" bases did not work
  - Enhance long range (bomber) force
  - Increase numbers of available standoff weapons
  - ➡ Develop off-board targeting and mission replanning for standoff platforms / weapons
  - ➡ Provide "final mile" communication to standoff weapons

- Key attributes of future force structure capability
  - ➡ Look deep, early
  - ➡ Continuous track - 24 hr
  - NBC detection from space
  - ➡ More awareness of enemy intent
  - Ground penetration radar; deep buried targets
  - ➡ Better stand-off capability

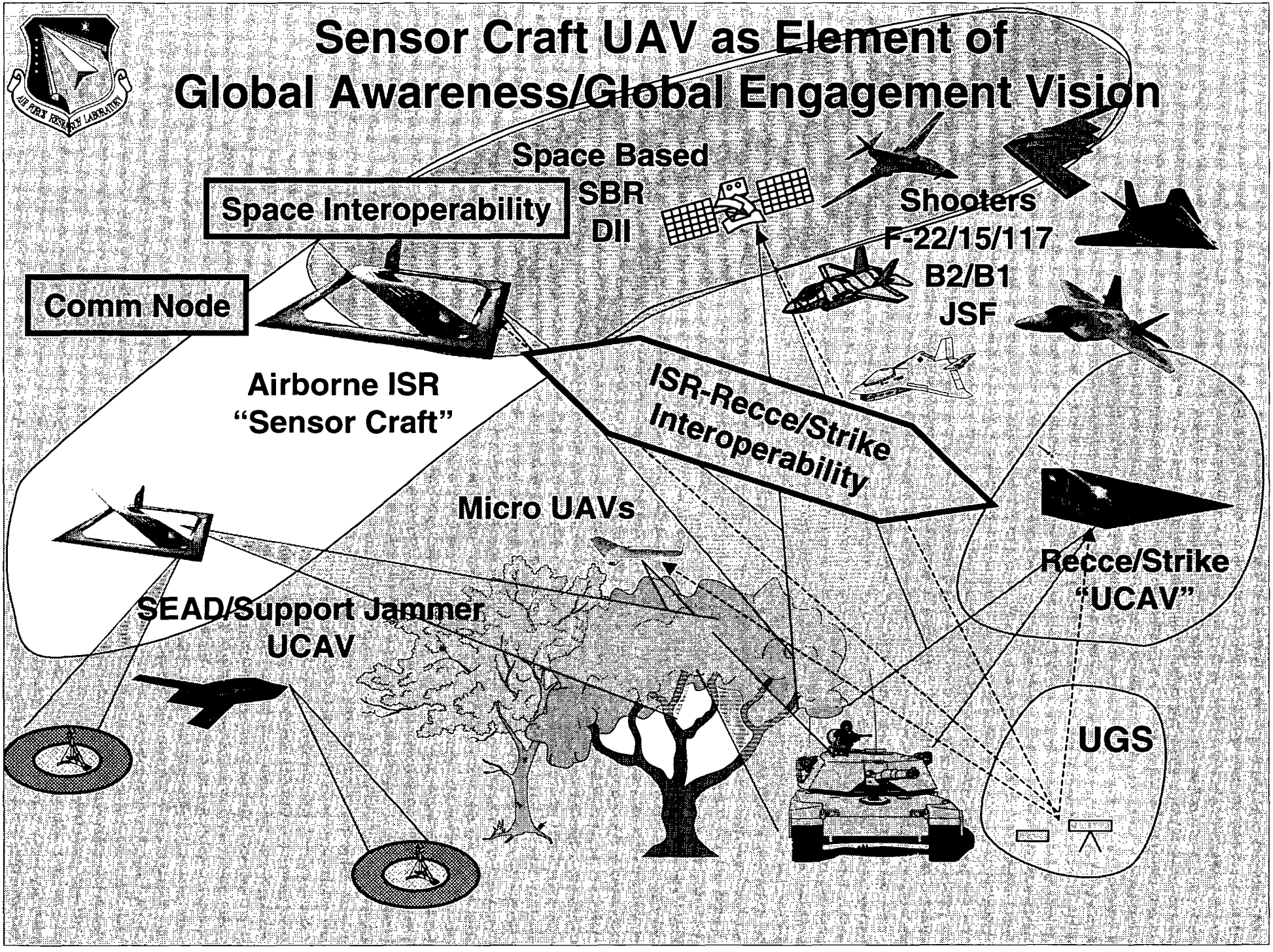
Sensor Craft Coverage of Large Countries

Sensor Craft can provide Continuous Coverage Complementing Space "Deep-Look" Periodic sampling

