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Original OA/ID Number: 266				
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TO: JUKES, J

FROM: ITOH

DOC DATE: 17 OCT 94
SOURCE REF:

KEYWORDS: DEFENSE POLICY

LEGISLATIVE REFERRAL

PERSONS:

SUBJECT: NEC PROPOSED RPT ON MTG CHALLENGES OF DEFENSE DOWNSIZING

ACTION: SENS SGD MEMO

DUE DATE: 15 OCT 94 STATUS: C

STAFF OFFICER: HAHN

LOGREF:

FILES: WH

NSCP:

CODES:

D O C U M E N T D I S T R I B U T I O N

FOR ACTION

FOR CONCURRENCE

FOR INFO

BELL
DANVERS
EXECSEC
JONES

COMMENTS: _____

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DOC 3 OF 3

UNCLASSIFIED
ACTION DATA SUMMARY REPORT

RECORD ID: 9408313

DOC ACTION OFFICER

CAO ASSIGNED ACTION REQUIRED

001	HAHN	Z	94101217	PREPARE MEMO ITOH TO JUKES
002	ITOH	Z	94101717	FOR SIGNATURE
003		X	94101718	SENS SEC MEMO

DISPATCH DATA SUMMARY REPORT

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003 941017 JUKES, J

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National Security Council
The White House

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Situation Room	_____	_____	_____
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A = Action I = Information D = Dispatch R = Retain N = No Further Action

CC: _____

COMMENTS:

Exec Sec Office has diskette NO

NATIONAL SECURITY COUNCIL

WASHINGTON, D.C. 20506

October 17, 1994

MEMORANDUM FOR JAMES J. JUKES

FROM:

WILLIAM H. ITOH *WHS*

SUBJECT:

NEC Proposed Report on Meeting the Challenges of
Defense Downsizing

The National Security Council staff believes that the NEC draft report on defense downsizing is a solid, detailed statement of the Administration's defense reinvestment goals and programs.

We concur in the report's release, subject to the final editing to add missing statistics, and consideration of the following detailed recommendations:

Page ES-6: The Table I summary of defense reinvestment and conversion programs was not included in the draft. This overall view of programs is critical for the general reader to understand the overall organization and scope of defense reinvestment programs, and needs to strike a balance between readability and budgetary detail. This final table should be coordinated with OMB and the NSC.

Page ES-6: Next to last paragraph. Correct the date of the Acquisition Streamlining Act signing from October 6, 1994, to October 13, 1994.

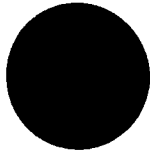
Page ES-9: First bold paragraph. Change to "...and dramatically reformed Pentagon procurement..." The reform is ongoing.

Page 68: The NEC may want to consider expanding this section to include more discussion of the "Troops to Teachers" program, since this is a project with special Presidential interest. The details of the June 29, 1994, signing of Sergeant Major Lazaro Ramirez with the El Paso Independent School District, the first military member to officially be assigned under the new program, might be a good "box" story to highlight Operation Transition accomplishments.

NATIONAL SECURITY COUNCIL

WASHINGTON, D.C. 20506

8313



October 14, 1994

ACTION

MEMORANDUM FOR WILLIAM H. ITOH

THROUGH: ROBERT G. BELL *RGB*
FROM: STEVEN R. JONES
SUBJECT: NEC Proposed Report on Meeting the Challenges of
Defense Downsizing

OMB has requested views on the attached NEC draft report (Tab II) on defense downsizing. I have worked closely with the NEC and DoD on the various drafts of this defense reinvestment and conversion "white paper" over the past year. Previous comments that I have submitted to the NEC have been incorporated into the report.

I believe this is a solid, detailed statement of our basic defense reinvestment goals and programs. I believe the NSC should fully endorse the report, with the minor changes recommended in the attached response (Tab I).

Concurrence by: *Bill* Bill Danvers

RECOMMENDATION

That you sign the memorandum at Tab I.

Attachment

Tab I Memorandum for Signature

Tab II Incoming Correspondence

NATIONAL SECURITY COUNCIL
WASHINGTON, D.C. 20506

8313

October 14, 1994

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WASHINGTON, D.C. 20506

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EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
Washington, D.C. 20503

October 7, 1994

LEGISLATIVE REFERRAL MEMORANDUM

LRM #M-1885

TO: Legislative Liaison Officer -

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OSTP - Elisa Wynn - (202)456-6020 - 288
CEA - Liaison Officer (vacant) - (202)395-5036 - 242
NEC - Sonyia Matthews - (202)456-6630 - 429

FROM: JAMES J. JUKES (for) *Ji*
Assistant Director for Legislative Reference

OMB CONTACT: James A. BROWN (395-3473)
Secretary's line (for simple responses): 395-3454

SUBJECT: NEC Proposed Report on Meeting the Challenges
of Defense Downsizing

DEADLINE: 5:00 Friday October 14, 1994

COMMENTS: Questions regarding the content of this report should be addressed to Dorothy Robyn of the National Economic Council Staff. Each listed Department or Agency should route a copy of this LRM to its Deputy Secretary (or Administrator). It should also be routed to the following persons: Commerce, Jonathan Sallet, Dave Witschi (EDA) and Keith Morrison (EDA); Defense, Josh Gotbaum, Ken Flamm, Ed Dorn, Paul Dempsey, Colleen Preston, Gary Denman, and Sherry Goodman; Energy, Bob DeGrasse, and Vic Reis; Labor, Jim Van Erden; Transportation, Judith Burrell; Treasury, Alicia Munnell; SBA, Karen Hontz; and NSF, Joe Bordogna.

OMB requests the views of your agency on the above subject before advising on its relationship to the program of the President, in accordance with OMB Circular A-19.

Please advise us if this item will affect direct spending or receipts for purposes of the the "Pay-As-You-Go" provisions of Title XIII of the Omnibus Budget Reconciliation Act of 1990.

CC:

Doug Criscitello
Dorothy Robyn
Gary Bennethum
Kitty Gillman
Jay Stowsky
Steve Jones
Bill Galston
Jack Quinn
John Emerson
Tom Epstein
Barbara Chow
Phebe Vickers
Steve Dotson
Greg Henry
Jonas Neihardt
Larry Matlack
Steve Kelman
Bill Coleman
Ron Peterson
Mike Goad

You may **also respond** by (1) calling the analyst/attorney's direct line (you will be connected to voice mail if the analyst does not answer); (2) sending us a memo or letter; or (3) if you are an OASIS user in the Executive Office of the President, sending an E-mail message. Please **include** the LRM number shown above, and the **subject** shown below.

FROM: _____ (Date)
 _____ (Name)
 _____ (Agency)
 _____ (Telephone)

The following is the response of our agency to your request for views on the above-captioned subject:

_____ Concur

_____ No objection

_____ No comment

_____ See proposed edits on pages _____

_____ Other: _____

_____ FAX RETURN of _____ pages, attached to this
_____ response sheet

MEETING THE CHALLENGES OF DEFENSE DOWNSIZING

Table of Contents

Executive Summary	ES 1 – ES 11
Introduction	1
Challenge #1: Commercial–Military Integration	2
Challenge #2: Regional Economic Adjustment	26
Administration Programs for Defense Reinvestment	
A. Technology and Industry Reinvestment	42
B. Community Redevelopment	58
C. Worker Training and Adjustment	62
Improving the Delivery of Economic Adjustment Assistance	72
Revitalizing Base Closure Communities	78
New National Initiatives	90

MEETING THE CHALLENGES OF DEFENSE DOWNSIZING

Executive Summary

The end of the Cold War has dramatically altered the global landscape. Democratic reforms underway throughout Eastern Europe and the former Soviet Union have overturned the assumptions upon which American military security rested for 40 years. The United States still faces significant threats to its national security, but these threats can be met with lower levels of defense spending than were required when a hostile superpower was poised constantly along the borders of Western Europe.

The new world order, and its consequent reduction in defense spending, offer an historic opportunity to strengthen the American economy. Wise reinvestment of resources can create high-paying jobs, enabling the scientists, engineers, factory workers, and soldiers who helped win the Cold War to transfer many of their talents to fulfilling a much needed domestic revival.

Although these changes are welcome, they pose two major challenges to the federal government: to integrate the commercial and military sectors, in order to maintain our technology-based military advantage with a smaller defense budget; and to ease economic adjustment by workers, firms and communities that have relied on defense spending for their livelihood.

Challenge #1: Commercial-Military Integration

The first challenge posed by the defense drawdown is to meet our continuing military needs in a world that still contains threats to our interests, our values and our security. This requires fundamental changes in the way DoD acquires the technology to support its weapons systems. Superior technology was the basis of America's military advantage throughout the Cold War, and it will be even more important in the unpredictable security environment we now face.

To maintain its technological advantage, DoD must break down the barriers it has created over the last 20 years between the defense and civilian sectors. Because of the Defense Department's rigid adherence to specifications and its needlessly cumbersome procurement system, many commercial firms refuse to do business with DoD altogether, and those that do often wall off their defense production. DoD, as a result, has become reliant on an increasingly autarkic defense industrial base.

Such a strategy is no longer appropriate for three reasons. First, as the defense budget declines, the cost of supporting an autarkic defense industrial base has become prohibitive. The military pays \$10 for computer chips that are virtually the same as ones being sold commercially for \$1; the \$9 difference is due largely to overhead caused by DoD's special requirements. The Defense Science Board estimates that DoD could save tens of billions of

dollars a year by integrating major parts of the defense industrial base with the commercial industrial base.

Second, defense technology is often no longer superior to what is commercially available, as was the case for many years. Especially in key industries such as electronics, software, and communications, state-of-the-art technologies, products and processes increasingly emerge first in the larger and more dynamic commercial sector, and DoD's maze of regulations limits access to them. Today five of the top ten U.S. semiconductor producers refuse defense business because of the way they are required to give DoD cost and pricing information. In short, reliance on defense-unique firms and facilities hinders DoD's ability to maintain its technological advantage.

Third, because of its isolation, the defense industrial base is losing its technology edge and failing to attract sufficient capital -- a process that IBM's former chief scientist describes as the "ghettoization" of defense technology. Moreover, in some sectors, the rapidly shrinking defense industrial base will lack the required surge capability for crisis response.

In sum, elimination of the artificial barriers between commercial and defense industry -- and increased reliance on commercial firms -- is crucial if DoD is to obtain state-of-the-art technologies, broaden the industrial base upon which the military depends, and save billions of dollars. Moreover, "commercial-military integration" will make DoD's still-large R&D and production resources more readily available to U.S. civilian industry, which will foster America's economic growth and industrial competitiveness. The goal, simply stated, is to erase the distinction between the defense and commercial industries wherever possible, allowing DoD to make maximum use of components, subsystems and technologies developed by commercial industry.

Three pillars support this "dual-use" vision for national security. Most important is **procurement reform**. To maintain technological superiority, DoD must embrace commercial products and practices. It is not enough to finetune the existing system; it must be thoroughly redesigned to enable DoD to reach out and take full advantage of the inventiveness and efficiency of today's dynamic commercial market.

Procurement reform will also help defense firms diversify into commercial markets: Many of our military contractors can compete successfully in the global marketplace, but not if they must carry the weight of all the red tape and special requirements placed on them by the government. Lifting this burden will help them preserve high-paying jobs and will assure the survival of our industrial base, from which we can generate even more innovation and jobs.

Second, the Pentagon is bolstering its **investment in dual-use R&D**. The Administration's recently announced initiative in flat-panel displays, designed to foster a commercial U.S. display industry, is indicative; by targeting investments in information technology, advanced manufacturing, advanced materials and other areas, DoD is ensuring that commercial firms in this country can supply the superior technologies that will maintain our military advantage. This reflects a significant new goal for defense R&D -- to ensure that U.S. industry retains the lead in those commercial technologies that are critical to military capabilities.

The third pillar of our dual-use technology vision is increased **international cooperation**. Technology is global, and thus cooperation with foreign countries and foreign firms is necessary to give us access to the very best technologies and manufacturing know-how for use in defense systems. In addition, by conducting R&D and procurement jointly with our allies, we can gain economies of scale and lay the groundwork for joint military operations in the field.

Challenge #2: Regional Economic Adjustment

Our second challenge is to ease economic adjustment to the defense drawdown. By 1997, defense spending will have been reduced nearly 40 percent from its 1985 peak. Hundreds of thousands of military personnel, Defense Department civilian employees, and defense industry workers must find new employment. Communities dependent on the military for their livelihood must find new sources of economic strength. Defense firms must learn to compete in commercial markets.

Granted, this drawdown is smaller than those following World War II, Korea and Vietnam, and the economic effects at the national level are likely to be moderate; nevertheless the impact on particular regions is severe. Nearly two-thirds of the expected loss in defense industry jobs between 1991 and 1997 is concentrated in only 10 states, and a small number of communities in those states will bear most of the burden. The challenge to the federal government, then, is to minimize regional disruption while promoting overall economic growth by reinvesting in activities that will increase U.S. productivity.

In contrast to many areas experiencing industrial decline, defense industrial regions have highly sophisticated technological and industrial capabilities. Their endowments include a flexible and adaptable network of subcontractors and specialized suppliers in machinery, metalworking, electronics, composites, advanced materials and other dual-use technologies that could provide the basis for new growth industries; a large pool of scientists and engineers, technicians and highly skilled blue-collar workers; and advanced R&D capabilities in universities and other specialized research institutes. (Unlike smaller defense firms, the large prime contractors have limited ability to diversify, because of a culture and skill base unsuited to commercial competition.) With appropriate assistance (including significant reform of the federal procurement system), many of these centers of defense industry have the potential to compete globally in emerging industries in environmental and biomedical

technology, medical equipment, advanced transportation equipment and communication systems.

To elaborate, due to decades of DoD investment in advanced R&D and production capabilities, these networks of firms, people and research organizations have developed into specialized industrial agglomerations -- e.g., aerospace and electronics in Southern California, lasers and electro-optics in Orlando, or marine technology in San Diego and Connecticut. Such regional concentrations -- or "technology clusters" -- are becoming more, not less, important as a source of global competitive advantage, because their dense inter-firm networks, specialized labor markets, and technical expertise cannot easily be replicated elsewhere.

Regional concentration alone does not provide sufficient advantage, however. Defense industrial regions, like other manufacturing regions, must overcome the stand-alone structures and top-down mindset of the mass production era in favor of a more flexible, decentralized industrial system that combines intense competition with collaboration and collective learning among customers, suppliers and competitors. Policies to achieve this transformation are often most effectively pursued at the regional level, where decentralized initiatives can catalyze, coordinate and sustain cooperation among firms and between firms and the public sector.

To speed economic adjustment, the Clinton Administration's defense reinvestment initiative combines substantial investments in critical civilian and dual-use technologies with more targeted support for defense-dependent workers, firms and communities. These programs make possible locally-driven efforts to diversify defense-dependent economies, building on the often-strong regional capabilities in advanced technology. Stated differently, defense-dependent regions must take the lead in developing a diversification strategy -- a vision for the future; the federal government's role is to provide resources with which workers, firms and communities can build that economic future.

Base Closings. Communities with military bases scheduled for closure confront special problems and opportunities. Although these communities frequently lack the technological capabilities of defense industrial regions, they possess other assets that can provide the basis for charting a new economic future. An airfield, a port, or the land, buildings, furniture and equipment on a base can be the catalyst for local economic development. Civilian base employees represent a skilled, dedicated, and trainable workforce. And the very closure of the base can also provide new market opportunities -- such as the need for environmental cleanup.

The most effective approach to revitalizing base closure communities emphasizes local leadership to reemploy rapidly the facilities and workers no longer needed by the military. Plans for economic renewal must come from the community organizations, firms and workers with a stake in the future of an affected region.

The appropriate role for the federal government is to support the development and implementation of the community reuse plan by making it easier to utilize newly available assets. It does this by funding the planning process, transferring property at an affordable price, investing in infrastructure improvements to make property more attractive, paying for training that gives workers skills needed in the local economy, and fully funding environmental cleanup. These federal contributions will attract and complement private sector capital investment in new business activity on the closing base. Together, these public and private investments, guided by local planning, will help realize an economic vision appropriate for the region.

Links between Commercial-Military Integration and Economic Adjustment

These two challenges -- commercial-military integration and economic adjustment -- overlap to a considerable degree. Reform of the defense procurement system will benefit national security and, at the same time, make it easier for defense firms to pursue commercial production; thus commercial-military integration promotes economic adjustment. More generally, a strategy of commercial-military integration will maximize the benefit of defense technology investment for commercial purposes and thereby boost overall economic growth.

Conversely, adjustment efforts can help preserve a strong industrial base for defense. For example, regional manufacturing extension programs can help small defense suppliers identify and pursue new markets in the commercial sector. Sustained by the additional commercial business, these firms can continue to supply their (now smaller) defense contracts.

There are limits to this synergy between economic adjustment and defense reinvestment, however. Defense funds to develop leading-edge dual-use technologies will not go exclusively to defense-dependent regions. Rather, some of the most promising technologies will inevitably reside in firms (and regions) with relatively little past connection to DoD. If DoD were to target such funds entirely to regions hard-hit by military cuts, as some people advocate, it would jeopardize defense technology needs.

Administration Actions to Promote Defense Reinvestment

To meet these challenges, President Clinton announced in March 1993 a five-year, \$20 billion spending initiative for defense reinvestment and conversion. The initiative -- which built on and expanded the foundation laid by Congress in the Defense Conversion, Reinvestment and Transition Assistance Act of 1992 -- consists of new, targeted investments in four key areas:

- worker training and adjustment
- community redevelopment
- dual-use technologies
- civilian technologies with significant diversification opportunities

In July 1993, the President announced an additional initiative to speed the economic recovery of communities where military bases are scheduled to close.

In October 1993, the President and Vice President kicked off a high-priority campaign to overhaul the federal procurement system, with an emphasis on defense procurement. The Administration urged Congress to pass legislation to make it easier for federal agencies to adopt commercial products and practices; legislation introduced the same day in the Senate, and subsequently in the House, proposed a major streamlining of federal procurement.

Nineteen months into the Clinton Administration, these programs are well underway. New spending on defense reinvestment is estimated to reach \$21.6 billion over five years -- \$2 billion more than initially proposed. See Table 1.

In FY93, the Administration spent \$2 billion of "new money" on defense reinvestment -- significantly more than what was initially budgeted -- as DoD personnel took advantage of new, early retirement benefits at higher-than-expected rates.