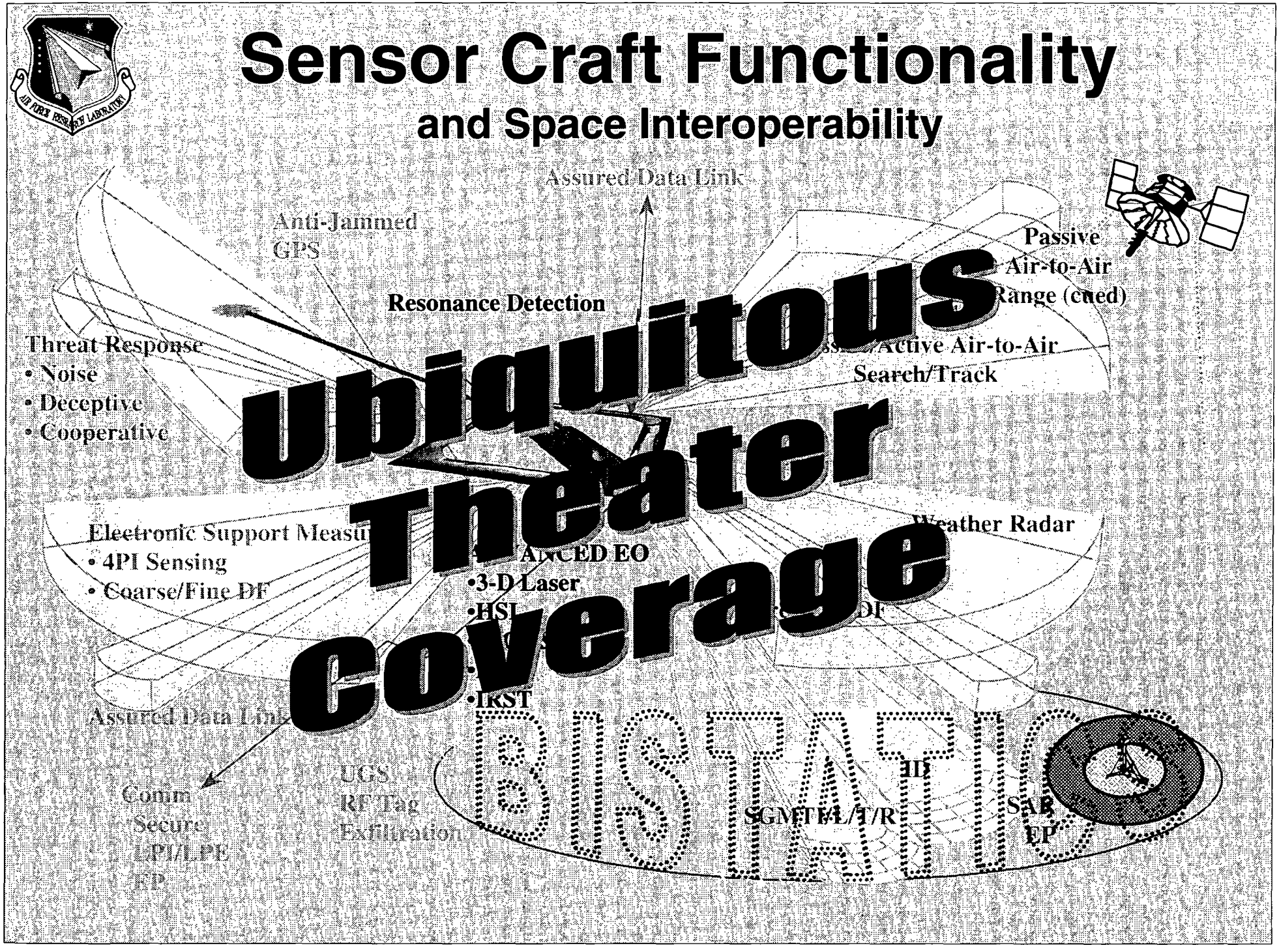
(DII – 15 minute revisit)