The FY94 budget maintains or expands support for key Administration defense reinvestment programs: congressional appropriations for these programs total \$4.1 billion -- more than double the FY93 level. The most significant increases are in support for dual-use and civilian technology and DoD personnel assistance.

And on October 6, 1994, the President signed the Federal Acquisition Streamlining Act of 1994, the most sweeping procurement legislation in XX years and a necessary complement to DoD's radical overhaul of its outdated system of "milspecs," as announced in June.

Highlights of the first [18] months of the Administration's defense reinvestment program, through [July] 1994, include the following:

Aggressively implemented programs to provide for adjustment and training of defense workers and DoD military and civilian personnel.

- Provided early retirement benefits and other incentives to DoD civilians, allowing the Pentagon to reduce its civilian workforce in 1993 by 70,000 with only 2,000 involuntary layoffs.
- Dispatched an interagency "SWAT" team to every community on the 1993 list of bases slated for future closure. Department of Labor staff, along with state employment officials, spent several days in each community designing a customized training and reemployment plan for civilian base employees as well as separating military personnel.
- Awarded \$125 million in Department of Labor funds for 73 projects targeted to retraining of some 38,000 defense-dependent workers.
- Provided extensive assistance to 300,000 separating military service members and their families at 330 military installations worldwide through Operation Transition.

Expanded and accelerated grants for redevelopment of communities hard-hit by defense downsizing.

- Awarded planning grants to 27 of the 29 most seriously affected communities on the 1993 base closure list, through DoD's highly-regarded Office of Economic Adjustment. The awards, on average, were made within two weeks of receipt of a processable application.
- Expanded OEA significantly (from \$4 million in FY92 to \$39 million in FY94) to respond to the reinvestment planning needs of defense-dependent communities.
- Obligated or committed nearly \$210 million to implement community reinvestment strategies, through the Department of Commerce's Economic Development Administration.
- Established an electronic clearinghouse for information on defense economic adjustment. The clearinghouse provides regularly updated information on government assistance programs, procurement opportunities, and pertinent laws and regulations.

Launched the Technology Reinvestment Project (TRP) to stimulate commercial-military integration through partnerships between defense and commercial firms.

- Conducted a national outreach initiative to ensure maximum TRP participation by U.S. industry, generating 2,850 proposals for this unprecedented, ARPA-led multiagency program to develop new, dual-use technologies; help small and mid-sized defense firms make the transition to commercial markets; and reorient engineering education for the manufacturing industries of the future.
- Announced federal matching funds totaling \$605 million to 212 projects, involving 1,600 firms, universities and other participants. These projects, selected on a purely competitive basis, will leverage an investment of \$1.5 billion.
- Announced another \$15 million in Small Business Innovation Research (SBIR) awards. Phase I grants -- to determine technical merit and feasibility -- will go to 153 projects, representing 130 small companies with an average of 34 employees.
- Conducted a second national competition (the first of two competitions in 1994), with matching-fund awards worth \$175 million to be announced in late October.

Expanded federal support for dual-use technology and advanced civilian technology with significant opportunities for diversification.

- Changed the name of DARPA (Defense Advanced Research Projects Agency) to ARPA, to signify the new DoD reliance on commercial technology.
- Announced new ARPA initiatives in flat-panel displays and electronic packaging, and expanded support for dual-use programs in manufacturing technology, advanced computer simulation and other areas.
- Expanded dramatically the civilian-oriented Advanced Technology Program, which supports diversification in a broad, economy-wide way, from pilot size to a full-scale \$200 million program, and an anticipated increase to over \$400 million in FY95.
- Invested nearly [\$1 billion] in other civilian technology programs that provide significant opportunities for diversifying defense firms.
- Increased cooperative R&D with Department of Energy laboratories [CRADA count] and made the DOE labs more user-friendly: Lab directors can now commit up to \$500,000 in DOE funds to support cooperative research projects with industry; small businesses can get up to four days of assistance from a lab expert at no charge.
- Expanded the Manufacturing Extension Program from 7 centers to 35 centers nationwide, with another 23 projects funded to provide extension support services such

as electronic linkages to national labs and training for extension field agents.

Led the fight to enact the most sweeping procurement legislation in XX years, and dramatically reformed Pentagon procurement, substituting commercial specifications and standards for milspecs wherever possible.

- Led the fight for congressional reform of federal procurement laws, resulting in enactment of the Federal Acquisition Streamlining Act of 1994, which will reform the way the federal government buys \$200 billion worth of goods and services a year, from software to jet aircraft. The legislation could ultimately save the government billions of dollars, and the reforms will make it easier for the Defense Department to buy cutting-edge commercial technology that is available only in the commercial sector.
- Ordered a dramatic revision and simplification of the way the Pentagon buys its goods and key components and military systems. Defense Secretary William Perry in June directed the military to replace military specifications (milspecs) with commercial standards and specifications, unless no practical alternative exists.
- [Launched the Dual Use Technology Application Program to encourage greater use by the Armed Services of commercial technology and products during the development, production and support of military equipment, and to support defense contractor efforts to integrate defense with commercial production.]

Implemented an aggressive Shipbuilding Initiative to enable U.S. shipyards to reenter commercial competition.

- Provided increased funding and more generous financing terms under the Title XI Ship Financing program, allowing U.S. yards to compete for international business for the first time in nearly 30 years. On August 2, the President announced approval of two applications for shipbuilding loan guarantees (\$138 million) and receipt of applications for two others (\$859 million), which will retain 7,100 U.S. shipbuilding jobs.
- Secured passage of the five-year, \$220 million MARITECH program to support R&D on ship design and construction. Transportation Secretary Pena recently awarded the first \$30 million in matching grants.
- Concluded an OECD agreement to end longstanding foreign shipbuilding subsidies.
- Increased export promotion efforts on behalf of U.S. yards.
- And will soon introduce legislation to make U.S. shipyards more globally competitive by bringing U.S. construction standards in line with international standards.

Laid the groundwork for greater DoD access to cutting-edge foreign commercial technologies, components and subsystems, and manufacturing knowhow.

- Launched a major initiative to expand our technology cooperation with Japan. This "technology-for-technology" initiative seeks to better balance the significant amounts of U.S. military technology that flow to Japan, with a compensating flow of commercial technology obtained from Japanese firms for use in defense applications.

Looking Ahead

The President's FY95 budget request reflects his continued strong commitment to defense reinvestment. Support doubles for civilian technology programs such as ATP that offer significant diversification opportunities, raising the overall investment request to \$5 billion.

Program plans for FY95 include the following:

- The first of two TRP competitions for 1994 was announced in April, with awards of approximately \$175 million to be announced in late October. This "Focused TRP Competition" will provide matching federal funds to competitively-selected projects in seven specific dual-use technology development focus areas (e.g., flat-panel display manufacturing; environmental sensors). Technology deployment projects to establish manufacturing extension centers will also be selected.
- A second competition, worth approximately \$500 million in federal matching funds, will be announced in October. This "General TRP Competition" will address a broader set of dual-use technology development focus areas, as well as regional technology alliances, manufacturing education and training, and Small Business Innovation Research.
- The Advanced Technology Program will implement its new programs in specific technology development focus areas (e.g., component-based software, low-cost processing of composite structural materials; DNA diagnostic tools). These programs will last five years with funding of \$30 million to \$40 million a year each.
- The Economic Development Administration will launch its "Competitive Communities" program with a focus on regions hurt by defense downsizing. This program is designed to help defense-impacted regions build a new economic foundation through partnerships that foster high-growth, globally-competitive firms and industries. The President's budget requested \$140 million for EDA's defense diversification activities in FY95.

- DoD, working through the Small Business Administration and the Economic Development Administration, will implement a new program to provide loan guarantees to defense manufacturing firms. The \$50 million "Dual Use Diversification Loan Program" will provide loan guarantees worth several billion dollars to as many as 5,000 defense firms.

Conclusion

For half a century, defense spending not only provided for the Nation's military security but also conferred substantial economic benefits: advances on the frontiers of technology, support for knowledge-intensive, wealth-generating industries, and the creation of productive well-paid jobs. Although greater civil-military integration can preserve some of these benefits, some will certainly vanish as military spending winds down in the post-Cold War era.

Thus the post-Cold War transition must also include government investments that will lift the performance of the whole economy. This means investing in first-class education and training of all our workers; forming R&D partnerships with industry on commercially promising technologies; and developing new national initiatives that meet widely accepted public needs while also fostering the advance of technology, the growth of knowledge-intensive, wealth-generating industries, the creation of high-quality jobs -- and, so far as possible, the use of human talents and institutions formerly devoted to defense. This is defense reinvestment in the broadest sense: through public investment and public-private partnerships, promote the kind of growth that opens satisfying new opportunities for the workers, ex-soldiers, managers, scientists, and engineers who did so much to win the Cold War.

INTRODUCTION

These changes had to come. But if we do nothing in the face of change, we have learned the hard way that we are its victims. If we take bold action, we can be the beneficiaries of change.... Clearly defense conversion can be done and can be done well, making change our friend and not our enemy. But in order to do it, we must act, act decisively, act intelligently, and not simply react years after the cuts occur.

*President Clinton
March 11, 1993*

The end of the Cold War has dramatically altered the global landscape. Democratic reforms underway throughout Eastern Europe and the former Soviet Union have overturned the assumptions upon which American military security rested for 40 years. The United States still faces significant threats to its national security, but these threats can be met with lower levels of defense spending than were required when a hostile superpower was poised constantly along the borders of Western Europe.

The new world order, and its consequent reduction in defense spending, offer an historic opportunity to strengthen the American economy. Wise reinvestment of resources can create high-paying jobs, enabling the scientists, engineers, factory workers, and soldiers who helped win the Cold War to transfer many of their talents to fulfilling a much needed domestic revival.

Although these changes are welcome, they pose two major challenges to the federal government: to integrate the commercial and military sectors, in order to maintain our technology-based military advantage with a smaller defense budget; and to ease economic adjustment by workers, firms and communities that have relied on defense spending for their livelihood.

CHALLENGE #1: COMMERCIAL-MILITARY INTEGRATION

The Defense Department can no longer afford the luxury of having its own private industry.

*John Deutch,
Deputy Secretary of Defense
July 28, 1993*

The collapse of the Soviet Union and the end of the Cold War have required us to fundamentally redefine national security. Instead of a potential confrontation with a global nuclear power, we find ourselves facing threats that are more varied but possibly more complex. The major threats are these:

- 1) Proliferation of nuclear and other weapons of mass destruction and associated delivery systems;
- 2) Regional conflicts;
- 3) Failure of democratic reform in Russia, the former Warsaw Pact nations and the developing world; and
- 4) Weak U.S. economic performance.

To varying degrees, our country's economic performance will determine how well we are able to respond to the first three threats. A thriving U.S. economy will inspire nations hoping to make the transition from authoritarianism to democracy, at the same time that it provides a market for their exports and a source of capital for their investments. A strong economy will also enable us to develop the technologies and to retain the industrial base that support and sustain our military capabilities.

Reflecting this new security environment, the following objectives will drive U.S. defense policy for the foreseeable future:

- Continued reliance on qualitatively superior weapons systems, to overcome potential opponents with a quantitative advantage;
- Fast, mobile and flexible forces to deal with threats that are more varied, more dispersed and less predictable;
- Acquisition and analysis of information in large volumes and at high speed, to maximize the utility of "smart" weapons systems, to gather intelligence, and to deploy forces for maximum effectiveness;

- Efficient, affordable procurement of weapons systems; and
- Greater emphasis on the U.S. technological and industrial infrastructure, with economic security treated as a central element of national security.

Technology is the key. Since World War II, U.S. military superiority has been based on our technological advantage, and technology will be even more important in the uncertain and unstable environment we now face.

If technology is to continue to provide our military advantage, however, we must fundamentally revise our defense technology policy. Two primary forces make this change imperative.

First, in important dual-use areas, the Defense Department is no longer in a position of technological leadership. That represents a major change: Historically, DoD's needs drove technological development in key sectors, and industries such as computers, semiconductors and jet aircraft grew out of the hothouse environment created by (1) defense support for long-range, high-risk R&D and (2) DoD/NASA procurement of high-risk technology that was extremely expensive to develop.¹

Although defense spending continues to support development of key technologies, the rate at which innovation actually moves into volume production often trails well behind that of commercial industry. Moreover, DoD is no longer the dominant customer for high technology.² For both of these reasons, the defense technology base is increasingly dependent on developments in the larger and more dynamic commercial market.

Second, despite this growing dependence, the commercial technology base has become less and less accessible to DoD, both because of its rapid growth and because of a cumbersome, sclerotic defense procurement system that discourages many commercial firms from doing business with the Defense Department. The Carnegie Commission on Science, Technology and Government concluded that, "in effect, the United States has two technology bases, a defense technology base and a commercial technology base."

This segregation of resources is particularly inappropriate at a time of growing convergence between the underlying technologies that support military and commercial activities -- particularly electronics, software, computers, telecommunications and advanced

¹The importance of federal -- largely defense/space -- purchases in launching high-technology industries is illustrated by computer hardware. In the early 1950s, the government (including defense contractors) represented most of the market for computer hardware, and that share was still 30 percent in the mid-1960s.

²For example, 1964 DoD/NASA bought 85 percent of all the integrated circuits produced in the U.S.; today that figure is about [one] percent.

materials. This point -- often misunderstood -- bears repeating: Even though defense and commercial products often diverge, many of the underlying technologies are in fact converging.

To illustrate, advances in commercial electronics in the last ten years mean that the commercial technology is at least as rugged and reliable as its military counterpart. For example, a new car contains a computer chip, hard-mounted to the engine block, that can accommodate levels of temperature, vibration, and humidity that meet or exceed all military specifications. Moreover, the commercial chip is only one-tenth the cost of the comparable milspec chip.

Given the changing relationship between defense and commercial technology, reliance on an autarkic defense industrial base would have been problematic even had the Cold War continued. But with the declining military budget, the situation has reached crisis proportions. DoD's procurement budget -- spending on weapons and supplies -- is already down in real terms by almost 50 percent from its peak in 1986, and it is scheduled to drop even more. As the defense industrial base contracts, an ever larger share of DoD's budget goes to non-productive overhead.

The Dual-Use Technology Vision

As a nation, we no longer can afford to maintain two separate industrial bases. We must move toward a single, cutting-edge national technology base that will serve military as well as commercial needs. This "dual-use" strategy will allow DoD to draw more easily from the commercial sector to meet defense needs. It also will allow DoD's continuing investments in technology to contribute much more to our nation's commercial performance and economic growth.

By using components, subsystems and technologies developed by commercial industry wherever possible, DoD should be able to attain three compatible objectives.

- Shorten weapon system development times, increasing the pace at which innovation is incorporated into new defense systems. Introduce the commercial high-tech sector's continuous stream of improvements and updates during both the development and deployment phase.
- Reduce costs for procuring leading technology to satisfy military needs. Commercial components, technologies and subsystems in many instances can meet functional needs at lower costs than technology that is military-driven and customized.³

³A DoD-appointed task force recently concluded that commercial-military integration could, within four or five years, produce tens of billions of dollars of savings annually to the military. Report of the Defense Science Board Task Force on Defense Acquisition Reform, July 1993.

- Prepare for building back military capabilities. Close integration with the private sector is imperative if our nation is to be equipped to quickly gear up its capabilities.

To be sure, commercial technology will not work in all instances: conventional munitions and nuclear attack submarines, for example, require technology that is defense unique. But a great many defense needs can be served better and less expensively by commercial firms and facilities. Moreover, as flexible manufacturing systems are developed and more widely adopted, it will increasingly be possible to produce in a single plant both low-volume military equipment and equivalent high-volume commercial equipment.

"Dual-use" in this context does not refer simply to DoD purchase of commercial-off-the-shelf parts and equipment. Rather, it involves a fundamental shift toward dual-use R&D, equipment and operations. Generic technology must be consciously pushed to satisfy both civil and military needs -- for lower costs and higher quality, as well as increased performance. Moreover, future weapon systems must be consciously designed to use commercial parts and subsystems, and to be built in integrated facilities.

The three pillars that support this dual-use technology vision are: procurement reform; increased support for dual-use R&D; and international cooperation.

Reform Defense Procurement

The DoD procurement system is a web of laws and regulations adopted for laudable reasons. The aim of these laws and regulations is to ensure that competition is fair and the taxpayer is protected from waste, fraud and abuse. But the rules have led to a system that is overregulated, inflexible and incompatible with commercial practices. The system discourages firms from doing business with DoD -- resulting in fewer suppliers, less competition, and higher costs.

The consequences of this system are unacceptable. During the Gulf War the Army placed an emergency order for 6,000 Motorola commercial radio receivers. But because Motorola's commercial unit lacked the record-keeping systems required to show the Pentagon that it was getting the lowest available price, the deal reached an impasse. The impasse was resolved only when the Japanese government bought the radios and donated them to our Army.

To take a more routine example, Pratt & Whitney makes aircraft engines for military as well as for commercial customers. Although these engines incorporate sophisticated electronics, leading commercial suppliers such as Intel and Motorola will not partner with Pratt in custom technology development because they are unwilling to abide by cost-accounting standards and other defense-unique procurement requirements. (Motorola has a "Government Electronics Group" which adheres to these requirements, but it lacks access to the most advanced technology and production techniques found elsewhere in the company.)

To overcome these problems, DoD's procurement system must undergo a fundamental, top-to-bottom transformation. It is not enough to fine tune the existing system. It must be thoroughly redesigned to enable DoD to reach out and take full advantage of the inventiveness and efficiency of today's dynamic commercial market.

That is a tall order, and it is fair to ask why the Clinton Administration thinks it can succeed when every previous attempt at reform has failed or fallen far short of its goals. The answer is that the declining military budget gives us no other choice.

Congressional Reform. Significant changes in procurement law are necessary, if not sufficient, to redesigning the system. In October 1993, the President and Vice President called for legislation to fundamentally reform federal procurement, and the Administration subsequently worked closely with Congress to pass the "Federal Acquisition Streamlining Act of 1994". This bill -- which the President signed at a White House ceremony on October 6 -- is the most sweeping procurement legislation in XX years.

The Act provides for three statutory changes that are key to DoD undertaking the necessary reform. First, it makes it easier for the Defense Department (as well as other federal agencies) to buy commercial components, products and services. For example, under the new law, the Army will be able to buy commercial radio receivers without requiring the company to certify that it is offering the government the lowest available price. Even receivers that have been modified for DoD to handle encrypted information will be treated as a commercial product, because similar modifications are made for commercial customers.

Second, the reform legislation streamlines small purchases by raising the threshold for simplified acquisition procedures from \$25,000 to \$100,000 and by exempting purchases below this threshold from many government-unique requirements.