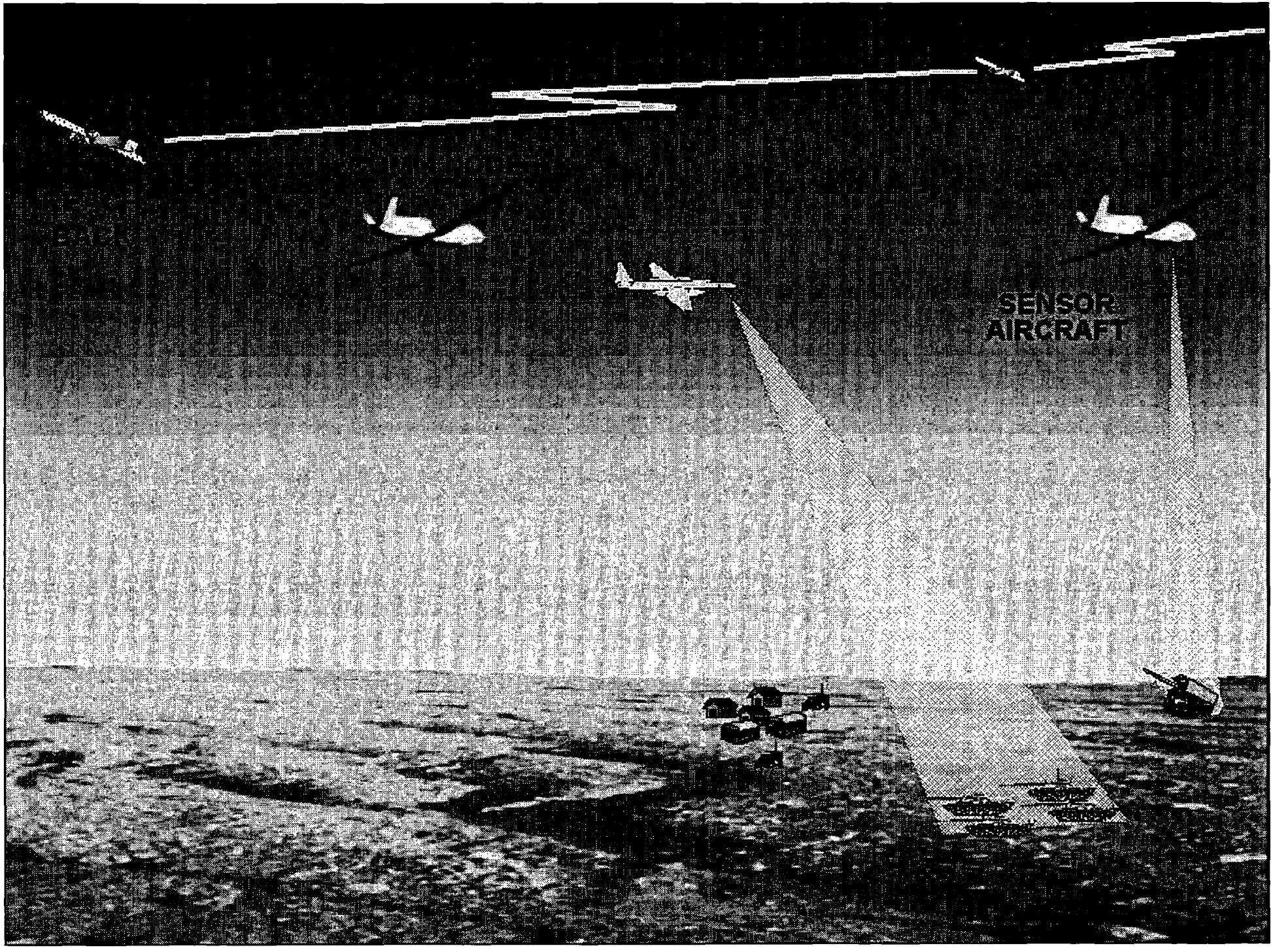


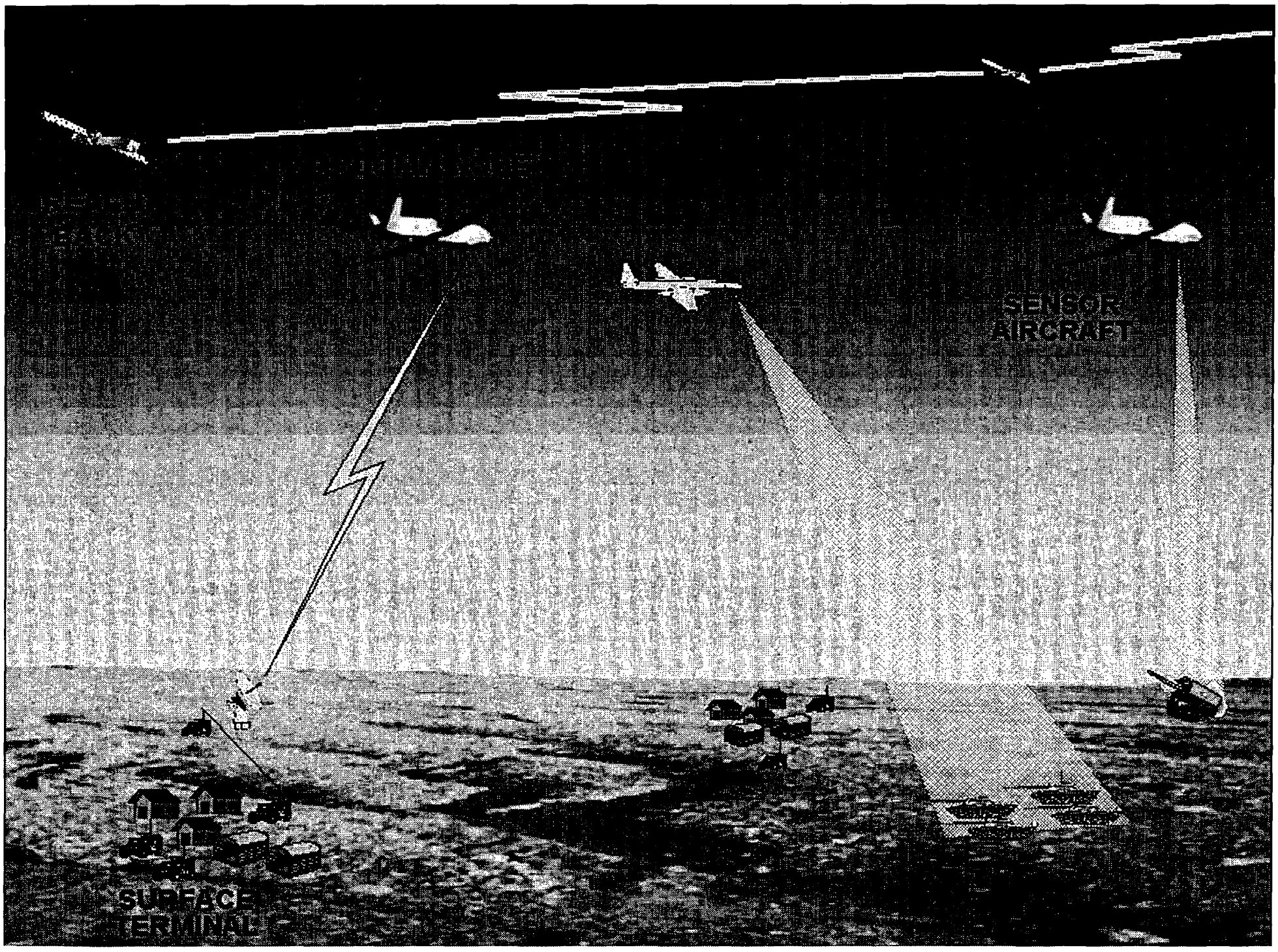
Sensor Craft UAV as Element of Global Awareness/Global Engagement Vision



Sensor Craft Functionality
and Space Interoperability




SENSOR
AIRCRAFT


SENSOR
AIRCRAFT
SURFACE
TERMINAL

Sensor Challenges & Technologies

Challenges	Technologies
Greatest challenge – Affordability, reduce a $50-100 million RF sensor suite to $5-10 million	Production MMIC Transmit Receive (T/R) Modules
Beamforming over doubly curved surfaces	Conformal Active Electronic Scan Arrays
100X reduction in size and weight of today's receivers	Conformal Wideband Receive Apertures
Weight reduction of at least 1000X of all sensors systems from current aircraft configurations	Compact, Wideband Digital Receivers
Performance improvement of at least 30 dB for AMTI and at least 12 dB improvement in GMTI from existing systems	Direct Digital Synthesis
Conformally integrated Low Frequency and High Frequency apertures. Laboratory samples demonstrated	Multi-beam Space Time Adaptive Processing
Light Weight, compact & tunable lasers	Passive Detection and Location of RF Emitters
	Multiple/Simultaneous Radar Modes (GMTI, AMTI, SAR)
	Infrared Search and Track Systems
	LADAR Imaging Systems
	HSI
	Precise Reference Systems/Geolocation
	Ownship Sensor Fusion and Identification

Air Vehicle Challenges & Technologies

Challenges	Technologies
360º aperture integration for resonance detection never done	Revolutionary Integrated Air Vehicle / Sensor Design
Integrated high aspect ratio wing, sensor, passive cooling, power generation & distribution has never been done	Low Cost Smart Structures
Integrated structural sensor integrity, durability, damage tolerance increased 4X	Capillary Pump Heat Rejection
High altitude heat rejection, cooling system weight, volume improved 2-3X	Reconfigurable Damage / Fault Tolerant Control
High aspect ratio joined wing has never been done	Prognostics and Health Management
Reliable and affordable sensor, propulsion, vehicle integrated design for overall unit flyaway cost 10X less than AWACS, JSTARS	Reliable And Affordable Control Systems
	Intelligent UAV Autonomous / Cooperative Control
	Collision Avoidance / Aerial Resupply
	Simulation Based R&D