Third, the legislation gives DoD the authority to undertake several pilot programs that will allow the Department to test innovative approaches to acquiring commercial jet aircraft, aircraft engines and other items. These cost-saving innovations are critical to our ability to meet future military within our budgetary limits.

See Box A for a summary of the legislation.

BOX A
FEDERAL ACQUISITION STREAMLINING ACT OF 1994

The Federal Acquisition Streamlining Act of 1994 -- the most sweeping procurement legislation in XX years -- will reform the way the federal government buys \$200 billion worth of goods and services a year, from software to jet aircraft. The legislation could ultimately save the government several billion dollars a year -- much of that in the Department of Defense, which accounts for 75 percent of all federal purchases. Even more important, the reforms will make it easier for DoD to get access to cutting-edge technology that is available only in the commercial sector.

COMMERCIAL PRODUCTS. The Act makes it easier for federal agencies to buy commercial components and end-items, including commercial products that are modified to meet government needs, using standard business practices.

- The new law establishes a clear statutory preference for the acquisition by agencies of commercial items rather than items specially designed for the government.
- It exempts commercial goods and services from many statutory certifications and accounting requirements that serve as a disincentive for commercial firms to sell to the government.
- And it expands the scope of products and services that qualify for treatment as commercial items, thereby enhancing the government's access to components, end-items and services from the commercial sector. For example, the new law covers products that are based on evolving technology but that are not yet available in the commercial market.

By adopting commercial business practices and relying on the marketplace -- instead of the bureaucracy -- the federal government can get better value and greater variety, at lower cost to the taxpayer. This will also enable the military to get state-of-the-art commercial technology that is critical to developing future weapon systems.

SIMPLIFIED ACQUISITION THRESHOLD. The Act streamlines small purchases by raising the threshold for simplified acquisition procedures from \$25,000 to \$100,000 and by exempting purchases below this threshold from many burdensome requirements. The increase will make an additional 45,000 procurement actions valued at about \$3 billion eligible for simplified treatment. Purchases below \$100,000 (and above \$2,500) will be reserved for small business.

The Act also establishes a "micropurchase" threshold of \$2,500 to exempt truly small purchases from the small-business reservation and other requirements applicable to purchases below the \$100,000 threshold. Agency staff will be able to make such purchases directly, without having to go through purchasing offices.

PILOT PROGRAMS. The Act enables agencies to pilot test acquisition concepts that extend beyond those directly authorized. DoD pilot programs include commercial-derivative aircraft and aircraft engines, as well as joint direct attack munitions, joint primary aircraft training systems, and fire support combined arms tactical trainers. Under these programs, DoD can test the application to noncommercial products of any of the commercial product reforms in the Act. DoD also can apply the Act's reforms immediately, before they officially take effect.

BOX A (cont.)
FEDERAL ACQUISITION STREAMLINING ACT OF 1994

ELECTRONIC COMMERCE. The Act encourages agencies to conduct federal purchases through electronic commerce, to enhance competition, reduce administrative burden and increase access by small businesses. Agencies' authority to use simplified procedures for purchases between \$50,000 and \$100,000 will be tied to their ability to conduct procurement electronically.

BEST VALUE PROCUREMENT. The Act promotes best value procurements by enabling civilian agencies to award contracts to other than the low-cost bidder (an authority already enjoyed by the Defense Department).

Administrative Reform. Although legislative change is necessary, there is much that DoD must do administratively to reform procurement. Military-unique product and process specifications impose large costs on contractors and, ultimately, on DoD -- costs that are usually not justified.

For example, during Desert Storm, the Army needed a large number of global positioning system (GPS) receivers, to tell soldiers precisely where they were located on the battlefield. However, the milspec receiver cost \$34,000, weighed 17 pounds, and would have taken 18 months to procure. By going to the commercial market, the Army was able to buy GPS receivers that weighed three pounds and cost \$1,300. (Today, the same commercial receiver sells for about \$800.)

Consider also the example of shotgun ammunition. The leading U.S. manufacturer has the most efficient commercial factory line in the world -- three automated machines, each producing 240 rounds per minute, with quality control done automatically through statistical process control. The firm also supplies DoD, but military process specification requirements prohibit the use of the same machines for making virtually identical shells. Instead, the firm must follow antiquated procedures that require 12 machines, each manned, producing fewer than 100 rounds per minute in total. The company continues to sell to the military only out of a sense of patriotism.

Because stories such as this are far too common, DoD is moving aggressively to reduce its reliance on milspecs in favor of commercial specifications and standards. One June 29, Defense Secretary William Perry ordered a dramatic revision and simplification of the way the Pentagon buys its goods and key components and military systems. Secretary Perry's directive, based on a year-long study by a "process action team," calls on the military services "to use performance and commercial specifications and standards in lieu of military specifications and standards, unless no practical alternative exists to meet the user's needs." (See Box B.)

[Dual Use Technology Application Program]

The Challenge Ahead. Restructuring the defense procurement system will not be easy. It has taken us four decades to build up the barnacles on the procurement ship, and it will take a number of years to scrape them off. One thing is certain: success is essential to integrating our commercial and defense sectors and preserving our technology-based military advantage.

BOX B
SPECIFICATIONS AND STANDARDS: A NEW WAY OF DOING BUSINESS

**Remarks by Defense Secretary William Perry,
on release of his directive on commercial specifications, June 29, 1994:**

More than 100 years ago, Victor Hugo said that more powerful than the threat of mighty armies is an idea whose time has come. Integrating the defense industrial base into the national industrial base is an idea whose time has come....

I have just, this afternoon, signed a directive to civilian and military service leaders that directs them to use performance and commercial standards to guide our purchases in lieu of the lengthy, detailed military-unique specifications which we have come to call ... milspecs.

...When we say we're going to rely on performance standards, we mean that instead of relying on milspecs to tell our contractors how to build something, we're going to tell them what we want it to do and then let them build it to achieve that desired result.

For example, when we order jet engines, we'll tell our contractors how much thrust we want, how much durability we want, and let them decide how to build it. Through the use of commercial technology and off-the-shelf procurement, moving to performance specifications can save us up to \$700 million over the next two to four years for microelectronics in the Army's new training helicopter alone....

There will still, of course, be situations where we will need to spell out how we want things built in detail. In those cases we still will not rely on milspecs but rather on industrial specifications--the specifications used in industry. In those situations where there are no acceptable industrial specification, or for some reason they are not effective, then the use of milspecs will be authorized as a last resort, but it will require a special waiver.

In short, what we are doing is turning the present system upside down. Today a program manager is able to buy commercial products but he has to get a waiver to do it. He has to do it on an exception basis. In the future, he will be able to use milspecs but he'll have to do it on an exception basis.

[Milspecs] made sense when the DoD set the standard because none existed and when DoD and the defense industry were the leaders in advanced technology. But in the fields of technology most important to the Defense Department today--semiconductors, computers, software, telecommunications--the technical leadership is in [commercial] industry. If we do not accept their standards, we are not only paying the extra price needed to adapt their equipment and their technology to our requirements, but we're also buying a generation of delay in being able to get the equipment....

BOX B (cont.)

SPECIFICATIONS AND STANDARDS: A NEW WAY OF DOING BUSINESS

We have tried to move to commercial products in the past but with very limited success. This time it is different. The action we're taking today is different. It is a directive which calls for major change, but it is not just a directive from above. It is a clear, well thought out approach to reduce our reliance on milspecs. It addresses the impediments to success which we've faced in the past: the training, adequate funding to manage the transition to the new system, and, most importantly, a clear leadership commitment from myself and the services.

Bolster Dual-Use R&D

Lower defense budgets and the growing realization that economic and national security are inseparable means that defense research and development needs to focus more on dual-use technologies. DoD will no longer try to reinvent technology that already exists in the commercial sector. Rather, a new goal for defense R&D is to ensure that the American technology base remains at the leading edge in key strategic areas. This will require the Defense Department to learn to work more closely both with commercial industry and with the civilian research agencies to support the technological underpinnings of sectors critical to national security.

DoD has already taken the first steps toward reshaping defense R&D toward the dual-use agenda. The principal defense-wide agency for supporting research and development is the Advanced Research Projects Agency, or ARPA -- formerly DARPA, with the prefix of "Defense". At the direction of President Clinton, the agency dropped "defense" from its name as a visible symbol of the transformation to a dual-use agenda.⁴ ARPA is now undertaking an ambitious program of investment in a broad range of technologies that support important defense needs but also have considerable potential for commercial applications.

The Technology Reinvestment Project, a multi-agency effort managed by ARPA, is the largest and most visible of these initiatives. Unveiled by President Clinton in early 1993, the TRP has announced matching funds totaling \$620 million to more than 200 dual-use projects; these projects, selected purely on the basis of technical merit, involve more than 1,600 participants from industry, government and academe. In addition to supporting dual-use technologies in a wide-range of areas, the TRP has an instrumental mission -- namely, to stimulate the very process of integrating the military and commercial sectors: TRP technology development awards go primarily to projects that bring defense and commercial firms together in a single team; such teams provide a practical way of moving defense technology and talent into the commercial market, ultimately lowering the cost of that technology to DoD.

For example, DoD-funded diode laser technology has considerable potential for improving the manufacturing process for automobiles, aircraft, engines and ships, by enabling higher precision and greater tooling speeds than are currently available. High volume production of lasers for commercial use, will in turn reduce the cost of military applications, such as laser-guided munitions. The TRP project team includes the firms that supply and use that technology for military purposes, but it also includes the non-defense suppliers and users that want to adapt this technology for commercial application. (See Box C.) This partnering approach is far more feasible than efforts by defense firms to "convert" to commercial operation. (See section on Administration programs for more detail on the TRP.)

⁴ARPA was the original name of the agency, established in 1958. The word "Defense" was added in 1972, at a time when many Americans sought to limit the impact of the Pentagon on society. The name change was part of a effort to restrict DoD to research with direct defense application.

BOX C
TRP'S PRECISION LASER MACHINING PROJECT

The TRP's Precision Laser Machining (PLM) Consortium brings together defense and commercial firms to put the speed and precision of military laser technology to work in machine shops and manufacturing plants across the U.S. Manufacturing experts estimate, for example, that the new laser machining techniques can increase aircraft fuel savings by five to nine percent, by improving the uniformity of millions of microscopic holes drilled in airframes to reduce wind drag. High volume production of lasers for commercial use will lead to lower laser costs for all manufacturing uses, including production of ships, aircraft and other military equipment. It also will reduce the cost of battlefield applications, such as precision-guided munitions, countermeasures to defeat heat-seeking missiles, and remote detection of chemical and biological agents.

Lasers are highly focused beams of light that can deliver a large amount of energy quickly to a tiny, often inaccessible area with little or no damage to surrounding areas. They have proven effective in manufacturing applications such as high-speed welding of sheet metal for ships and automobiles, drilling of cooling channels in aircraft engines, and precision cutting of composites for lightweight airframes. However, most laser machine tools today use either carbon dioxide gas lasers or lamp-pumped solid state lasers, both of which have major limitations.

The PLM consortium will develop a new class of high-speed, high-precision laser machine tools using diode-array-pumped solid state lasers. Developed by DoD because of its greater precision and reliability for battlefield applications, this diode laser technology will be able to deliver:

- Brighter, higher quality laser beams that can target a work surface "spot" about one-tenth the size, with an energy density 100 times greater than current lasers;
- Higher peak power (25 megawatts versus the current 50 kilowatts) and higher average power (6 kilowatts versus the current 3 kilowatts for lamp-pumped solid state lasers);
- Smaller packaging (10-20 cubic feet versus 70 and 150 cubic feet for currently available lasers);
- Lower maintenance requirements (maintenance intervals of 10,000-20,000 hours versus the current 500-1000 hours).

For a broad range of defense and commercial products, these new lasers will be able to cut and drill holes faster, deeper, and more accurately; cut and shape a wider variety of composite materials; weld aluminum and other materials that dissipate heat quickly; and reduce the size of the heat-affected zone, allowing new and higher precision applications. For example,

- More precise drilling of cooling channels in aircraft engine turbine blades constructed of super alloys will allow the engines to operate 20 degrees cooler. This will double the life of military engines.

BOX C (cont.)
TRP'S PRECISION LASER MACHINING PROJECT

- Use of next-generation lasers to weld automobile bodies will mean a savings of \$185 per auto in materials and time; it will also reduce the weight of each auto by 45 pounds, which will increase fuel efficiency.
- PLM lasers, delivered through fiber optics, will make it possible to weld very large structures -- for example, deep penetration welding of double-hulled panels for military and commercial ships.

The PLM consortium, led by TRW, comprises 19 defense and commercial firms, including the technology developers (e.g., Fibertek, Hughes, Northrop, SDL and TRW); the tool integrators (Process Equipment Co. and Utilase Systems); end users of laser tools (Boeing, Caterpillar, Chrysler, Cummins Engine, Ford, G.E. Aircraft Engines, General Motors, Newport News Shipbuilding, TRW and United Technologies); and process developers (Edison Welding Institute, University of Illinois, and Pennsylvania State University). This vertically and horizontally integrated structure means that the products being developed will be fully responsive to user needs. The involvement of "tool integrators" -- two small firms that specialize in building laser capabilities into machine tools -- ensures that the products will be factory-compatible. The consortium plans to have its new laser tools ready for commercial use by 1996. According to L.N. Durvasula, the ARPA program manager who is overseeing the PLM project, the tools will be cost competitive with existing industrial lasers.

In addition to strengthening U.S. manufacturing capabilities in a range of industries, the PLM lasers can improve American competitiveness in the laser machine tool business itself. Lasers for industrial tools were first developed in the U.S. in the early 1960s, and American firms maintained nearly all of the world market in laser machine tools through the 1970s. Since then, however, U.S. superiority has slipped: Japan and Germany now control about two-thirds of the market. Among other things, that decline has reduced U.S. access to leading edge laser machine tooling technologies: according to a new study by the federal Critical Technologies Institute, it takes one to two years for the most advanced commercial machine tools from Japan and Germany to become available to U.S. firms.

In addition to encouraging teaming between defense and commercial firms, DoD is ensuring that commercial firms in this country can supply the superior technologies that will maintain our military advantage, by targeting investments in information technology, advanced manufacturing, advanced materials and other areas. This reflects a significant new goal for defense R&D -- to ensure that U.S. industry retains the lead in those commercial technologies that are critical to military capabilities.

DoD's dual-use R&D strategy will have a far reaching impact on the acquisition of defense systems. To illustrate, a few years ago, DoD pursued monolithic microwave integrated circuit technology (MIMIC) as a strictly military development, but the high costs prohibited widespread defense use of the devices. MIMICs are solid state devices that receive, transmit and process microwave signals; they are the eyes and ears of a wide range of military systems such as "smart" munitions. As part of the MIMIC program, DoD now promotes commercial applications -- in collision avoidance systems for automobiles, satellite communications, and air traffic control signal processing -- thus creating the prospect of affordable devices for defense. (See Box D.)

BOX D
A DUAL USE TECHNOLOGY
FOR FIGHTER AIRCRAFT AND SCHOOL BUSES

Betty Hougland believes that FOREWARN,⁵ the civilian sibling of a military technology, saved the life of a little boy who got off the school bus she was driving, and then disappeared from view.

Ms. Hougland, a ten-year veteran driver in Kokomo, Indiana, had stopped her bus at a busy stop where 16 children got off. She watched the chattering crowd move away, checked the mirrors that see into blind spots around the bus, and was ready to roll. Then the FOREWARN'S buzzer went off and red lights flashed on its screen, indicating that something was right in front of the bus, too close and too low to see. It turned out to be "a little guy, a kindergartner," said Ms. Hougland. He had dropped his backpack and spilled its contents, and had dived almost underneath the bus to pick them up.

The FOREWARN system makes use of MIMIC (millimeter wave and microwave integrated circuit), a semiconductor device built on gallium arsenide instead of the more familiar silicon, developed for military purposes by the Defense Department's Advanced Research Projects Agency (ARPA). For its advanced tactical fighter, the F-22, the Air Force chose a sophisticated phased-array radar based on MIMIC. There are 2,000 transmit-receive modules in a phased-array radar set, and every module originally cost \$8,000. That added up to a \$16 million price tag for the radar on every F-22.

The Air Force and ARPA worked with their contractors to reduce the price, brought it down below \$2,000, and expect it to drop further to a few hundred dollars -- assuming that production of the military device can be combined with high-volume production of a commercial version. A very large potential market could be automobiles, which might use the system for such things as safe following or cruise control. The Air Force could benefit greatly if a large commercial market materialized, since it could then have low volume access to a high volume line. However, the price is still high for the auto market.

One of the Air Force contractors is Hughes Aircraft, a subsidiary of GM Hughes Electronics. Delco Electronics, another subsidiary of GM Hughes Electronics, saw an important immediate market for a civilian version of the device. Every year, there are twenty-odd serious accidents and eight fatalities, on average, when children are run over by their own school buses. Obviously, it is worth a lot to avoid these accidents.

Delco's know-how in marketing and commercial production, combined with the MIMIC-radar technology that Hughes brought to the table, produced a system suitable for school buses. The system includes two radar modules and a display and can be sold at a fleet price of \$1,895. A Delco spokesman said the company is ramping up, and can soon produce enough FOREWARN systems to equip every school bus in the country, whenever school boards are ready to buy.

⁵FOREWARN is a trademark of the Delco Electronics Corporation.

**BOX D (cont.)
A DUAL USE TECHNOLOGY
FOR FIGHTER AIRCRAFT AND SCHOOL BUSES**

A special joint venture between Hughes and Delco, HE Microwave, produces both the school bus module and a fighter aircraft version on the same production line, with a changeover time of less than two hours. By using readily available commercial process technology and designing for manufacturability and easy testing, HE Microwave gained further cuts in the cost of both the civilian and military versions -- with no sacrifice in quality and reliability. High-volume production of a module for automobiles could bring economies of scale that would push costs down still further. HE Microwave is aiming for a production system that can make modules of various dimensions and performance characteristics with no time out for switching.

The cumbersome Department of Defense rules for procurement have not applied so far in this case, because the military purchases have been for demonstration purposes, not procurement. Reforms urged by the Clinton Administration and recently adopted by the Congress change federal procurement laws so as to give DoD much more flexibility in buying commercial products. In future purchases, the Air Force will be able to take full advantage of the commercial-military integration that is already reality on the production line.

As for Ms. Hougland, who has had FOREWARN on her bus for a year and a half, "I'm lost when I have to drive a spare bus without it." She says that driving a school bus can take all your attention, and more. "It's an extra set of eyes and ears for me. I love it."

Some of the dual-use technology initiatives now being launched by ARPA will yield significant, tangible payoffs by the end of the decade for America's industrial competitiveness as well as for national security. One initiative aims to perform massive computing tasks, that can be done today only on supercomputers, on computers scaled for personal use. This will revolutionize information processing. Over the next five years, new scalable computer architectures will make extremely powerful software applications available to a broad range of civilian as well as military users, giving them the analytical capability to solve highly complex problems. For example, this technology will be able to handle three-dimensional computer-aided design for manufacturing, analyses of genetic structures for medicine, and massive processing of transactions data for banks, airlines and other businesses.

Another initiative involves an all-optical network testbed that will lay the foundation for an information superhighway by interconnecting computers throughout the country. The ability to transfer high resolution images, full motion video, and massive amounts of data in real time will stimulate new applications in medicine, education and business. The information superhighway will open new opportunities for competitive success to U.S. firms and will give every household in America access to virtual libraries of information at the push of a button.

Dual-use initiatives in manufacturing technology emphasize affordability, flexibility and integration with the commercial sector. For example, multi-chip modules (MCMs) make it possible for electronics manufacturers to replace separate components with a single module. They allow electronic systems to achieve faster performance, greater reliability, lower power consumption, and lower production costs, and they open the door to a vast range of new products including global positioning systems, real-time engine controllers for automobiles, solid state recorders, and digital signal processors for speech and images in telecommunications. Use of MCMs in the new scalable computers should enable U.S. computer companies to advance computer performance by a generation. A high-performance dual-use manufacturing base for multichip modules can provide the foundation for U.S. economic leadership in information technology well into the twenty-first century.

To foster U.S. manufacturing capability in flat panel displays, a technology with increasingly important military applications, DoD recently announced a new interagency program. The National Flat Panel Display Initiative will continue the successful R&D effort in that technology now run by ARPA. It will add a second manufacturing test bed -- a facility designed to develop the knowledge base for high-volume production. Finally, it will add a targeted category of R&D for firms that demonstrate a commitment to high-volume manufacturing of displays.

This R&D incentive program is designed to support high volume production of flat panel displays in the U.S., with the goal of achieving 15 percent of the world market for displays by the year 2000. The program will be run as a competition based on technical merit, defense relevance and contribution toward a self-sustaining industry, regardless of the specific technology employed. (See Box E.)

BOX E
NATIONAL FLAT PANEL DISPLAY INITIATIVE

Success on the battlefield of the future will hinge on the ability to collect, collate, analyze and disseminate a torrent of information. Flat-panel displays, now seen chiefly in laptop computers, will be the primary means by which the combatant will dip from this river of data.

Because of this, the military needs early access to the latest generation display technologies, and it needs it while still in development in order to work out the battlefield and air combat tactics and strategies for their use. We need responsive suppliers who will customize commercially derived technology to produce displays that operate in both desert and Arctic temperatures, are readable in sunlight as well as night combat, offer extremely high resolutions, integrate specialized information processing capabilities and are available in nonstandard sizes. And it all must be affordable.

The key to making it affordable is the phrase "commercially derived." The flat-panel display market and technologies are driven by mushrooming commercial demands. Defense demand will ultimately be only a minor factor. The Defense Department can no longer afford to create defense-unique capabilities that depend on DoD programs for their survival. We have to benefit from economies of scale and keep up with leading-edge technologies. That means we must piggyback on commercial production.

So what's our problem? Currently, a handful of foreign firms dominate the flat-panel display industry, with over 90 percent of global production. The world's dominant flat-panel display manufacturer, the Sharp Corporation of Japan, is unwilling to work with DoD on its specialized requirements. With other producers, it's speculative at best.

Moreover, U.S. firms today show little potential for meeting critical DoD requirements if left undisturbed.

To fix this, the Administration recently proposed to make innovative new use of a tool used effectively in the past -- investment in R&D. The DoD-led National Flat Panel Display Initiative will make a portion of DoD R&D investment in future display technologies available only to companies that commit to domestic volume production for current generation products, and a commitment to support DoD display requirements.

This initiative does not subsidize production or attempt to "pick winners." Instead, it is technology-neutral and company-neutral. It does not attempt to substitute a government bureaucrat's judgment for the judgment of the "market." It does attempt to tip the balance in favor of production by supporting next-generation R&D by those already contemplating production. It is entirely reasonable for the Defense Department to join in developing technology for the year 2000 with those likely to be in a position to actually build products for DoD in 2000.

We already have a track record in flat-panel display technology. A U.S. company, for example -- with DoD R&D support -- has created what is by far the highest resolution flat-panel display yet unveiled. The DoD's problem is that little of this advanced technology has traveled off the laboratory bench and onto a production line, where it can ultimately be procured and used in U.S. combat systems.

BOX E (cont.)
NATIONAL FLAT PANEL DISPLAY INITIATIVE

Critics observe that "it's hard for government to improve consistently on the 'market.'" This observation is both correct and beside the point. Where market forces are at work, DoD is taking steps to support the choices of the market as to technology and production. Where there is no competitive market, DoD is acting to solve national security problems.

Perhaps these critics would be less concerned if they thought of this initiative as an insurance policy. If they're right, DoD will cancel the initiative before the premiums get too high. But if they're wrong, their prescription of doing nothing would be a disaster.⁶

⁶Adapted from an op-ed by Deputy Defense Secretary John Deutch, Washington Post, June 21, 1994.

Distributed simulation technology is another area with potentially high payoffs. This technology will appear in digital libraries, software authoring tools for multi-media computer-assisted training applications, and artificial intelligence techniques that can tailor training to individual learning styles. Now used extensively in military training, distributed simulation can also be applied to a wide range of civilian training needs in maintenance, medicine and technical education. Equally important in civilian and military environments, computer-assisted simulation technology will be an important element in the retraining needed to bolster flexibility of the work force and to open new job opportunities for displaced workers.

A special application of advanced computer simulation integrates live training with actual operations. In military applications, simulation displayed on a computer screen interacts with information coming in from the operations of real vehicles and weapons. This virtual reality training develops skills quickly and could be applied to such civilian activities as maritime navigation.

Expand International Cooperation

Technology today is global, flowing with relative freedom across national boundaries. Therefore, a third pillar of the new dual-use vision involves seeking greater access to cutting-edge foreign commercial technologies, components and subsystems, and manufacturing knowhow.

The Defense Department recently launched a major initiative to expand our technology cooperation with Japan. With a significant amount of U.S. defense technology now flowing to Japan, this effort seeks to bring about a compensating flow of dual-use technologies to the U.S. from Japanese commercial firms. For example, DoD has expressed interest in technology related to flat panel displays for use in cockpits, ceramics to make engines more efficient, and composite materials to make lightweight airframes.

This "technology-for-technology" initiative will foster company-to-company linkages that provide American manufacturers with access to Japanese component technology and manufacturing knowhow. These linkages will include joint research projects and technology licensing agreements between companies in the U.S. and Japan.

In Europe, we have recently proposed significant new initiatives to jointly develop military systems with our NATO allies. In an era of declining defense budgets worldwide, cooperative development programs can lower financial burdens for all participants. Although joint development programs sometimes involve additional expenses due to differences in language, culture and institutions, the gains from sharing development costs should be far greater.

In addition, by making weapons systems interoperable, U.S. forces can get allied support in foreign operations more easily and inexpensively, and can participate in the kinds

of joint operations that are increasingly likely in the post-Cold War world. Thus enhanced international cooperation should save both lives and dollars.

Conclusion

Technology, the key to America's Cold War military strategy, will be even more important in the unpredictable security environment we now face. For technology to be an effective bulwark, however, we must abandon our reliance on a separate and increasingly "ghettoized" defense industrial base. We must recognize that commercial industry, not the military, is the driving force behind most advanced technology today.

The Defense Department's new dual-use technology policy is designed to eliminate the artificial barriers built up over the years between commercial and defense industry. This will save billions of dollars annually in procurement costs and broaden the industrial base upon which defense can draw. Most important, it will provide DoD access to advanced technologies that are critical to developing future weapon systems.

More broadly, DoD's dual-use technology vision recognizes the need to link our economic policy and our military policy. That marks a departure from past practice, which treated national security and industrial competitiveness as separate, and often contradictory, goals. The strategy of commercial-military integration recognizes the growing commonality of these goals and takes a much needed step toward achieving it.

CHALLENGE #2: REGIONAL ECONOMIC ADJUSTMENT

The vision for the future is up to you. Our job is to give you the tools to build [that] future.

*President Clinton in Alameda, California
August 13, 1993*

The Problem: Regional Dislocation

The challenge of economic adjustment is twofold: to minimize the pain of military downsizing while promoting offsetting economic growth. In the President's words, "The men and women who won the Cold War must not be left out in the cold by a grateful nation." No adjustment plan can avoid the necessity for defense layoffs altogether, but bold action can limit the dislocation and speed the pace of economic recovery.

Although defense downsizing is national in scope, adjustment is troublesome mainly at the regional level. The defense industry -- like other sectors -- is geographically concentrated; a small number of regions (described by some as the "Gun Belt") bears the brunt of cuts in the defense procurement budget. Similarly, the impact of closing military facilities is felt primarily by the host communities.

Economic development specialists have long debated what is the best response to regional industrial decline. One strategy is to help workers move to growing regions that offer available jobs (workers-to-jobs). The alternative strategy focuses on helping the region recover so that it can create new jobs (jobs-to-places).

Although these two strategies are not mutually exclusive, the Administration's defense reinvestment initiative emphasizes regional revitalization, for several reasons. First, as discussed below, many defense-dependent regions have the potential to excel in global competition because they have advanced technological capabilities that will be hard for other regions to replicate. Moreover, preserving these regional capabilities -- the legacy of decades of DoD investment in technology and people -- is important to maintaining a strong industrial base for defense. Finally, developing new jobs and revitalizing the communities where displaced workers live avoids some of the pain of personal uprooting and community dislocation.

To achieve this revitalization, the Clinton Administration's defense reinvestment initiative combines substantial investments in critical civilian and dual-use technologies with more targeted support for defense-dependent workers, firms and communities. These programs -- many of them described in the second half of this report -- make possible locally-driven efforts to diversify defense-dependent economies, building on the often-strong regional capabilities in advanced technology. President Clinton expressed the importance of

this bottom-up approach to defense economic adjustment when he spoke to several thousand civilian defense workers at California's Alameda Naval Air Station last year. "Nobody knows better what kind of future you can build than your own people," said the President. "The vision for the future is up to you. Our job is to give you the tools to build [that] future."

Technology-Oriented Economic Development

At one time, economic development in most states meant "smokestack chasing" -- the zero-sum game of luring manufacturing plants from other states with the promise of lower taxes and cheap labor. However, a new, technology-oriented model of economic development is emerging that is directed toward enhancing existing businesses, developing new indigenous companies and products, and expanding into international markets. This new approach came out of core industrial states such as Pennsylvania, Ohio and Michigan, which hemorrhaged jobs in the late 1970s and early 1980s, but it is applicable to areas now losing defense industry.

The range of programs established by states as part of this new approach to economic development is broad, but three themes stand out. The first is support for technology-based business development. Obstacles to technology-based industrial growth include a research base that is too small to stimulate advanced technology growth within the regional economy; inadequate linkages between universities or research laboratories and local firms; and insufficient support for business start-ups as a way to commercialize new technologies. State efforts to address these obstacles include support for joint industry-university R&D, specialized technology transfer organizations, seed capital funds to increase the supply of risk capital, small business incubators and business assistance programs to increase the survival rate of high-tech startups, and training programs to assure access to a technologically sophisticated work force.

The most successful state technology programs share at least two features: they are comprehensive in scope and put industry in the driver's seat. Pennsylvania's decade-old Ben Franklin Partnership is a leading example. Each of the Partnership's four regional Technology Centers couples matching grants for industry-supported R&D with a broad range of cost-shared support services that link entrepreneurs and small firms with the technical and financial resources to promote their growth. Pittsburgh's Technology Center -- through its support for industry-financed research, grants to implement advanced process technology, entrepreneurial and training programs, seed capital funds, business incubator loans, a software entrepreneurs forum, and a CEO mentor program -- has helped that city's emerging high-tech sector grow at a more rapid rate. Most important, the Ben Franklin Partnership has changed the relationship between business and universities -- and the culture of university research -- by signalling to both sides the need for greater interaction.

Oregon's newly-established Wood Products Competitiveness Corporation also illustrates the principles of comprehensive scope and industry leadership. The Corporation provides a range of services to Oregon secondary wood products producers, including

marketing, training of workers and managers, manufacturing modernization, R&D, financing, and promotion of cooperative industrial networks. Service providers certified by the Corporation offer these services to individual firms as well as groups of firms. Industry co-funds the program and controls it through a management board.

Even as they pursue high technology, states have increasingly recognized the economic importance of small nuts-and-bolts manufacturing firms. Many of this country's 350,000 small manufacturers still use 1950s technology and practices; their shortcomings in turn reduce the global competitiveness of the large U.S. firms to whom they supply parts and equipment. To address this problem, some states have established programs to help smaller firms adopt manufacturing technologies and approaches that can significantly improve product quality, cost, and time-to-market. Although many of these programs are small and new, they have real potential to raise the performance of American manufacturers.

Cleveland's Advanced Manufacturing Program is a model. CAMP's extension agents -- most are engineers with years of experience in industry -- provide firms with various forms of assistance, from one-time advice on the purchase of advanced machinery to ongoing help with the adoption of stringent quality standards necessary to sell to the European Community. At its headquarters at Cuyahoga Community College, CAMP operates a demonstration facility where firms can test new equipment and software or get help with a knotty production problem. CAMP also runs a teaching factory at Cleveland State University where engineering students design and build production equipment for industrial clients.

The third theme that stands out in the new approach to regional economic development has to do with strengthening indigenous industry clusters. Firms in related industries cluster geographically, and almost every state contains at least one sectoral concentration, from autos in Michigan to light aircraft in Wichita to electronics and aerospace in California. Some clusters are more dynamic than others, however, resulting in greater investment, innovation and more rapid generation of new firms and new industry clusters.

Although states have had little luck in creating industry clusters where none existed, they have succeeded in nurturing and strengthening indigenous clusters. Rochester, New York, revitalized its optics and imaging industry after foreign competition led Kodak and other local firms to move substantial production overseas. Corporate and community leaders fashioned a recovery strategy that stressed significant public and private investment in advanced technology, educational reform, and collaboration within and between companies to share and improve nonproprietary technology. Kodak and other firms, together with the University of Rochester, spent \$23 million to develop OPTICAM, a calibration process that experts predict will give Rochester an edge in building sophisticated scanning devices and optical assemblies -- a major new market.¹

¹Andrea Gabor, "Rochester Focuses: A Community's Core Competence," Harvard Business Review (July/August 1991).

Another comeback city, Akron, Ohio -- formerly the tire capital of the world -- is now a leader in polymer research and production. Akron had an established scientific and manufacturing base in synthetic rubber, a form of polymer, and as tire industry employment dwindled, the region began to move into more exotic materials. State and local government sped the process through its support for the University of Akron's flagship College of Polymer Science and Engineering. To promote polymer research with strong commercial possibilities, the state in 1984 set up the Edison Polymer Innovation Corporation, a business-government venture based at the University of Akron and Case Western Reserve University in Cleveland. EPIC's highly specialized staff and facilities augment the expertise of the region's 1,200 polymer producers and suppliers.

The Growing Importance of Regions

The shift toward a technology-oriented model of regional development reflects broader developments that are transforming our economy: the globalization of markets, rapid technological advance, and the resulting reorganization of traditional manufacturing. Paradoxically, these developments mean that regional concentrations of industry are becoming more, not less, important as a source of competitive advantage. To oversimplify, the emerging world economy can be seen as a mosaic of specialized industry clusters which are nonetheless increasingly dependent on one another.

Industrial concentration alone does not provide sufficient advantage, however. There is growing evidence that the more successful regions combine intense competition with high levels of cooperation, through a relatively decentralized industrial system that encourages collaboration and collective learning among dense networks of input suppliers and specialist companies. By promoting widespread and shared investment in innovation, and by drawing on the resulting local knowledge and relationships to create new, high-value added products, these industrial regions have blurred the traditional boundaries between customers, suppliers, and competitors.

Flexible Manufacturing and Regional Clusters. International competition and the need for higher productivity are forcing significant changes in the organization of manufacturing. The new system -- known as "flexible manufacturing" or "lean production" -- is gradually replacing mass production, just as that replaced craft production, through its ability to increase productivity and quality while keeping costs down. New computer-based technology makes possible shorter production runs and more frequent product change, but the real key is fundamentally new organizational relationships both outside and inside the firm: close ties to the customer; collaborative relations between a manufacturer and its suppliers, with suppliers made part of new product design and development teams; continuing interaction between design teams and shop floor production teams to assure that products are designed for manufacturability; and decentralization of responsibility to workers, who are encouraged to find ways to regularly and continuously improve the process. These relationships replace hierarchy and vertical integration with cross-functional teaming and interdependency at all levels, allowing for a rapid and integrated response to changing consumer demands.

Relentless pursuit of quality -- getting it right the first time -- means that firms can reduce waste, minimize their inventories of replacement parts, and avoid the time and space devoted to rework.

With the gradual shift to flexible manufacturing, economies of scale and scope within firms are declining, and industrial clusters -- which capture external (or geographic) scale and scope economies -- are becoming a more important source of competitive advantage. Lead manufacturers are decentralizing production in order to enhance their flexibility; they are outsourcing work that used to be done in-house and partnering with outside firms, to access new technical know-how, and specialized equipment and skills. Much of the high-value-added activity is carried out in close geographic range, because proximity promotes the intensive interaction and mutual trust needed to sustain close collaboration.²

The reindustrialization of the Great Lakes region illustrates the important role of high-performance industrial clusters. Between 1977 and 1982, this eight-state region lost 15 percent of its manufacturing jobs, and many people predicted that the "Rustbelt" would lag farther and farther behind a new bicoastal economy. Today, there are clear signs of economic renewal, led by a relatively small number of world class manufacturing firms that are creating global competitive advantage through flexible production, low cost and high quality.³

One of these leaders is the Diamond-Star auto plant in Bloomington, Illinois. Diamond-Star is not a centralized mass production plant but rather the hub of a dense network of supplier firms, including tool and parts makers, engineers, electronic component manufacturers, and marketers, linked tightly in a region wide research, design and production network. Also among the region's leaders are Japanese transplants such as Honda that are

²The growth of specialized production is, in some respects, a return to an earlier era. Much industry in the 19th century was characterized by low internal economies of scale and scope; production occurred in complexes of specialized workshops, known as "manufactures," where skilled craft workers achieved a high degree of technological and commercial innovation. U.S. examples include the gun and machinery industries of Hartford and the Connecticut River Valley, the Massachusetts shoe and leather industry, and its neighbor, the New England textile industry.