Sensor Craft: An Extremely Complex, Multidisciplinary Vehicle Design Optimization Problem

Propulsion/Power Challenges & Technologies

Challenges	Technologies
Need to improve power generation capacity by 2-fold and reduced logistic footprint	Integral Starter Generator (ISG)
Need to extend mission duration (goal – 80 hrs; threshold – 60 hrs)	Magnetic bearings / ISG eliminates oil system
Increase fuel efficiency	Technologies for high altitude, long endurance fuel burn reduction by up to 50%
Light weight, high efficiency regenerative power	Photovoltaic, fuel cell for regenerative power
Reduce Cost of Engine / Power system	Technologies for up to 50% cost reduction for an integrated engine/power system
Reduce Maintenance Cost	Technologies for a "Full Life" hot section and maintenance free engine core

RASTPED *The Evolution*

Resource Allocation, Synchronization, Tasking, Processing, Exploitation & Dissemination

Synchronization ⇒ **Tasking** ⇒ **Processing** ⇒ **Exploitation** ⇒ **Dissemination**

Explicit RA ***Collection*** ***Distribution***

Synchronization ⇒ **Tasking** ⇒ **Processing AND Exploitation** ⇒ **Dissemination**

Explicit RA ***Collection*** ***Distribution***

---------- Fusion ----------

---------- Cueing ----------

"Integrated – Adaptive" ISR Management ***(highly Automated)***

---------- Fusion ----------

Adaptive RA ⇒ **Tasking** ⇒ **Processing AND Exploitation** ⇒ **Dissemination**

Sourceable Assets ***Collection*** **--- Dynamic Synchronization ---** ***Distribution***

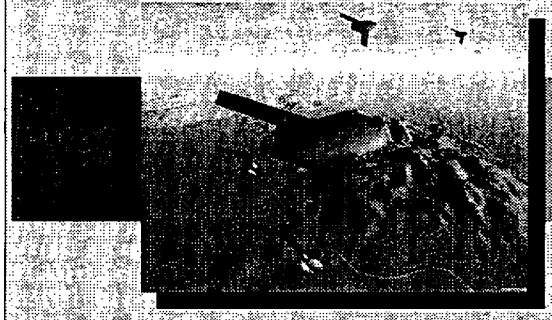
---------- ID / Locate ---------- ***TCT Attack***

Role of ISR UAVs – *"Projected"* Evolution

Attributes and Mission Relevance

Near Term

Predator, Global Hawk
UCAV



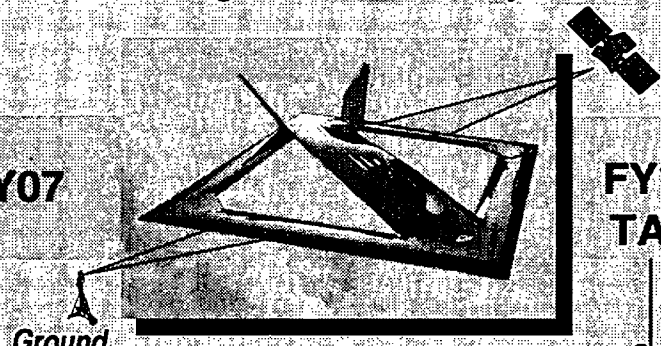
FY07

Attributes
- **Affordable**
- **Mixed manned and unmanned operations**

Mission Relevance
- **SEAD/Strike**
- **Reconnaissance**
- ***Operationalization***

Mid Term

Sensor Craft, UGS, Space
Integrated Functionality



FY13
TAD

Attributes
- **Modular structure/subsys**
- **Vantage Optimization**
- **Extended endurance/range**
- **Space/Ground Interoperable**

Mission Relevance
- **Augmented Surveillance**
- **ISR Integrated Functionality**
- ***Poised for TCT Attack***