The advent of large-scale mechanization in the late 19th century paved the way for mass production -- high-volume manufacturing of standardized, low-cost products using moving assembly lines, hierarchical systems of control, and a radical division of labor. With this shift, firms in many sectors of the American economy experienced rapid increases in scale and scope. An extreme example of the trend toward vertical integration was Henry Ford's River Rouge complex in the 1920s, which took in iron ore and coal at one end and dispensed Model T's at the other. Subsequent efforts by Ford and other durable goods manufacturers to differentiate their products resulted in greater reliance on independent suppliers of components, but competitive sourcing meant that relations with suppliers, much like those with workers, were arm's length and often antagonistic.

³"North America's High-Performance Heartland: Developing Sustainable Economic Advantage for the Great Lakes Region," Council of Great Lakes Governors (May 1994).

seeking to recreate the integrated regional supplier networks they were accustomed to at home.

Paradoxically, even as the Great Lakes auto belt is growing more specialized, it is becoming more tightly linked to other regional concentrations -- in steel, electronics and advanced materials. Overlapping supplier networks effectively tie these production clusters together, thus binding manufacturing companies (foreign as well as domestic) more tightly to the region.

Although world-class firms such as Diamond-Star and Honda are changing the economic landscape of the Great Lakes region, they are still the exception rather than the rule. The Center for Economic Development at Carnegie-Mellon University studied one quarter of the small manufacturing companies in Southwestern Pennsylvania and found that few of them had implemented modern manufacturing practices such as statistical process control, self-managing teams, and just-in-time inventories. The study faulted the larger, customer firms in Pittsburgh, which continue to emphasize arm's length relations and short-term price bidding rather than the development of long-term, supportive relationships with their suppliers. These larger firms (which, unlike the high-performance firms, purchase their most valuable inputs from non-local suppliers), "are hesitant to develop the mutual 'dependence' required for high-performance manufacturing to take root and flourish," the study concluded.⁴

Similar lessons about the sources of regional advantage come from a recent study comparing Silicon Valley and Boston's Route 128. AnnaLee Saxenian examines why, despite similar histories and technologies, Silicon Valley adapted successfully to intensifying international competition in the 1980s, while Route 128 ceded its longstanding advantage in computer design and manufacturing to the west. She concludes that Silicon Valley developed a decentralized industrial system that encourages collaboration and collective learning amid intense competition, whereas Route 128 came to be dominated by a few vertically-integrated, self-sufficient firms whose independence and isolation led them to overlook fundamental market shifts. (See Box F.)

⁴"Rebuilding America: Lessons from the Industrial Heartland," H. John Heinz III School of Public Policy and Management, Carnegie-Mellon University (December 1992).

BOX F
CULTURE AND COMPETITION IN SILICON VALLEY AND ROUTE 128

Annalee Saxenian's recent study comparing Silicon Valley and Boston's Route 128 provides dramatic lessons about the relationship between regional industrial organization and competitive adaptation.⁵ Both regions trace their origins to university research and military spending in electronics, and following boom years, both faced severe downturns in the early 1980s as the result of intense international competition. Defense downsizing in the late 1980s compounded the problem. But today, Silicon Valley is again flourishing while Route 128 continues to decline.

Saxenian, a professor of regional planning at the University of California, Berkeley, attributes Silicon Valley's success to a "network-based industrial system that promotes collective learning and flexible adjustment among specialist producers of a complex of related technologies."

The region's dense social networks and open labor markets encourage experimentation and entrepreneurship. Companies compete intensely while at the same time learning from one another about changing markets and technologies through informal communication and collaborative practices; and loosely linked team structures encourage horizontal communication among firm divisions and with outside suppliers and customers.

Despite similar roots to those of Silicon Valley, Route 128 in Boston developed as a collection of autonomous, vertically integrated firms, lacking social or commercial interdependencies, according to Saxenian. Route 128's autarkic structures -- vertical integration, proprietary standards, centralized organizations -- supported the manufacturing strategy of Digital Equipment Corporation and its local rivals during the 1970s, which was to churn out increasingly powerful minicomputers in large numbers at low cost (a strategy that became known as "pumping iron"). But as the pace of innovation in computers accelerated, these same structures became a severe constraint. By the early 1980s, many of DEC's internally manufactured products were technologically obsolete. Most damaging, the insular minicomputer makers -- focused on their rivalry with one another and disconnected from leading-edge suppliers and customers -- failed utterly to recognize the importance of personal computers and workstations. Despite a wave of corporate reorganizations, none of the Route 128 minicomputer firms managed to capture a significant share of those markets, and by the end of the 1980s, the West Coast had overtaken Route 128 as the locus of computer innovation.

These patterns suggest that regional policy will be "as important as macroeconomic or sectoral policies to ensuring industrial competitiveness in the 1990s," according to Saxenian. Since World War II, national macroeconomic and sectoral policies have been seen as the dominant levers affecting industrial and regional performance. But the shift to flexible manufacturing and regional specialization creates opportunities for exercising greater local influence on economic performance.

The challenges facing Route 128 and Silicon Valley mirror the challenges facing American regions and industry more broadly, Saxenian writes.

Large parts of American industry need to overcome the autarkic mind-sets and structures of an outmoded model of mass production. For these older industrial regions, the task will be

⁵Regional Advantage: Culture and Competition in Silicon Valley and Route 128, Cambridge: Harvard University Press (1994).

BOX F (cont.)

facing American regions and industry more broadly, Saxenian writes.

Large parts of American industry need to overcome the autarkic mind-sets and structures of an outmoded model of mass production. For these older industrial regions, the task will be to construct more decentralized industrial systems that encourage collaboration as well as competition. But even the newer industrial regions that boast elements of network systems will need to promote the local relationships needed to sustain collaborative -- and competitive -- advantage.

Globalization and Regional Specialization. The globalization of markets is a second reason that industrial concentrations are becoming more important, as Harvard Business School professor Michael Porter concluded from his study of competitive advantage in 10 countries and scores of industries.⁶ Global markets serve to make the basic factors of production -- raw materials, equipment, unskilled or semiskilled labor -- available to all firms on roughly the same terms. Higher-order competitive advantages such as proprietary production technology or a differentiated product require factors of production that are highly specialized to the needs of a particular industry and thus highly localized -- for example, a scientific institute in optics, a port designed specifically to handle bulk chemicals, or a pool of venture capital to fund software start-ups. Thus, paradoxically, in a world of increasingly global competition, regional assets are becoming more, not less, important.

Several other attributes contribute to competitive advantage, primarily through their effect on factor creation: a home market with sophisticated and demanding customers who give companies an early picture of emerging buyer needs; internationally-competitive supplier firms; and strong, local competitors whose rivalry creates constant pressure to innovate and improve. The presence of a cluster of related industries magnifies and accelerates the entire process, according to Porter, as "local universities take notice, specialized programs are created, institutes grow up, specialized infrastructure happens, and local suppliers get interested in investing."⁷

An industry cluster becomes more than the sum of its parts, quite literally, with one industry helping to create another in a mutually reinforcing process, as in Silicon Valley. And although clusters need not be geographically concentrated, they usually are, because proximity increases the concentration and flow of information and thus the likelihood of its being noticed and acted upon; at the same time, it tends to limit the spread of information outside because communication takes forms (such as face-to-face contact) which leak out only slowly. "If you're 500 miles away, you'll miss something," Porter said in an interview. "You need that stimulation; things are happening more quickly and are more linked. It's a supercharged environment."⁸

A Vision for Economic Adjustment: Defense Industrial Regions Competing Globally in Advanced, Dual-Use Technologies

Centers of defense industry, such as Southern California, Silicon Valley, and New England, can draw on highly sophisticated technological and industrial capabilities as the basis for rebuilding their economies. Their endowments include a flexible and adaptable network of subcontractors and specialized suppliers in machinery, metalworking, electronics,

⁶Michael E. Porter, The Competitive Advantage of Nations, New York: Free Press (1990).

⁷Washington Post, April 5, 1992.

⁸Ibid.

composites, advanced materials and other dual-use technologies that could provide the basis for new growth industries; a large pool of scientists and engineers, technicians and highly skilled blue-collar workers; and advanced R&D capabilities in universities and other specialized research institutes. With appropriate assistance (including major reform of the federal procurement system), many of these centers of defense industry have the potential to compete globally in emerging industries in environmental and biomedical technology, medical equipment, advanced transportation equipment and communication systems.

To elaborate, due to decades of DoD investment in advanced R&D and production capabilities, these networks of firms, people and research organizations have developed into specialized industrial agglomerations -- e.g., aerospace and electronics in Southern California, lasers and electro-optics in Orlando, or marine technology in Connecticut and San Diego. Such regional concentrations -- or "technology clusters" -- are becoming more, not less, important as a source of global competitive advantage, because their inter-firm networks, specialized labor markets, and technical expertise cannot easily be replicated elsewhere.

This vision of regional diversification does not assume that large defense prime contractors will "convert" to commercial production. Defense primes -- and defense divisions of commercial primes -- have a culture and skill base that ill prepares them for commercial competition; among other things, they lack marketing know-how and have limited experience in producing high-volume products at low unit cost. Recognizing their limitations, most defense prime contractors are steering clear of the kind of major investments in new commercial directions that got them into trouble in the 1970s.

However, several large defense firms are marketing non-military systems to civilian public agencies, where their experience in working for a government customer gives them an edge. Moreover, some primes are trying to enter narrow commercial markets directly -- often in partnership with commercial firms -- based on the technical similarities between their military products and potential niches in the commercial sector.

Finally, many smaller defense firms seem willing and able to redirect their activities from defense to dual-use or commercial markets. Although some of these firms will consolidate or liquidate in response to overall market conditions, their prospects are relatively good. Many of them are already dual-use producers, manufacturing sub-systems, components and production equipment that can be used for both military and commercial applications. Moreover, their level of technical sophistication is generally higher than that of purely commercial firms.

See Box G for a discussion of the limits to diversification efforts by large defense firms.

BOX G
DIVERSIFICATION EFFORTS BY LARGE DEFENSE FIRMS
WILL BE LIMITED

Most large defense contractors have a culture and skill base that is ill suited to commercial competition. They are adapted to the strict auditing and record-keeping requirements of the Department of Defense, to restrictive military specifications and standards, and to the lower-risk, if generally lower-profit, defense environment. Perhaps more important, they lack marketing know-how, and they have limited experience in producing high-volume products at low unit cost.

Recognizing these limitations, many large prime contractors are drastically downsizing and shedding employees. Others are selling off their companies, or major parts of them, to former competitors. And a few are buying and enlarging themselves, in the expectation that they will be able to get the lion's share of remaining defense contracts.

However, some large defense firms are energetically looking for civilian markets, usually for high-technology intermediate products based on their military product line. These products include electronic components and subsystems, and civilian applications of sensor and control technologies originally developed for military command, control, communications and intelligence. Generally, defense firms look first for customers in civilian government agencies or quasi-public bodies, for two reasons: defense firms understand best how to sell to the government, and public agencies' projects and contracts tend to be relatively large. Large-scale projects take advantage of the defense firms' abilities to organize and integrate complex production systems. In a few cases, large defense firms are directly entering commercial markets, based on technical similarities between their military products and product niches in the commercial sector.

Examples of diversification by large defense companies include:

- Martin Marietta makes mail-sorting equipment for the U.S. Postal Service.
- TRW's Space and Defense Sector is involved in a new multi-billion air traffic control system for the Federal Aviation Administration and makes tax-processing equipment for the Internal Revenue Service.
- Lockheed handles the collection of parking fines for the city of Los Angeles, and is involved in the dismantling of nuclear weapons. It also does contract maintenance for commercial airlines, and is designing small satellites for cellular phone networks.
- Hughes Aircraft manufactures avionics and video systems for commercial airliners, plus high-tech arcade games. The company is also involved in location-finding equipment for "smart cars," advanced car phones, and power systems for electric cars.

In some of these cases, companies are producing civilian goods and services in their old defense plants, with some of the same workers. Often, however, one division of the company will close while another, in a different location, takes up a new line of work. One defense company that has made an unusual effort to switch to commercial production at its same location, with many of its same workers, is Westinghouse Electric Corporation's Electronic Systems Group, mainly located in and around Baltimore.

BOX G (cont.)
DIVERSIFICATION EFFORTS BY LARGE DEFENSE FIRMS
WILL BE LIMITED

In 1986, 84 percent of the sales of the Electronic Systems Group were to the Department of Defense. Last year, DoD accounted for 70 percent of the Group's total sales of \$2.6 billion, and the forecast for 1994 is 65 percent defense and 35 percent non-defense. The Group's non-defense products are based on core competencies in sensors, computers, communications, data distribution and information processing -- mostly stemming from and still used in its military business.

Much of the Group's non-defense sales are to other federal agencies, with some additional sales to foreign governments (military as well as civilian). Westinghouse is the leading supplier of air traffic control radars to the FAA and is a strong seller of the same internationally. The company is a key participant in a consortium working to modernize the air traffic management system in Russia. Other important products sold to civilian government agencies are in law enforcement, including sensors for detection of drug smuggling, computer systems for police vehicles, and low-cost surveillance aircraft systems.

Products sold in commercial markets include advanced propulsion systems for electric vehicles, some of which, the company believes, are already affordable and competitive for transit, school bus, and fleet applications. Another new commercial market is residential and commercial security systems, based on sensor technologies and computer information systems. Also, Westinghouse is a major supplier of automated equipment to the Postal Service and to private mailing companies.

Employment at the Electronic Systems Group peaked at 25,000 in 1989, and is now about 15,000; that includes 1,550 employees added with the recent acquisition of an existing company, Norden. Employment in Baltimore peaked at 18,000 and is now about 9,500. Of the 8,500 jobs lost in Baltimore, 4,360 were actual layoffs; the rest were eliminated through attrition (including retirement and voluntary job-leaving). The company has no direct count of current jobs in civilian versus military production, because many of these activities are now integrated. But since 30 percent of sales were non-defense in 1993, a rough estimate of jobs on the civilian side is about 4,500 for the Group as a whole, and 2,850 in the Baltimore area.

Clearly, diversification into civilian activities in the Westinghouse Electronic Systems Group has not made up for all the job losses or the outright layoffs due to declining defense sales. Just as clearly, the increase in civilian activities has mitigated the losses, and is helping this division of the Westinghouse Corporation adapt to life after the Cold War.

In contrast to the large defense primes, small defense companies are far more willing and able to diversify into dual-use or commercial activities. These smaller firms typically manufacture sub-systems, components, and production equipment that are by nature dual-use, with applications in commercial as well as military spheres. Also, because many of these smaller firms have remained involved in commercial markets to some extent, their culture and skill base are reasonably compatible with commercial competition.

BOX G (cont.)
DIVERSIFICATION EFFORTS BY LARGE DEFENSE FIRMS
WILL BE LIMITED

However, it is not an easy matter, even for smaller defense companies with some commercial experience, to shift into largely commercial production. Small defense firms report that their biggest problems are in figuring out how to redesign their products for commercial applications, and how to get into new markets. Often, they need to change their company culture as well. For example, the Long Island firm Frisby Airborne Hydraulics shifted from 90 percent defense production in 1987 to 25 percent four years later. Frisby did it without any layoffs, but it took aggressive marketing and follow-up customer services from a new sales team, and a thorough change in management, from top-down to participative. The company offered workers cross-training in multiple tasks, flexible work shifts, profit-sharing, and a voice in cost-cutting and production improvements.

Impediments. Despite their leading-edge capabilities, defense industrial regions face sizable impediments to achieving this vision. For example, the traditional, arm's length relationship between most defense primes and their suppliers, and the adversarial relationship between labor and management, means that these regions often lack a culture of cooperation that contributes to rapid commercial innovation. Moreover, government-industry relations in defense-reliant states and regions are often distant, if not antagonistic; blessed with lucrative defense contracts in the 1980s, these regions failed to develop the kind of public-private partnerships that sprouted in other parts of the country. These gaps will slow the transition of defense-based regional economies into new, commercial industries.

More generally, the danger is that defense industrial regions will lose (or fail to realize the full potential of) their agglomeration advantages. The dynamism of an industrial hub depends on individual talents and assets, but also on qualities of the system as a whole. These jointly-held attributes are susceptible to market failure under the best of circumstances -- for example, when customer firms underinvest in a common base of suppliers. The system's ability to respond collectively is further reduced when key generators of economic activity -- in this case, large defense primes -- begin to contract.

Regional Defense Diversification. Several defense-dependent regions are beginning to overcome these impediments through collective strategies for diversification and industrial growth. Joint Venture: Silicon Valley, a broad-based consortium of local businesses, governments and educational institutions was formed in 1992 to "reinvent" Silicon Valley. The group's 1993 blueprint for action is based on a year-long assessment of which local industries are losing jobs (semiconductors, computers, defense), where the growth is occurring (environmental technology, bioscience, software and business services), and which regional problems require a collective response.

The heart of the effort is Smart Valley, Inc., and its spin-off, CommerceNet, a public-private initiative to electronically link businesses in Silicon Valley. Through computer simulations, customer firms will be able to take remote "test drives" of microchips and other components that have not yet gone into production. Hypertext software will make it possible to sort through product data or bid specifications and combine information from many computers on the network. The aim is to "help different companies work together as closely as if they were departments within the same company," according to Jay Marty Tenenbaum, CEO of Enterprise Integration Technologies Corp., project manager for CommerceNet.⁹ The broader goal is to develop the standards and software necessary for an "industrial-strength" electronic network that businesses everywhere can use.

Joint Venture: Silicon Valley is promoting the transition of local defense firms to indigenous commercial and dual-use markets in communication systems, advanced computing, and environmental and sensing technologies. JV:SV's Defense/Space Consortium

⁹Business Week, April 18, 1994.

is brokering partnerships with commercial firms; putting entrepreneurs in touch with critical financial, technical and business resources; and providing retraining and job placement for defense workers needing new skills to compete in the commercial marketplace. The region's planned electronic network, CommerceNet, will allow firms to gain on-line access to many of these resources.

Joint Venture: Silicon Valley is also pursuing opportunities associated with the closure of military facilities in nearby San Francisco and Alameda County. Paradoxically, the environmental cleanup problems on the otherwise valuable commercial property now occupied by the bases actually present an economic and technological opportunity, and area defense and environmental firms are collaborating to adapt lasers, sensors and other military technology for use in remediating these sites. JV:SV's broader environmental partnership of private companies, research organizations, governmental bodies, and environmental groups is looking at cleanup as both an urgent need in the region and a chance to create commercial markets for new, sophisticated environmental technologies.

Other defense industrial regions are developing broad-based visions and strategies for diversification. A public-private effort, Project California, has developed a statewide blueprint for industrial revitalization. Launched by the California Council on Science and Technology, Project California has identified six advanced transportation and communications technologies in which the state can build clusters of firms with a sustainable international competitive advantage: advanced telecommunications; intelligent vehicle and highway systems; mass transit vehicles and systems; electric vehicles; alternative fuel vehicles; and high-speed rail and magnetic levitation. Project California's action agenda includes several innovative proposals that would use the state's regulatory authority to help create new markets for these technologies and provide industry with information about what consumers want; one proposed policy would provide for reduced insurance premiums for consumers who invest in certain IVHS products.

Another key element of this blueprint is CALSTART, a California consortium that is working aggressively to create a new industry in advanced transportation systems, including electric and natural gas vehicles, advanced batteries, and an infrastructure for battery charging, servicing and recycling. CALSTART's members include aerospace and defense firms both large and small, utilities, transit agencies, local government entities, and labor and environmental organizations. The California aerospace industry's expertise in designing and integrating lightweight electro-mechanical products and systems gives the state a technological advantage over other potential international production sites. State universities and federal research laboratories have highly specialized knowledge in fuel cells, advanced batteries and related computer modeling techniques.

On a smaller scale, Southern New England (Massachusetts, Connecticut and Rhode Island) is pursuing a diversification strategy that builds on the region's strength in the emerging marine environmental technology industry. The New England Defense Adjustment Project (NEDAP) is working to link firms with separate capabilities in marine technology and

environmental technology, to pursue new market opportunities that call on their combined abilities.

The marine technology firms, many of them defense-dependent, have sophisticated technology that is applicable to growing commercial markets in water quality monitoring and treatment and underwater mining and oil exploration. For example, automated underwater vehicles might be used for undersea surveillance -- to monitor undersea pipelines, conduct seafloor mapping, explore sites for offshore drilling, and locate drums of toxic waste at undersea dumpsites; defense mapping equipment can allow for better mapping of contamination undersea; and military sensors offer improved capabilities for detecting toxic materials.

NEDAP is trying to build a "culture of collaboration" among firms that are not accustomed to working together. Among other things, it will provide modest financial incentives to networks of firms willing to work together to pursue specific market or technology opportunities. The project is also working with environmental officials from the three states to consider how regulations can best foster new markets. (See Box K for more detail on NEDAP).

These California and New England initiatives are just getting started, and it is too early to know if they will work. But they contain many of the elements of strategies that Eastern and Midwestern states developed in the 1980s -- strategies that by now have proved themselves.

ADMINISTRATION PROGRAMS FOR DEFENSE REINVESTMENT

A. Technology and Industry Reinvestment

Two-thirds of the Clinton Administration's \$22 billion budget for defense reinvestment is devoted to technology investments. Federal support for technology is central to meeting both challenges of defense downsizing: commercial-military integration, and regional economic adjustment.

Technology Reinvestment Project

A cornerstone of the Administration's defense reinvestment and conversion initiative is the Technology Reinvestment Project.

The TRP's mission is to **"stimulate the transition to a growing, integrated, national industrial capability which provides the most advanced, affordable, military systems and the most competitive commercial products."** Simply stated, the TRP's mandate is to accelerate the process of commercial-military integration in order to ensure DoD access to cutting-edge, affordable technology.

Toward this end, the Project awards matching federal funds, on a purely competitive basis, to three types of activities:

- **Technology Development**, to create dual-use product and process technologies that meet both military and commercial needs;
- **Technology Deployment**, to help small firms, particularly small defense firms, compete in commercial markets and achieve world-class manufacturing standards;
- **Manufacturing Education and Training**, both to retrain defense engineers/technicians for commercial industries and to reorient engineering education to the manufacturing industries of the future.

A fourth activity area, Regional Technology Alliances, cuts across the first two; the goal is to foster industry clusters with an international competitive advantage in critical dual-use technologies.

The TRP is being implemented jointly by a six-agency council representing the Departments of Defense (chair), Commerce, Energy and Transportation, the National Science Foundation and the National Aeronautics and Space Administration. The Project's FY93 budget was \$477 million, with FY94 spending increasing to \$554 million. The President has requested \$625 million for the Project in FY95.

TRP Strategy. The TRP is part of DoD's larger effort to maintain U.S. military advantage through continued technological superiority. The program seeks to preserve defense access to critical technologies, even where the DoD can no longer afford to be the primary investor. It reflects the realization -- key to the Administration's dual-use vision -- that much of the same advanced technology required by defense has great commercial potential and thus can attract private sector investment and expertise.

Technology is not the ultimate objective of the TRP, however, but rather the means to stimulate fundamental change through integration of the defense and commercial industrial bases. Most important, the TRP seeks to attract commercial firms as risk-sharing partners, in order to reduce the time and expense required to develop technologies critical to defense.

Toward that end, the TRP strongly encourages the formation of partnerships, or consortia, that bring defense and commercial firms together on a single team. Such teams provide a practical way -- more feasible than direct "conversion" of (large) defense firms -- of moving defense technology and talent into the commercial sector.

Strong Industry Response. The 1993 TRP drew a powerful show of interest from American industry, following its announcement by President Clinton in March 1993. A special 1-800-DUAL-USE hotline, set up to handle TRP inquiries, received 35,000 calls. The TRP office distributed 55,000 copies of its program information package, known as the "Red Book". More than 7,000 people in all attended 19 regional TRP briefings.

In its first call for proposals, with a July 1993 deadline, the TRP received 2850 proposals, requesting \$8.5 billion in federal funds -- more than 17 times the amount available. Those proposals involved more than 12,000 participants, including firms, universities, federal laboratories and state and local governments from all 50 states and the District of Columbia. A separate competition for \$7.5 million in Small Business Innovation Research, or SBIR, grants elicited another 2400 proposals.

Merit-Based Selection Process. **The TRP selection process was entirely merit-based.** More than 300 technical experts from the TRP member agencies and other federal agencies participated in the evaluation of proposals. The process was set up to ensure a thorough, fair and competitive evaluation. On average, a proposal was reviewed by six technical experts.

On October 22, 1993, the President announced the first round of 1993 TRP awards; three subsequent rounds were announced on November 24 and December 3, 1993; and February 23, 1994.

The four rounds announced federal matching funds totaling \$605 million; these awards are going to 212 projects involving 1,600 firms, universities and other participants. **The total size of the projects leveraged by these funds is \$1.45 billion.**

Because of the large number of excellent proposals received in the FY93 competition, the TRP opted to pay for some of them using FY94 funds. In this way, **the TRP was able to announce awards to all of the 1993 applicants that were rated "highly recommended"** in the evaluation process.

On March 25, 1994 the TRP announced 1993 SBIR awards of \$15 million to 153 small businesses.¹⁰

(See Box I for descriptions of a few of the projects selected for TRP matching funds.)

Indications of Success. Although it will take months or even years to measure the results of the 1993 TRP, several indications of success are already apparent.

Enthusiastic Response to Complex Solicitation: Despite the complexity of the TRP solicitation (eight statutory programs, each with its own requirements), the response was enormous: requested funds exceeded available funds by a factor of 17 overall, and by as much as 30 or 40 for some of the technology development programs. Moreover, many of the proposals were excellent.

Another indication of applicants' enthusiasm was the quality of the matching funds they committed. Of the roughly \$9 billion in matching funds committed by applicants, **\$3 billion was in cash.**

Finally, applicants committed more than the 50 percent match required by law. On average, successful TRP projects contributed 58 percent of total project costs, thus reducing the necessary federal match to 42 percent. Stated differently, each federal dollar is leveraging \$1.40 in non-federal investment.

Significant and Unique Collaboration: The TRP competition stimulated an enormous amount of collaboration and alliance-building both within industry and between industry, universities and federal laboratories. (As one participant told Technology Transfer Business, the TRP "forced a lot of people...to rethink relationships.") Many losing teams confided that they had gained from the process, and some teams said they would proceed even without federal funds.

Two aspects of the TRP collaboration are particularly notable. First, technology development proposals brought together teams that are well-integrated, both horizontally and vertically; a typical winning team includes a large defense prime, a large commercial prime, one or more small firms, and a university or federal lab.

¹⁰The TRP solicitation for SBIR grants advertised \$7.5 million in matching federal funds. Because so many firms responded, ARPA added \$7.3 million of its own SBIR funds to the federal pot, for a total of \$14.8 million.

Second, despite the requirement for matching funds, small firms were well represented as participants, if not as sponsors, in TRP proposals: Nearly 60 percent of all technology development proposals selected for funding include at least one small firm.

See Box H for a description of different types of defense–commercial partnerships, and the role of small and large firms in these partnerships.

BOX H
TRP TECHNOLOGY DEVELOPMENT TEAMS TAKE DIFFERENT PATHS
TO COMMERCIAL-MILITARY INTEGRATION

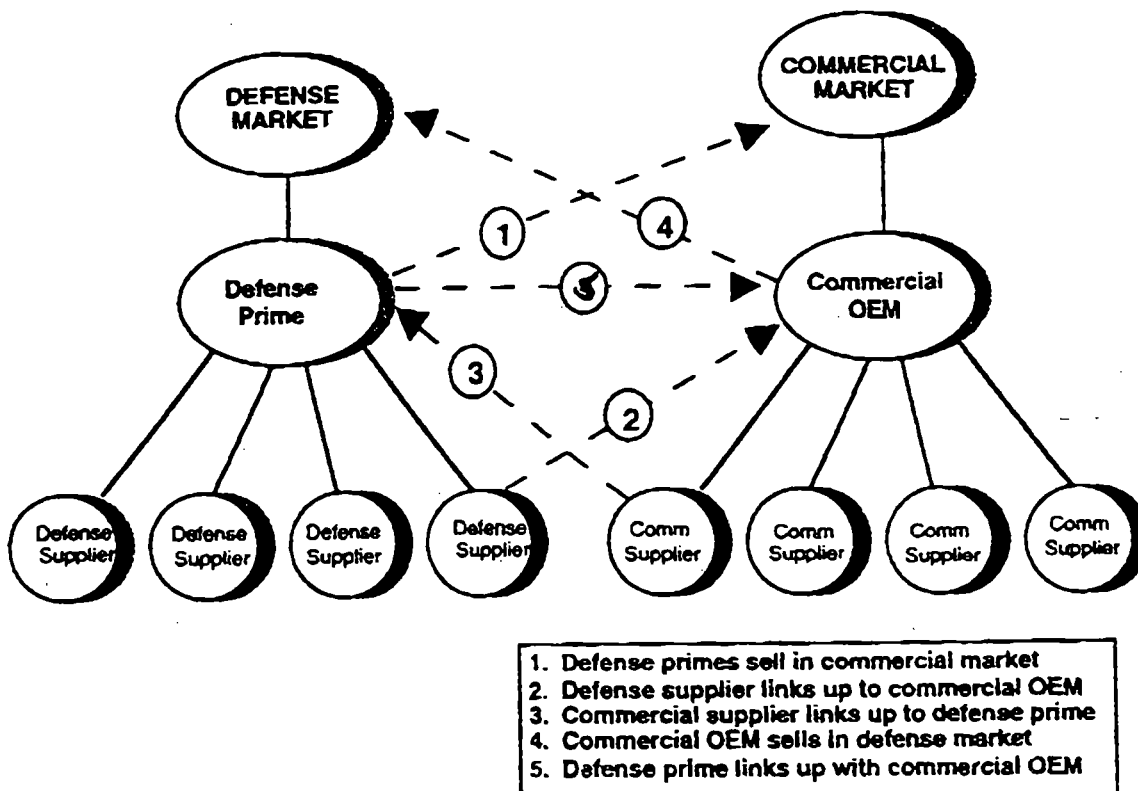
The TRP selected three types of technology development projects:

- "Spin-off" projects that preserve DoD access to critical technologies by creating or enhancing commercial markets for them;
- "Spin-on" projects that demonstrate the military utility of existing commercial technologies;
- Dual-use projects that develop new technologies with commercial as well as military application.

Prospective applicants were encouraged to form partnerships that combined commercial and defense expertise and resources on a single team, and 80 percent of the winning teams displayed this combined expertise.

Figure 1 below depicts the different approaches to commercial-military integration being taken by TRP teams:

Figure 1



BOX H (cont.)
TRP TECHNOLOGY DEVELOPMENT TEAMS TAKE DIFFERENT PATHS
TO COMMERCIAL-MILITARY INTEGRATION

MODEL #5: Defense Prime Partners with Commercial OEM. Under this approach -- which was the most prevalent among winning TRP teams -- a defense prime contractor and a commercial OEM (original equipment manufacturer) join forces to pursue dual-use opportunities that neither is likely to succeed at alone. Such efforts (which usually include one or more supplier firms as well) often involve the adaptation of a defense technology for the commercial market, thus lowering the cost and increasing the odds that the technology will remain available to DoD. The Precision Laser Machining project (Box C) illustrates this approach.

MODEL #4: Commercial OEM Targets the Defense Market. Under this approach, a commercial OEM, on its own, invests R&D funds to modify its commercial product for sale to DoD. Not surprisingly, this approach is almost non-existent among winning TRP teams: the defense market is smaller and less reliable than the commercial market, and it requires commercial firms to meet cumbersome procurement requirements. Rather, commercial OEMs that participated in the TRP almost always teamed with defense primes (Model #5).

MODEL #3: Commercial Supplier Partners with Defense Prime. This model addresses partnerships between defense prime contractors and small companies with dual-use capabilities but little, if any, defense experience. For defense primes, such partnerships provide access to a robust (and potentially more efficient) supplier base and an introduction to commercial practices. However, partnerships of this type fared less well in the TRP competition, in part because commercial suppliers often lack direct access to commercial markets -- a role that has traditionally been assumed by their commercial OEMs.

MODEL #2: Defense Supplier Partners with Commercial OEM. Model #2 blends the technologies and capabilities of the defense supplier base with the market expertise of a commercial OEM. It also provides defense suppliers with a more secure customer base, which can make the difference between continuing to serve defense and going out of business. Like Model #3, this approach has a potentially high payoff for DoD, but its prevalence among successful TRP teams was limited, in part by the difficulty small defense firms had in meeting the TRP's cost-share requirements.

MODEL #1: Defense Prime Targets the Commercial Market. In this model, a defense prime, on its own, applies its core competencies to commercial market opportunities. This represents the traditional view of "defense conversion" approach; the probability of success is relatively low because defense primes face two obstacles to penetrating commercial markets: identifying realistic market opportunities and changing the defense-oriented business practices that pervade their organization. Examples of this approach among TRP teams are rare and tend to focus on highly selective assistance to firms that offer marketable product ideas, based on technologies that are closely related to important defense requirements.

BOX H (cont.)
TRP TECHNOLOGY DEVELOPMENT TEAMS TAKE DIFFERENT PATHS
TO COMMERCIAL-MILITARY INTEGRATION

SMALL BUSINESS

Not depicted in Figure 1 are teams led by small firms -- either defense or commercial. Although several winning TRP projects fit that description, most proposals led by small firms were deficient. Specifically, many small technology-based firms lack commercialization and production know-how, and their proposed teams often did not include other firms with compensating expertise. Similarly, proposals led by small firms often featured technology that was unconnected to a product or a customer. Overall, small firms did best in the TRP competition when they were participants on teams led by defense and commercial primes.

Small supplier firms will benefit from prime-led projects, even if they are not formal participants. Defense primes typically "bring their subcontractors along" when they partner with commercial firms; this arrangement provides a flow-down of funds and commercial expertise to the defense suppliers, while preserving the traditional prime-subcontractor relationship.

To improve the ability of small companies to participate, in the future the TRP will:

- recognize SBIR awards as part of small firms' cost-share;
- give small firms 120 days following an award announcement to come up with their share of matching funds;
- provide outreach to small firms to help them with financial as well as non-financial obstacles to participation.

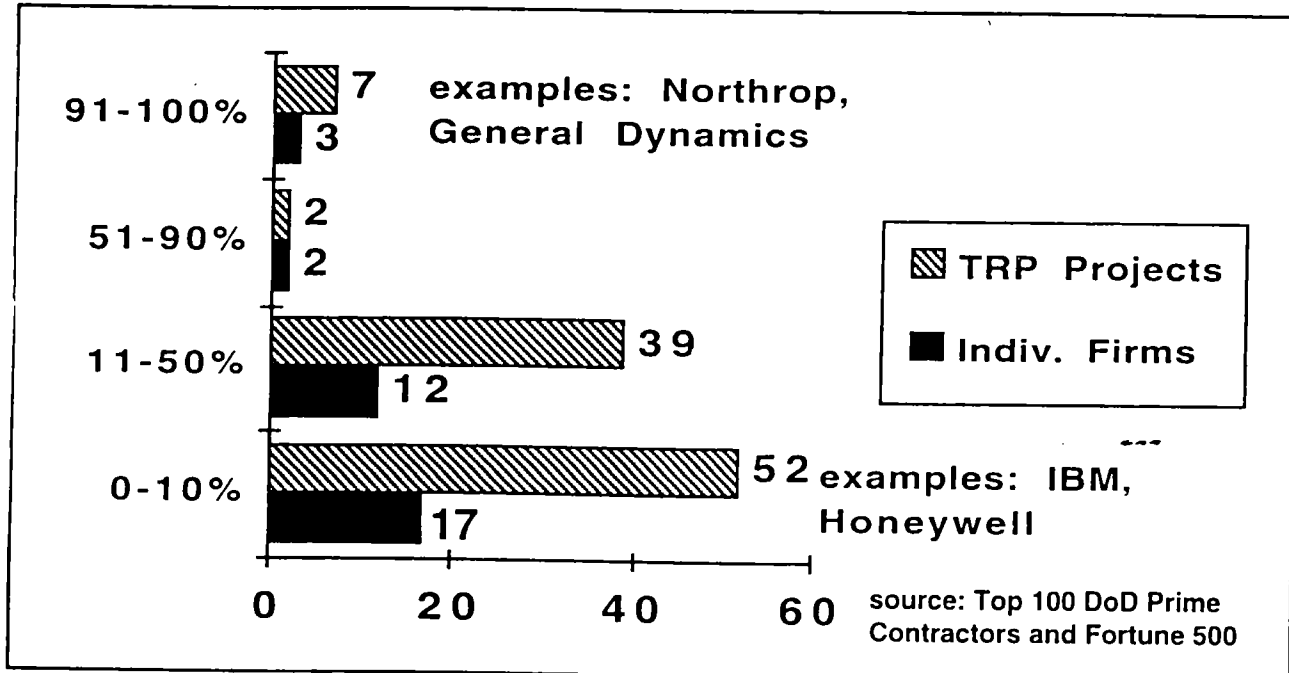
LARGE FIRMS:

Because of the program's emphasis on commercial-military partnerships, large firms that did well in the TRP competition are characterized by relatively less dependence on the military (see Figure 2 below). For example, 17 firms with less than 10 percent of sales to DoD won TRP awards; those 17 firms won a total of 52 awards. By contrast, only 3 firms with more than 90 percent of sales to DoD were on winning TRP teams, and they accounted for only 7 awards. In short, the TRP is dominated by large commercial and diversified defense firms.