Far Term

MicroUAVs
Integrated ISR Enterprise

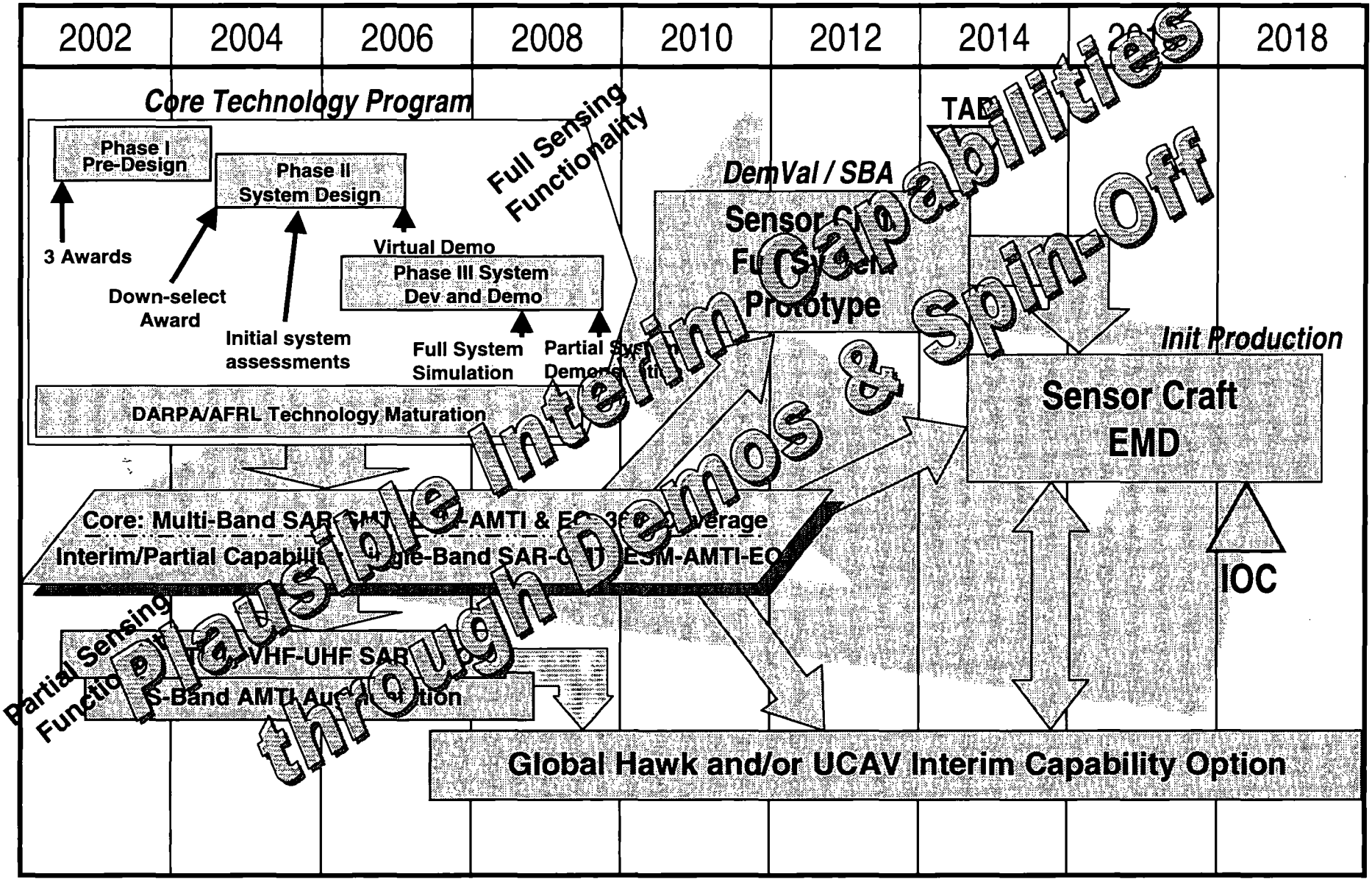
FY22

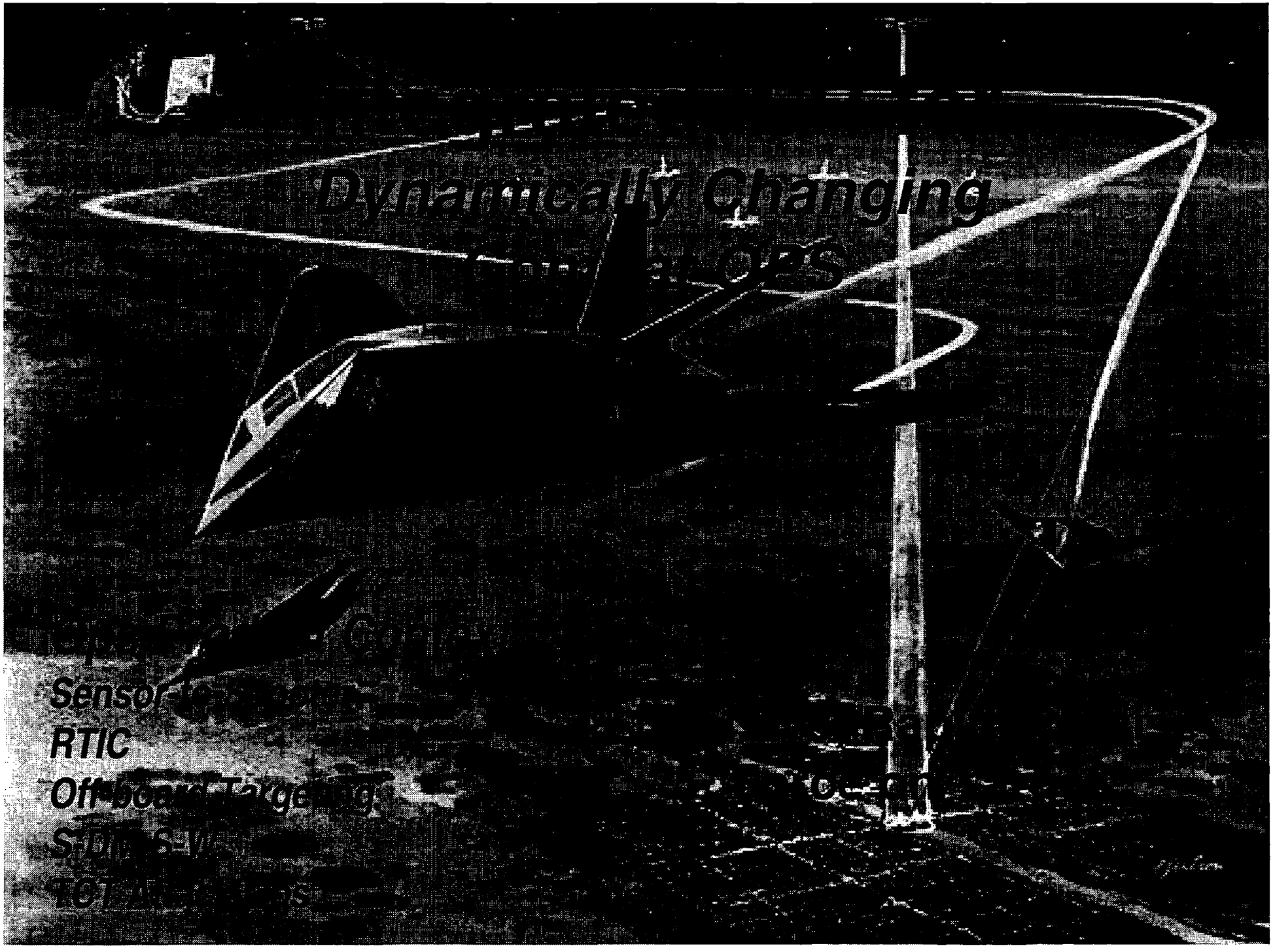
Micro UAVs

Attributes
- **Distributed Sensing**
- **Intelligent swarms**
- **Covert Ops**
- **Supersonic capability**

Mission Relevance
- **Integ ISR Enterprise**
- **Covert Recce/Strike**
- **Access Ubiquity**
  "Perpetual Presence"
- ***Poised for Urban Warfare***