BOX H (cont.)
TRP TECHNOLOGY DEVELOPMENT TEAMS TAKE DIFFERENT PATHS
TO COMMERCIAL-MILITARY INTEGRATION

Figure 2

Distribution of TRP awards by Percentage of DoD Sales



Active Participation by State and Local Governments: State and local governments responded aggressively to the opportunity to partner with the federal government in support of grass-roots programs. State and local agencies committed significant amounts of matching funds, and several states set up their own preliminary competition in an effort to identify the strongest proposals. Inspired by the TRP, several states also established separate defense diversification grant programs.

Unprecedented Collaboration Among Federal Agencies: The TRP produced an unprecedented partnership among agencies within the federal government. DOD got the benefit of the other agencies' expertise in civilian technology applications, while the non-defense agencies got valuable exposure to military technologies with potential relevance to their mission needs. For example, the Department of Transportation is now looking at increasing its funding to adapt advanced composites for construction of bridges and roads. Cooperation among the agencies outside of the TRP has increased, as a result of their greater awareness of one another's activities in dual-use technology. Of lasting value, the civilian agencies have begun to adopt ARPA's more streamlined approach to funding R&D, including greater flexibility toward intellectual property rights.

Lessons Learned. Based on feedback from the TRP's 1993 competition, two key areas require improvement: First, the TRP must improve the success rate of proposals in order to reduce the bid and proposal costs incurred by firms and other applicants. (The TRP estimates that industry invested more than \$100 million in proposal preparation and partnering.)

One response to that problem, reflected in the 1994 solicitations, is to target some funds to particular, well-defined technology focus areas. (This approach, the one traditionally used by ARPA, has other advantages -- primarily the ability to tackle a major technological challenge through a structured set of interlocking projects.) Second, the TRP is conducting more outreach to prospective applicants, including day-long workshops on each technology focus area. Third, prospective teams will be encouraged to submit "white papers" for review, prior to preparing a full proposal.

Second, the TRP must also improve the ability of small companies to participate. Provisions in the FY94 defense authorization act permit small firms to use SBIR grants as part of their cost-share. In addition, small firms will have up to 120 days following the announcement of an award to come up with their share of the matching funds. Finally, with its Fall competition, the TRP will be announcing an outreach effort to small businesses, designed to help reduce obstacles to their participation in the program.

1994 Program. The Clinton Administration is committed to improving and expanding the TRP. Program staff have been conducting workshops around the country both to provide feedback to 1993 applicants and to solicit ideas for improving the program. The TRP held several two-day workshops to help participants form and maintain R&D partnerships.

The 1994 agenda calls for two competitions. The first, referred to as the "focused

competition," solicited technology development proposals in seven dual-use technology focus areas:

- High Density Data Storage Systems
- Object-Oriented Technology for Rapid Software Development and Delivery
- Interoperability Testbeds for the National Information Infrastructure
- High Definition Systems Manufacturing
- Low Cost Electronic Packaging
- Uncooled Infrared Sensors
- Environmental Sensors

The six agencies participating in the TRP worked closely with industry to define these technology areas, based on (1) military need, (2) dual-use potential, and (3) link to national priorities; the agencies also took into account gaps in the 1993 TRP program and compatibility with ARPA's broader dual-use investment strategy. In addition, the TRP is soliciting proposals to establish manufacturing deployment centers to work directly with smaller manufacturers, particularly small defense firms that need assistance to compete in commercial markets.

The focused competition was announced on April 8, 1994. During April and early May, the TRP held workshops for industry on each of the seven technology-focus areas, as well as two workshops on manufacturing deployment. The formal solicitation was issued on May 20, with proposals due on June 30.¹¹ Awards totaling approximately \$175 million in FY94 funds will be announced this Fall.

A second, more general competition will be announced this Fall. It will address a broader set of dual-use technology development focus areas (proposals outside of those areas will also be eligible), as well as regional technology alliances, manufacturing education and training, and Small Business Innovation Research. This competition will award approximately \$[500] million in matching funds, including a significant share of FY95 funds.

¹¹Federal agencies are limited in the kind of communication they can have with industry once a formal solicitation for proposals is issued. For this reason, the TRP delayed the solicitation until after it had conducted extensive outreach to prospective applicants.

BOX I¹²

PROJECTS SELECTED FOR TRP AWARDS: TECHNOLOGY DEVELOPMENT

- **Amerinex Artificial Intelligence of Amherst, MA, is leading an effort to commercialize computer-vision technology originally developed for NASA. The technology will enable robots to see and understand objects on the manufacturing floor, recognize license plates at toll booths, and distinguish tumors from organs in medical images. Commercialization of this technology will improve performance and lower the cost for military robotics sensing applications, including unmanned vehicles/aircraft, health care and manufacturing. (\$18.4 million)**
- **Martin Marietta of Moorestown, NJ, will lead an effort to develop a new airport radar system that can detect hazardous weather conditions while simultaneously monitoring air traffic. Commercialization of this technology, first developed for the Navy, will enhance civilian air travel safety and also meet military needs in tactical ballistic missile defenses and airborne fire-control systems. (\$16.2 million)**
- **The University of California, San Diego, and an industry team will demonstrate the use of corrosion-resistant, lightweight composites -- developed for advanced military aircraft -- for repair and replacement of the nation's aging bridges. A bridge column wrapped with this material withstood the recent Los Angeles earthquake, and project members are already working with the State of California on retrofit and reconstruction efforts. Advances in this technology will improve the military's ability to construct lightweight, mobile bridges. More important, development of a commercial market for high performance polymer composites will preserve a critical part of the defense industrial base for future military needs. (\$21 million)**
- **San Francisco's Bay Area Rapid Transit (BART) and Hughes Aircraft will develop an advanced automated train control system. The system will identify the precise location of each train, even in tunnels, thus allowing trains to operate closer to one another. The result will be a doubling of transit carrying capacity with no additional infrastructure. This location-capability is also directly applicable to battlefield operations. (\$39 million)**

¹²Dollar values shown represent the total estimated cost of the project; federal share, still to be negotiated in some cases, is generally 40 to 50 percent.

BOX I (cont.)

PROJECTS SELECTED FOR TRP AWARDS: TECHNOLOGY DEPLOYMENT

- **The Cleveland Area Manufacturing Program (CAMP) will target its extension services to 600 defense-dependent firms in northeastern Ohio. Using a range of training programs and state-of-the-market manufacturing facilities, the project will help these small and mid-sized defense suppliers improve their competitive performance and get into commercial markets. (\$6.7 million)**
- **The Edison Welding Institute in Columbus, OH, will lead an industry-based Alliance for National Excellence in Materials Joining. The Alliance will package and disseminate materials-joining technology (e.g., welding and composites-joining knowhow) as well as provide training and technical assistance to 150,000 firms nationwide with emphasis on defense-impacted regions. (\$7.6 million)**
- **Silicon Valley electronics leaders (Hewlett Packard, Intel, Sun, Apple, National Semiconductor, and Texas Instruments) will create an Internet-based network for "electronic commerce." The goal is to revolutionize the Valley's core electronics, software and information service industries by facilitating interactions between these firms and their customers and suppliers. (\$8 million)**
- **An Orlando, FL, project will turn sophisticated training technologies developed for the Navy to commercial purposes. The project will introduce simulation-based training into commercial applications, and at the same time reduce the cost of these training technologies for the military, by developing a dual-use market. (\$4.6 million)**
- **A team led by the American National Standards Institute in New York City will develop an electronic network to link databases of hundreds of organizations involved in the development, production, distribution and use of technical standards in the U.S. This network will significantly reduce the time and cost of standards development and facilitate industry access to regional, national and international standards. (\$4.9 million)**
- **The GreatLakes Composites Consortium of Kenosha, WI, will establish an advanced technology center in Cerritos, CA, to transfer composites manufacturing technology to 16,000 small defense and commercial firms in the Los Angeles basin. (\$1.4 million)**

BOX I (cont.)

PROJECTS SELECTED FOR TRP AWARDS: MANUFACTURING EDUCATION & TRAINING

- **The University of California, San Diego, in partnership with Alcoa Electronic Packaging and Hewlett Packard, will offer displaced defense engineers a two-year master's program in World Class Manufacturing Engineering. Drawing on UCSD's strength in international studies, this new degree will emphasize foreign language training and include a nine-month internship in an international manufacturing firm. (\$5.2 million)**
- **Cornell University and Corning will develop a practice-oriented course in modern manufacturing to be offered to master's students in engineering. This 15-credit course will require total immersion by students for a full semester. (\$450,000)**
- **A partnership of the Massachusetts Biotechnology Research Institute, Worcester Polytechnic Institute and the University of Massachusetts, Lowell, will retrain defense engineers to meet the needs of Massachusetts' growing biotechnology and biomedical industries. (\$2.8 million)**
- **Northeastern University has teamed with industry to train "change agents" from among mid-level defense engineers. The engineers will form teams with university faculty and engineers in other firms, to move new technology to the prototype stage. (\$2.6 million)**
- **The University of California, Los Angeles, with support from 30 local firms, will retrain defense workers for manufacturing jobs in the area's microfabrication industries (microelectronics, computers, telecommunications and biomedicine). (\$6.2 million)**
- **Three universities (Central Florida, Connecticut, and Texas at Austin) have teamed with the International Society for Optical Engineering to establish programs to retrain defense workers for photonics manufacturing. (\$4 million)**
- **Pennsylvania State University, working with IBM, Ford and other industry partners, will launch a new master's degree in quality and manufacturing. The degree -- a joint venture of Penn State's colleges of business and engineering -- will expose 45 students each year to real-world manufacturing problems. (\$1.2 million)**

The High-Performance Work Place

Companies making the shift from defense contracting to the commercial world need to apply the same lessons that civilian manufacturers have arduously learned over the past few years, and are still learning. To succeed in a world full of able competitors, companies must produce better goods at lower prices and get them to market faster, responding quickly to changing customer demands.

Modern manufacturing equipment can help firms meet the commercial market's tough demands for productivity, quality, and flexibility. But attention to human factors is just as essential, perhaps even more so. In the late 1980s, the International Motor Vehicles Program, directed by the Massachusetts Institute of Technology, found that, on average, Japanese auto assembly plants were turning out cars in two-thirds the time it took the average U.S. plant, with less than three-quarters of the defects. The Japanese advantage was not in more robots; some U.S. plants that had spent far more on automation were not even the best U.S. performers.

Factors in the stunning success of the Japanese auto industry were much more complex. They reflected an approach to the whole system of putting ~~cars together~~ that has been dubbed "lean manufacturing." This involves such things as ~~close~~, collaborative relations between the assembler and its suppliers; design for manufacturability, ~~with continuing~~ interaction between design teams and shop floor production teams; ~~dedication to~~ quality and getting it right the first time, rather than keeping large inventories for replacement of shoddy parts, and doing re-work at the end of the line; and a ~~commitment to continuing~~ improvement -- a constant search for ways, big and small, to do things ~~better~~.

An essential part of the lean manufacturing system ~~is the~~ productive use of people. Shop floor workers are thoroughly trained in multiple job skills, including higher level skills of problem solving and communication, and are given broad responsibility for finding and fixing problems. Layers of management are reduced. Famously, every blue collar worker has the authority to stop the line. But worker training in statistical process control and diligent management attention to running quality problems to ground should make it a rare event to stop the line.

The High-Performance Work Place, building and expanding on the human factor principles of lean manufacturing, is a U.S. vision for a more productive, collaborative work place. It emphasizes a flattened, simplified organization, with expanded roles for front-line workers. It gives workers more say as well as more responsibility in how work is carried out, in quality assurance, and in relationships with suppliers and customers.

Training goes beyond broad job skills to high-performance transformation skills, such as benchmarking the current organization, technology, and skills against the best of the competition, and evaluation of alternative technologies and training systems. Cross-functional teams that develop such advanced systems as concurrent engineering include

production workers. And worker or union participation is expected in the design of jobs, the organization of work, and the selection of new production technologies.

The Office of the American Work Place in the U.S. Department of Labor is committed to spreading high-performance ideas and practice widely in American industry. It is just as applicable to many service jobs, which predominate in the U.S. economy, as to manufacturing. And it is particularly applicable to firms that are making the transition from defense to more commercial production. A proactive adoption of high-performance work place practices can help firms to turn themselves into able competitors in the commercial market place and avoid layoffs of defense workers.

The Department of Labor has funded a few demonstration projects that are testing ways to avoid layoffs in defense firms through training of incumbent workers, and training of managers as well. These demonstrations are making use of high-performance work place principles. Box J (below) describes a demonstration project of this kind in Massachusetts, involving a dozen small defense firms.

A similar program is getting underway at AM General Corporation in Indiana, under the joint sponsorship of the company and the United Auto Workers Local 5. These partners are engaged in a collaborative effort to adapt the celebrated HUMVEE, a multi-purpose vehicle originally designed for the U.S. military, to new military and non-military uses. The company has already sold a limited number of civilianized HUMVEE models to luxury customers. The hope is to improve the vehicle further, lower costs, broaden the market, and avoid layoffs not only at AM General but also among its network of about 50 supplier firms in northern Indiana and southern Michigan. Employees of these supplier firms, as well as the 850 shop floor workers and 300 managerial employees at AM General, will be selected for training in high-performance work place skills.

Application of the high-performance work place concept to defense companies that are major suppliers for DOD could have still broader benefits. It could improve quality and lower costs for military purchases, strengthen the companies as defense suppliers, and at the same time improve their abilities in dual use production and their chances to compete successfully in civilian markets.

DOD has responded positively to a proposal by non-profit Institute for Work and Learning and a consortium of industry and labor organizations to establish demonstration projects for high-performance systems in several key defense plants. Members of the consortium include the International Association of Machinists, the United Auto Workers, the United Steelworkers, the AFL-CIO Industrial Union Department, and Corning and Xerox, two non-defense companies that have several years' successful experience in high-performance work place systems. Defense firms will be added to the consortium as the project gets underway.

First application of the concept could be in the Lean Aircraft Initiative. This initiative

was conceived at the Air Force's Wright Patterson Laboratories; is sponsored by the Air Force Manufacturing Technology program (MANTECH), with funding of \$600,000 per year; and is operated by MIT's Center for Technology, Policy, and Industrial Development, which directed the 5-year International Motor Vehicle Program, identified the lean manufacturing paradigm for auto assembly, and described it tellingly in the book *The Machine That Changed the World*.

The Lean Manufacturing Initiative is applying these same principles to air frame and aircraft engine manufacture. Twenty-one companies are participating in the project, including all the defense companies and divisions making aircraft for the military, major aircraft engine companies, and principal suppliers of airplane components and avionics. Two unions (IAM and UAW) are included on the MIT Advisory Board together with representatives of the participating companies and DOD.

MANTECH and MIT are committed to including high-performance work place concepts in the Lean Manufacturing Initiative, and MANTECH is providing financial support for participation by the consortium. Another avenue open to the consortium is the Agile Manufacturing program sponsored by ARPA and the National Science Foundation. Proposals for agile manufacturing demonstration projects were invited last spring, with projects to be selected competitively. The high-performance work place approach is entirely compatible with agile manufacturing, and could add an extra dimension to it.

B. Community Redevelopment

Although local businesses and organizations must take the lead, there are federal programs that can help communities get back on their feet after a defense industry cutback or a military base closure. These programs, combined with the Technology Reinvestment Project described above, and programs for workers described in the next section, provide funds for regional and community-based efforts to foster business development and promote economic revitalization.

Office of Economic Adjustment

The federal agency with the most experience and the most direct responsibility for aid to defense-dependent communities is the Office of Economic Adjustment (OEA) in the Department of Defense. OEA was created in 1961 to help communities cope with military base closures, and that has been its traditional role. Typically, OEA helps communities organize a planning group, provides a planning grant, guides the group through government requirements for base closures, and helps it develop plans for reuse of the base. Until recently, OEA was small, with no more than two dozen employees and a budget of about \$4 million a year; its strength has been in flexibility and quick response.

With the end of the Cold War, OEA's responsibilities have expanded to include help for communities hit by closings and cutbacks of defense plants; the agency is currently working with 81 communities that are home to bases scheduled for closure, and 11 communities affected by closures or downsizing of defense plants. OEA's budget in FY94 is \$39 million (up from \$29 million in 1993), and President Clinton has requested a similar amount for FY95.

In addition, OEA is now authorized to help communities plan in advance for coping with expected cutbacks in defense spending, before they become a reality; the agency had pre-planning activities underway in seven communities in Spring 1994. Kitsap County, Washington, for example, is exceptionally dependent on the Puget Sound Naval Shipyard and two Navy submarine facilities. These naval facilities employ about 24,500 people -- 35 percent of the county's total civilian work force of 82,800 -- and there is little in the way of non-defense business to support the region's economy. OEA's Advanced Planning Grant to Kitsap County is enabling local organizers to work on two projects: planning for a business incubator facility, and a plan for revitalizing downtown Bremerton, the county's largest town.

OEA also has new authority to go beyond planning. It can provide support -- up to 90 percent of the cost -- for state and local adjustment programs that, in turn, support business planning and market exploration services for defense firms that want to modernize and diversify. However, demands for OEA's planning services are great enough that they take up most of the agency's funds and staff time.

Economic Development Administration

The Economic Development Administration (EDA) in the Department of Commerce has much broader authority and more funds for carrying out redevelopment plans in defense-dependent communities. EDA's roots are in the 1960s and 1970s, when it undertook numerous large-scale projects to spur the development of lagging rural areas or redevelopment of rundown city neighborhoods. However, throughout the Reagan and Bush Administrations, EDA barely survived; it was repeatedly marked for extinction in Presidential budgets, but then rescued (at much reduced funding) by Congress.