Sensor Craft Programmatic Macro




Dynamically Changing
Sensor
RTIC
Off-board targeting
S-IV
ICT

Technical Challenges

RF Sensor

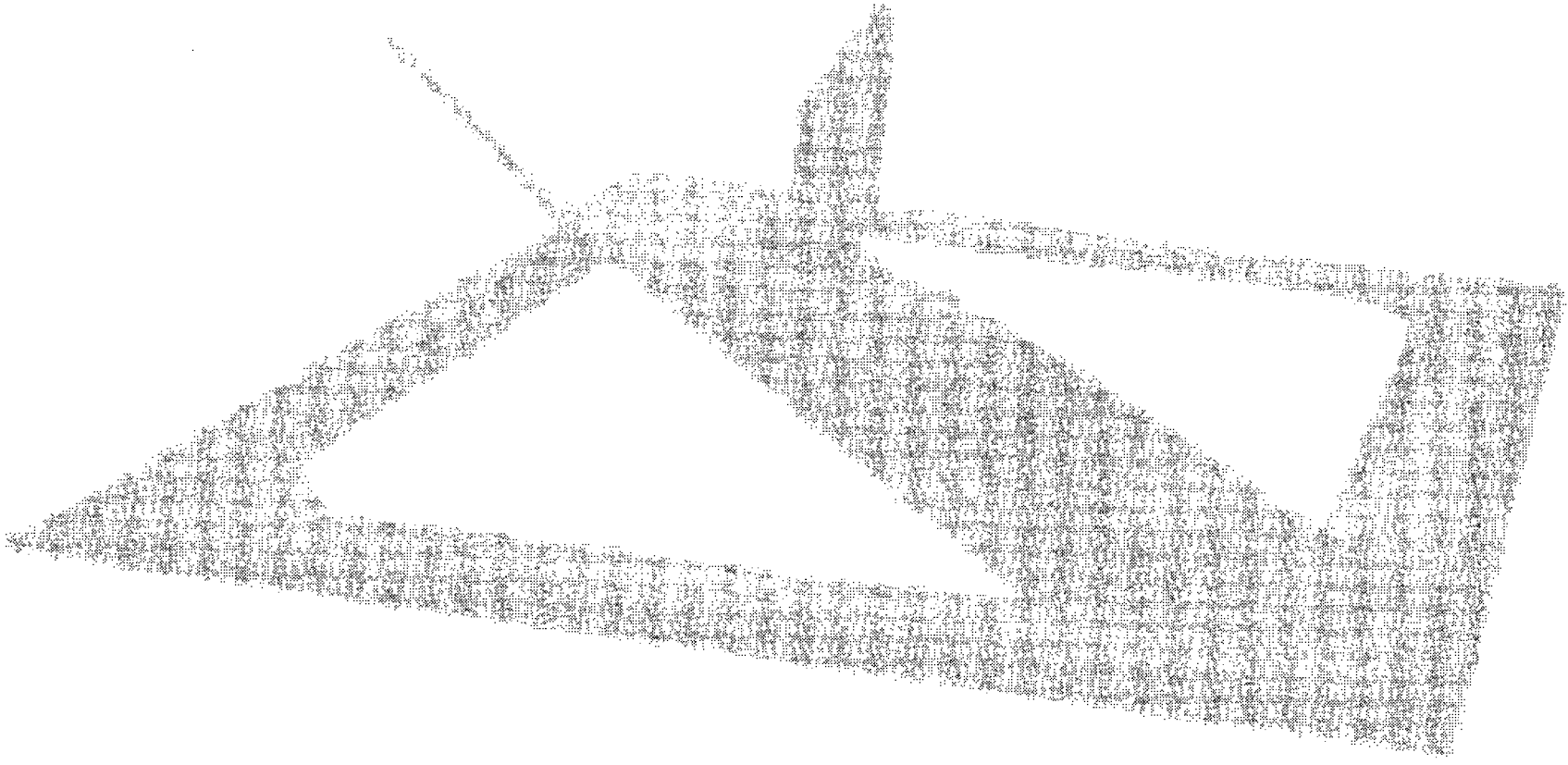
- Beam Forming across complex surfaces
- Conformal integrated Low Frequency and high frequency apertures have never been done. Laboratory samples demonstrated.
- Compact, Low Cost ESM receivers
- Affordability and Advanced Sensor Cost

Vehicle

- High aspect ratio joined wing has never been done
- Integrated structural sensor integrity, durability, damage tolerance increased 4X
- 360 degree aperture integration for resonance detection never done

Propulsion

- Magnetic bearings / ISG eliminates oil system
- Technologies for high altitude, long endurance fuel burn reduction by up to 50%
- Technologies for a "Full Life" hot section and maintenance free engine core



BACKGROUND PAPER
DOD S&T FUNDING SITUATION, FY2000-FY2001

FY2000

- The authorization conference has completed its work; the results are summarized in the attached spreadsheets.

- The appropriations conference has not yet finished, although at the NSC Senior Directors meeting it was announced that the conference might end this week. We estimate that the S&T appropriation will be $8.05 billion, compared to the $7.4 B budget request.

FY2001

- DDR&E believes that the overall S&T picture will not be as bad in FY2001 as during the previous two years. The Air Force probably will not propose as large a reduction to its S&T funding as it did last year, in large part due to the pressure and bad publicity it received for its previously proposed S&T reductions. However, there are several worrisome trends in the overall 6.1 funding and the Navy's 6.2 and 6.3 accounts.

- 6.1 funding under attack. Our contacts in DDR&E perceive a gradual shift away from basic research within DOD.

  - The Navy and Army will maintain 6.1 funding levels in FY2001 with essentially no real growth from FY2000.

  - The Air Force plans to slowly decrease 6.1 funding from $209 million to approximately $200 million (then year dollars) by FY2005. Although the R&D office within the Secretary of the Air Force's staff has been fighting to maintain 6.1 funding, there is pressure from the senior military leadership to reduce basic research to support near term requirements such as operations. The military leadership would like 6.1 funding to drop to the level supported by the Army ($180-190 million), if not below.

  - DARPA has been structurally shifting away from basic research. Although DARPA's 6.1 budgets have been on the order of $80 million per year, OMB and DDR&E now question whether DARPA's 6.1 funding truly supports basic research. The general feeling is that the 6.1 account leans more toward applied research or advanced technology development.

  - The Navy may go the same way as DARPA with its 6.1 funding. The service is restructuring its S&T portfolio to have "fewer walls" between 6.1, 6.2, and 6.3 programs—in other words, more blurring of the research accounts. Some Navy

personnel have expressed their concerns that 6.1 funding will eventually shift toward applied research.

- Navy 6.2 and 6.3 funding under attack as well. DDR&E tells us that the Navy plans to decrease its 6.2 and 6.3 funding in FY2002 and beyond. We do not have details on the size of the proposed cuts.

DOD S&T FOR FY2001: TALKING POINTS

I have four areas of concern for DOD S&T.

- FY2001 funding levels
- tendency of DOD to be less supportive than other agencies of interagency Administration initiatives
- "category creep": 6.4 projects classified as 6.3, 6.3 as 6.2, etc.
- lack of guidelines or standards for DOD to follow in their S&T funding

FY2001 FUNDING LEVELS

- Likely Appropriations action on DOD's 6.1/6.2/6.3 accounts will result in DOD S&T levels almost 9% higher than Administration request ($8.05B vs. $7.4).

- Given Administration commitment to S&T, our FY2001 DOD request for S&T should be no less than the level Congress has provided.

- Higher levels would allow them to be more supportive of interagency initiatives

INTERAGENCY INITIATIVES

- DOD has been lukewarm at best on several interagency initiatives: critical infrastructure protection, WMDP, others

- [ask Tom Kalil for more examples]

- DOD is a key player and must be more involved and committed, especially when these initiatives reflect Presidential priorities

CATEGORY CREEP

- DOD, and Air Force in particular, has sought to reclassify or inaccurately classify more applied projects as being more fundamental in nature.

- DARPA has also done this

S&T FUNDING GUIDELINES OR STANDARDS

- We fight this kind of fight every year. It may be inevitable, but it would help our efforts if we stated some kind of guidelines or standards to hold DOD to.

- Higher of either an absolute floor and, say, 3% of their overall budget for S&T.

- Cutting S&T is not going to solve DOD's procurement and O&M problems, and will exacerbate them in the future.

FY2001 S&T Funding Options for DOD

- **The Administration requested $7.4 B for DOD S&T in FY2000. The appropriation will probably be $8.05 billion.**
- **Possible S&T funding options for FY2001:**
  - **Option 1: $7.85 B = FY2000 request + 2% inflation + increases for Lane-Lew S&T priorities**
    - **Critical Infrastructure Protection: $100 M**
    - **Nanotechnologies: $50 M**
    - **IT2: $100 M**
    - **Weapons of Mass Destruction Protection: $50 M**
  - **Option 2: $8.21 B = FY2000 appropriation + 2% inflation**
  - **Option 3: $8.37 B = FY2000 appropriation + 2% inflation + 2% real growth. Option is consistent with FY2000 defense authorization bill guidance.**
  - **Option 4: $8.67 B = FY2000 appropriation + 2% inflation + 2% real growth + LL S&T priorities**

DEFENSE S&T BUDGET									
Figures in $ Millions (then year)									
Component	**Category**	**FY1999 Enacted**	**FY2000 Pres Bud**	**Appropriations**					
				House	**% Diff, Pres Bud**	**Senate**	**% Diff, Pres Bud**	**Conference**	**% Diff, Pres Bud**
Army	6.1	188.6	186.9	186.9	0.00%	210.2	12.47%		
	6.2	630.8	555.3	782.0	40.84%	635.1	14.37%		
	Tech Base	819.4	742.1	968.9	30.56%	845.2	13.89%	0.0	
	6.3	712.1	524.9	649.8	23.80%	587.4	11.91%		
	S&T	1,531.5	1,267.1	1,618.8	27.76%	1,432.7	13.07%	0.0	
	RDT&E		4,426.2	5,148.1	16.31%	4,900.8	10.72%		
Navy	6.1	362.7	376.7	376.7	0.00%	376.7	0.00%		
	6.2	570.7	523.8	597.2	14.01%	588.3	12.31%		
	Tech Base	933.4	900.6	974.0	8.15%	965.1	7.16%	0.0	
	6.3	580.8	519.5	721.8	38.94%	598.5	15.21%		
	S&T	1,514.2	1,420.1	1,695.8	19.41%	1,563.6	10.10%	0.0	
	RDT&E		7,984.0	9,080.6	13.73%	8,463.2	6.00%		
Air Force	6.1	210.4	209.5	216.5	3.34%	209.5	0.00%		
	6.2	605.6	507.6	613.0	20.76%	574.8	13.23%		
	Tech Base	816.0	717.1	829.5	15.67%	784.3	9.36%	0.0	
	6.3	423.5	465.7	526.4	13.04%	542.2	16.44%		
	S&T	1,239.5	1,182.8	1,355.9	14.64%	1,326.5	12.15%	0.0	
	RDT&E		13,077.8	13,709.2	4.83%	13,565.4	3.73%		
Services	6.1	761.7	773.1	780.1	0.91%	796.4	3.01%	0.0	
	6.2	1,807.1	1,586.7	1,992.3	25.56%	1,798.2	13.33%	0.0	
	Tech Base	2,568.8	2,359.9	2,772.4	17.48%	2,594.6	9.95%	0.0	
	6.3	1,716.4	1,510.1	1,898.1	25.69%	1,728.2	14.44%	0.0	
	S&T	4,285.2	3,870.0	4,670.5	20.69%	4,322.8	11.70%	0.0	
	RDT&E	0.0	25,488.0	27,937.9	9.61%	26,929.5	5.66%	0.0	

Component	Category	FY1999 Enacted	FY2000 Pres Bud	Appropriations					
				House	% Diff, Pres Bud	Senate	% Diff, Pres Bud	Conference	% Diff, Pres Bud
Defense Wide	6.1	346.3	340.0	366.5	7.79%	351.0	3.24%		
	6.2	1,343.9	1,372.3	1,389.3	1.24%	1,386.6	1.04%		
	Tech Base	1,690.2	1,712.3	1,755.8	2.54%	1,737.6	1.48%	0.0	
	6.3	1,816.6	1,804.0	1,830.4	1.47%	1,819.5	0.86%		
	S&T	3,506.8	3,516.3	3,586.2	1.99%	3,557.0	1.16%	0.0	
	RDT&E		8,609.3	8,930.1	3.73%	9,325.3	8.32%		
OT&E			24.4	29.4	20.46%	24.4	0.00%		
DT&E			253.5	272.0	7.30%	253.5	0.01%		
DOD Totals	6.1	1,108.0	1,113.2	1,146.7	3.01%	1,147.5	3.08%	0.0	
	6.2	3,151.0	2,959.0	3,381.6	14.28%	3,184.7	7.63%	0.0	
	Tech Base	4,259.0	4,072.2	4,528.2	11.20%	4,332.2	6.39%	0.0	
	6.3	3,533.0	3,314.1	3,728.5	12.50%	3,547.6	7.05%	0.0	
	S&T	7,792.0	7,386.3	8,256.7	11.78%	7,879.8	6.68%	0.0	
	RDT&E	0.0	34,375.2	37,169.4	8.13%	36,532.7	6.28%	0.0	

DEFENSE S&T BUDGET									
Figures in $ Millions (then year)									
Component	**Category**	**FY1999 Enacted**	**FY2000 Pres Bud**	**Authorizations**					
				House	**% Diff, Pres Bud**	**Senate**	**% Diff, Pres Bud**	**Conference**	**% Diff, Pres Bud**
Army	6.1	188.6	186.9	188.3	0.75%	201.9	8.03%	203.2	8.72%
	6.2	630.8	555.3	619.2	11.51%	577.9	4.07%	614.0	10.57%
	Tech Base	819.4	742.1	807.4	8.80%	779.7	5.07%	817.1	10.11%
	6.3	712.1	524.9	539.4	2.76%	541.9	3.24%	545.9	4.00%
	S&T	1,531.5	1,267.1	1,346.9	6.30%	1,321.7	4.31%	1,363.1	7.58%
	RDT&E		4,426.2	4,708.2	6.37%	4,671.2	5.54%	4,791.2	8.25%
Navy	6.1	362.7	376.7	376.7	0.00%	376.7	0.00%	376.7	0.00%
	6.2	570.7	523.8	554.3	5.82%	546.8	4.39%	576.3	10.02%
	Tech Base	933.4	900.6	931.1	3.39%	923.6	2.55%	953.1	5.83%
	6.3	580.8	519.5	549.7	5.81%	557.0	7.22%	555.8	6.99%
	S&T	1,514.2	1,420.1	1,480.8	4.27%	1,480.6	4.26%	1,508.9	6.25%
	RDT&E		7,984.0	8,358.5	4.69%	8,201.1	2.72%	8,362.5	4.74%
Air Force	6.1	210.4	209.5	209.5	0.00%	209.5	0.00%	209.5	0.00%
	6.2	605.6	507.6	537.6	5.91%	582.0	14.65%	583.4	14.93%
	Tech Base	816.0	717.1	747.1	4.18%	791.5	10.37%	792.9	10.57%
	6.3	423.5	465.7	493.2	5.91%	548.3	17.74%	533.2	14.49%
	S&T	1,239.5	1,182.8	1,240.3	4.86%	1,339.8	13.27%	1,326.1	12.11%
	RDT&E		13,077.8	13,212.7	1.03%	13,567.3	3.74%	13,630.1	4.22%
Services	6.1	761.7	773.1	774.5	0.18%	788.1	1.94%	789.4	2.11%
	6.2	1,807.1	1,586.7	1,711.1	7.84%	1,706.7	7.56%	1,773.7	11.78%
	Tech Base	2,568.8	2,359.9	2,485.7	5.33%	2,494.8	5.72%	2,563.1	8.61%
	6.3	1,716.4	1,510.1	1,582.3	4.78%	1,647.2	9.08%	1,634.9	8.26%
	S&T	4,285.2	3,870.0	4,068.0	5.12%	4,142.1	7.03%	4,198.1	8.48%
	RDT&E	0.0	25,488.0	26,279.4	3.10%	26,439.6	3.73%	26,783.8	5.08%

Component	Category	FY1999 Enacted	FY2000 Pres Bud	Authorizations					
				House	% Diff, Pres Bud	Senate	% Diff, Pres Bud	Conference	% Diff, Pres Bud
Defense Wide	6.1	346.3	340.0	346.0	1.76%	340.0	0.00%	345.5	1.62%
	6.2	1,343.9	1,372.3	1,416.8	3.24%	1,406.3	2.48%	1,392.8	1.49%
	Tech Base	1,690.2	1,712.3	1,762.8	2.95%	1,746.3	1.99%	1,738.3	1.52%
	6.3	1,816.6	1,804.0	1,815.6	0.64%	1,864.0	3.33%	1,895.9	5.09%
	S&T	3,506.8	3,516.3	3,578.4	1.77%	3,610.3	2.67%	3,634.1	3.35%
	RDT&E		8,609.3	9,278.4	7.77%	9,122.2	5.96%	9,210.8	6.99%
OT&E			24.4	24.4	0.00%	24.4	0.00%	24.4	0.00%
DT&E			253.5	253.5	0.00%	253.5	0.00%	253.5	0.00%
DOD Totals	6.1	1,108.0	1,113.2	1,120.6	0.66%	1,128.2	1.35%	1,135.0	1.96%
	6.2	3,151.0	2,959.0	3,127.9	5.71%	3,113.0	5.20%	3,166.5	7.01%
	Tech Base	4,259.0	4,072.2	4,248.5	4.33%	4,241.1	4.15%	4,301.4	5.63%
	6.3	3,533.0	3,314.1	3,397.9	2.53%	3,511.2	5.95%	3,530.8	6.54%
	S&T	7,792.0	7,386.3	7,646.4	3.52%	7,752.3	4.96%	7,832.2	6.04%
	RDT&E	0.0	34,375.2	35,835.7	4.25%	35,839.7	4.26%	36,272.5	5.52%