Concern in Congress for defense-dependent communities led to a revival of EDA's Title IX Sudden and Severe Economic Dislocation program, which is now the main source of funds for these communities' economic recovery efforts. Beginning in FY91, Congress gave EDA \$50 million in multi-year defense funds, specifically targeted to defense-reliant communities, and added \$80 million more in FY93; EDA received \$80 million in FY94 funds to devote to defense reinvestment. Of that \$210 million, EDA has obligated \$[134] million and informally committed nearly all of the remaining \$[76] million. Because there is a large unmet demand for EDA's defense reinvestment funds, President Clinton has called for a significant increase in that figure -- to \$140 million -- in FY95.

EDA has a wide assortment of redevelopment tools at its disposal. Its traditional activities include setting up revolving loan funds for local businesses, building industrial parks and business incubators, and constructing access roads to industrial facilities. In line with newer approaches to economic development, EDA can also arrange to provide services such as manufacturing modernization, assistance with new product design and commercial marketing, and worker training linked with new technologies. This "best practice" approach is especially useful in communities that have lost defense industries and are trying to grow other businesses to replace them.

During the 12-year period when it was starved for funds and repeatedly threatened with extinction, EDA lost staff, esprit, and institutional know-how. Under these handicaps, the agency lost the ability to respond promptly and effectively to distressed communities seeking redevelopment help. In 1990, the median time for EDA to approve a community's grant proposal was 198 days, and the mean was 292 days; 18 month delays were not unusual.

With new leadership under the Clinton Administration, the agency is taking energetic steps to improve response time and quality. In September 1993, EDA started a pilot grant application process for defense diversification projects with the goals of faster action, better quality, greater accountability, and improved customer satisfaction. Three of the nine projects in the pilot were approved by December, and all but two had gained approval by March. EDA is currently evaluating its new process, as a basis for improved service in the future.

In FY95, EDA will launch its "Competitive Communities" program, focusing primarily on regions hurt by defense downsizing. "Competitive Communities" will be a targeted

programmatic initiative designed to help these economically-distressed areas build a new economic foundation through partnerships that foster high-growth, globally competitive firms and industries. This approach, among other things, provides a link between the Administration's technology programs and local economic development efforts.

The "Competitive Communities" program (like other EDA programs) will fund not-for-profit intermediaries; EDA's funds, matched by other public and private funds, will be invested in high-growth business opportunities that would not otherwise receive financing. The funds will be provided on flexible terms -- including loan guarantees -- through partnerships between community institutions and those businesses that will form the economic base of the future.

The "Competitive Communities" program will depart from other EDA programs in several ways. First, projects will be selected competitively, so that the strongest and most innovative proposals receive funding. Second, the selection criteria will direct resources to generators of competitive commercial activity rather than to enablers of industrial development such as public infrastructure -- EDA's traditional approach. Finally, EDA will evaluate these activities on the basis of the quality of jobs created, not just the quantity.

Military Airport Program

A more specialized source of help is the Military Airport Program in the Department of Transportation. Its purpose is to ease the way for transferring to civilian use military airfields that are slated for closure. Funded at \$42.3 million in FY94, with a request for the same amount in FY95, the program pays for airport planning and capital improvements (e.g., for runways, taxiways, terminal gates and parking lots) for twelve current or former military airports per year.

Small Business Administration

Beyond the federal programs that are targeted to helping defense-dependent communities are others of more general application that could still be of use. Some of the more promising are to be found in the Small Business Administration (SBA). SBA's guaranteed loan program is one source of financing for the business expansion that is at the heart of economic redevelopment. SBA generally can guarantee up to \$750,000 of a loan made by a bank to an approved small firm; the guarantee averages 80 percent of the value of the loan, and interest rates are competitive.

Demands for SBA guaranteed loans are heavy. In 1992, loan authority ran out before the end of the fiscal year, so that small defense firms wanting to use the program for diversification purposes had to get in line and wait for supplemental funding -- approved later in the year. The Clinton Administration has worked to augment SBA loan guarantees to meet the demand from well-qualified small businesses. Funding authority was increased from \$5 billion in FY92 to \$6 billion in FY93, and \$7 billion in FY94. The Administration

has proposed to increase it to \$9 billion in FY95.

SBA's latest innovation is its GreenLine program, which will establish a five-year revolving line of credit for working capital -- an acute need for many small defense firms trying to shift their product line and get into commercial markets. The plans are to dedicate about \$500 million of the FY95 loan guarantee authority to the GreenLine program.

Another SBA activity, the "Section 504" Certified Development Company (CDC) program, is targeted more specifically to community economic development. A CDC is a public/private non-profit entity that can fund loans to small businesses by the sale of SBA-guaranteed debentures worth as much as \$1 million to private investors. Proceeds must be spent for fixed assets, including land, buildings, machinery and equipment. The chief purpose of a CDC must be to promote the growth of businesses and jobs within its region. The Administration's FY95 budget includes \$2.3 million for the CDC program.

In addition, the SBA is using its authority in creative ways to help defense-dependent communities make a comeback. The agency established a small business information center outside of Pratt & Whitney's plant in East Hartford, Connecticut, with links to all of SBA's programs and services. As a result of this Pratt-supported effort, former employees have started 20 new businesses, and many other Pratt workers have found jobs in the small business community in Connecticut and elsewhere. On Long Island, where small defense firms have had trouble getting bank loans for diversification, SBA and the State of New York are establishing a program that would allow SBA to review and pre-qualify loan applications. Under the Long Island project, New York would also piggyback its loan guarantee program on SBA's, to permit larger loans to receive the maximum guarantee protection. [Refer to description of \$50 million "Dual Use Diversification Loan Program".]

C. Worker Training and Adjustment

Defense Industry Workers: EDWAA

People losing jobs in defense plants have a great deal in common with workers displaced from commercial industries. Whether the plant closings or mass layoffs are in steel, computers, logging, or defense, the effects in disrupting people's lives are very much the same, and the help that government can offer follows a similar pattern. However, the government has a special responsibility and owes a special debt to the workers who contributed so greatly to winning the Cold War. The Clinton Administration is committed to prompt, effective delivery of re-employment and retraining services to defense industry workers who lose their jobs, as well as to streamlining and greatly improving the fragmented, confusing system that serves all displaced workers.

Of course, the best remedy for worker displacement is economic growth that opens opportunities for productive new jobs. But even in good times, the majority of displaced workers need more targeted help. Reemployment and retraining services tailored to their needs can make a real difference for many workers, helping them find jobs sooner at better pay, or make better choices for training, than they are likely to do on their own. Adjustment services cannot erase all the pain of losing a good defense industry job, but experience over the past 25 years has shown that well-planned, well-run programs can definitely help.

The main federal adjustment program for displaced workers is Title III of the Job Training Partnership Act (JTPA), created in 1982 and amended and renamed the Economic Dislocation and Worker Adjustment Assistance (EDWAA) program in 1988. Displaced defense workers can receive services under the general EDWAA program, which Congress funded at an all-time high of \$1.1 billion for FY94 (up from \$517 million in 1993), in response to the Administration's request for a much improved, expanded training program for all displaced workers. Earlier, Congress had also provided special, multi-year EDWAA funds amounting to \$225 million, that are targeted to workers losing defense jobs and provide some extra benefits not otherwise offered under EDWAA.¹³ Eligible workers include displaced civilian employees of the Department of Defense (for example, people losing jobs in military base closures) and veterans involuntarily discharged from the armed services, as well as workers losing jobs in the private defense industry. However, ex-service members have many other adjustment services to call on besides EDWAA (the GI Bill for education and training is an example) and the same is true, though to a lesser degree, of civilian DoD employees. For defense industry workers, besides unemployment insurance, EDWAA is the major source of help.

¹³The Defense Conversion Adjustment (DCA) program, enacted in 1990, provided \$150 million for EDWAA services to displaced defense workers; these funds are available through FY1997. The Defense Diversification Program (DDP), enacted in 1992, provided another \$75 million, available in FY93 and FY94.

A range of services is available to displaced workers under EDWAA, including:

- Personal and financial counseling
- Testing and skills assessment
- Job and career counseling
- Job search skills training, including resume writing and interviewing skills
- Placement assistance, including job development (scouting local employers for jobs that are not publicly listed) and matching job openings with suitable job seekers
- Many forms of training, including remedial education, entrepreneurial training, and on-the-job training as well as training in occupational skills
- Out-of-area job search and relocation assistance

EDWAA is wholly financed by the federal government, but the States and local agencies actually operate the program. The federal role is largely one of oversight and guidance. Under the leadership of Secretary Robert Reich, the Department of Labor is dedicated to improving the federal role. EDWAA's performance has been rated as moderately effective over its 11-year life, but critics have repeatedly called attention to two major shortcomings: in most States, the response to layoffs has been too slow, and participation has been low -- ranging from about 5 to 9 percent of eligible workers. These shortcomings are related. Workers are much more likely to take part in a project that is ready at the time of layoff than afterward, when they are dispersed and discouraged. Moreover, peak demand for help in finding or retraining for a new job usually comes in the first few days after layoff. Rapid response to layoffs is the hallmark of effective service; energetic oversight, technical assistance and information sharing by the Department of Labor can help States and local agencies to achieve it. Under the Clinton Administration, the Department has improved its own record of fast response to requests for discretionary funds that the Secretary controls, and is working with States to help their Rapid Response Units achieve faster, more effective action.

An extra benefit for defense-dislocated workers is extended income support for workers in training who have no other adequate family income ("needs-related payments"). The general program under EDWAA allows these payments, but in practice very few displaced workers have received them. Under the Defense Diversification Program, needs-related payments are mandatory for displaced defense workers in training whose family income is below the official Lower Living Standard Income Level.¹⁴ As of March 1994, three grants totaling \$17 million had been approved under DDP.

Another program element added by Congress for displaced defense workers is demonstration projects that are meant to avoid layoffs or to train people for new occupations and enterprises in innovative ways. Under EDWAA generally, services are reserved for people who are already out of work or have received termination notice, but some of these projects are retraining workers before the end of a weapons program. Others are helping firms shift to nondefense production and training workers in new production methods. Still others are linking retraining with innovative new enterprises; one of these is training California defense aerospace workers for jobs in CALSTART, a non-profit consortium focused on advanced transportation technologies, including electric vehicles (described in more detail in a previous section). Altogether, nineteen of these projects, funded collectively at \$8.5 million, are underway. Box H describes one of these projects.

From January 1993 to the end of June 1994, the Labor Department granted \$124.6 million for 73 projects targeted to 37,630 displaced defense workers. Forty-one of these projects, funded at \$55.9 million, were designed to serve 22,121 workers displaced from the private defense industry; the rest were for DoD civilian employees.

In March 1994, the Clinton Administration proposed legislation -- the Reemployment Act of 1994 -- to streamline, combine and greatly improve the fragmented system that now serves displaced workers through six separate programs. A worker seeking help will not have to qualify as losing a job on account of clean air programs, or trade, or defense cutbacks. Rather, there will be a comprehensive system of reemployment services, training, and income support for all permanently laid-off workers, no matter what the cause of displacement, in a program that builds on the best of the existing programs. Entering the program will be simpler, benefits will be more generous, and information to guide career and job choices will be more easily available.

¹⁴The Lower Living Standard Income Level (LLSIL) is above the poverty level, but is still extremely modest; the poverty level is 30 percent below the LLSIL. For example, if the official poverty level for a family of four is \$14,000, the LLSIL is \$20,000. Needs-related payments for displaced defense workers may bring the family income up to the level of unemployment insurance or to the LLSIL, whichever is higher.

BOX J
THE MASSACHUSETTS STRATEGIC SKILLS PROGRAM
A JOB-SAVING DEFENSE DIVERSIFICATION STRATEGY

Beginning early in 1993, a dozen small and medium-sized defense firms in Massachusetts took part in a retraining project for managers and workers, to help fit them for competitive performance in the world of commercial production. It was an uphill climb for most of them -- especially the managers -- but it was worth it. Near term measures of success, such as faster cycle times, reduced scrap, and shorter setup times, all point to positive achievements of the demonstration project. And by early 1994, two of the firms had already found new commercial customers and were adding workers. A third planned to add workers once it gets financing to expand.

The project was supported by a \$367,000 grant from the U.S. Department of Labor (DOL) and carried out by the Massachusetts Industrial Services Program (ISP), which is responsible both for assistance to small companies that need help to stay alive. The project is part of a small DOL defense conversion demonstration program that is testing ways to avoid layoffs in defense firms, and to create new job opportunities for defense workers.

Suzanne Teegarden, ISP Director, explained the goals of the project as 1) creating a learning environment in the companies; 2) providing broad training that both fits the company's needs and helps make the workers more generally employable. Teegarden emphasized that training for shopfloor workers is not enough. Company managers must be trained as well. And every company that took part had to start with a strategic plan for getting into commercial business.

The training was based on up-to-date concepts of the high-performance work place, involving team building, worker responsibility and participation, cross-training for flexible work teams, continuous improvement, and management that relies on leadership, not top-down command. Training also included occupational skills such as good basic reading and math, advanced measurement techniques, and computer literacy and applications, and management skills in quality issues, financial resources, and new product planning.

The high-performance approach demands simultaneous training for managers, Teegarden said. When workers get trained in problem solving and communications, it can be a threat to managers (and was at times during the project) unless the managers are also properly trained. Teegarden added that continued training support is desirable -- some of it by means of networking between companies and perhaps some from a circuit rider who visits companies once a month.

The companies that have already found new commercial customers took advantage of core abilities, in turning defense technologies to commercial applications. For example, a firm that was expert in making miniscule electronic devices turned that skill into making small electronic components for medical instruments. Another made indestructible furniture that is different in function, but based on the same technologies, for fast food restaurants and hospitals.

Most of the small defense firms in the project already had some commercial business, Teegarden said. Even so, they were still behind their commercial competitors in adopting the practices of the high-performance work place, and had some catching up to do to become competitive.

Department of Defense Personnel

The United States has the most capable, motivated and professional defense personnel in the world. While the process of defense downsizing is necessary to establish a force structure appropriate for our post-Cold War era, care must be taken to minimize disruptions for our armed forces and ensure the continued outstanding quality of our people. The prospect of layoffs harms soldiers' morale and productivity, and makes recruiting more difficult. Although involuntary layoffs of DoD personnel cannot be eliminated entirely, they will be kept to a minimum, thus preserving the fitness and readiness of our forces.

As important, our policies to reduce the size of our forces must honor the solemn bond between the federal government and military Service personnel. Accordingly, transition programs for DoD military and civilian personnel seek to minimize involuntary layoffs of career personnel who are not eligible to retire and to guide those leaving the Department of Defense into productive new careers. In addition, to the extent feasible, our policies seek to encourage future careers that utilize the skills and character attributes developed during military service to address unmet public and community needs.

Military Personnel. The Department of Defense has reduced its active uniformed service strength levels from a high of nearly 2.2 million in the late 1980s to a projected strength of 1.6 million at the end of Fiscal Year 1994. This significant reduction has been achieved in part through the extensive use of voluntary separation programs and monetary incentives. Transition benefits and services ensure the fair treatment of departing Service members by providing for their health and welfare, and that of their family members, while they make their way into civilian life.

The Department of Defense has been able to reduce its forces **with very few involuntary separations** due to the aggressive use of voluntary separation programs, such as the Temporary Early Retirement Authority, the Voluntary Separation Incentive (VSI) and Special Separation Benefit Bonus (SSB) programs. The early retirement program, authorized by Congress in 1992, provides for retirement benefits after 15-19 years of military service under certain conditions, rather than the usual 20 year threshold. The other two programs target career Service members with more than 6 years of military service, providing annual annuity payments in the case of the VSI program, or a lump sum payment under the SSB program. In 1993, 24,000 men and women took advantage of the VSI or SSB benefits. These highly successful programs will continue to be used as needed to reduce the number of career personnel until at least Fiscal Year 1999.

In addition to these monetary incentives to leave the All-Volunteer force, the Department of Defense has initiated a series of programs designed to help prepare separating personnel to begin new careers in the civilian economy. Although transition assistance is a relatively new mission for the Department of Defense and some transition programs were implemented unevenly at first, DoD and the Military Services are now vigorously moving ahead with a variety of important programs.

DoD provides an extensive array of services and benefits designed to equip separating Service members with the basic job-hunting skills, tools, and self-confidence necessary to secure good jobs in our nation's civilian work force. Each of the military Services has initiated programs designed to fit the needs of separating Service members and their families. Preseparation counseling provides individuals with information on the following potential benefits:

- education benefits available under the Montgomery G.I. Bill (up to \$12,600 for education and training);
- compensation and vocational rehabilitation benefits available to medically separated members;
- opportunities for affiliation with the Reserves;
- job counseling and job search and placement assistance;
- job placement counseling for members' spouses;
- relocation assistance services;
- financial planning services;
- medical and dental coverage available for some departing personnel; and
- DoD purchase of homes in communities where base closures or other reductions have depressed values (under the Homeowners Assistance Program, or HAP).

The Department of Defense, in conjunction with the Labor Department and the Department of Veterans Affairs, also provides assistance with skills assessment, interview techniques, resume preparation, and other job search support through seminars at 204 locations across the United States. These seminars are offered to all military personnel and their spouses.

The Department of Defense, aggressively utilizing automation technology, has put in place a number of ongoing programs to aid the job search process. For instance, each separating Service member's military skills and training history are translated into equivalent civilian experience several months before separating. The resulting document -- the Verification of Military Experience and Training Document -- can help prospective employers understand the marketable job skills of military personnel looking for employment.

In addition, the Defense Outplacement Referral System (DORS), an automated mini-resume registry and referral system in place since December 1991, enables participating employers to reach departing Service members and their spouses who have the skills and

qualifications needed by requesting employers. Currently, there are over 6,000 employers in the DORS employer data base, and over 475,000 mini-resumes have been referred to employers. Eighty-three percent of the military job seekers who have registered in the data base have been referred for a job opening at least once. The Transition Bulletin Board (TBB) allows employers to place their job ads on an electronic bulletin board which is available at military installations world-wide. The TBB also contains the Federal Job Opportunity Listing from the Office of Personnel Management. In partnership with the Department of Labor, DoD provides military transition offices with an automated form of America's Job Bank containing 21,000 jobs. All of these information-sharing programs are meant to bring separating military personnel closer to actual job opportunities. Job fairs, sponsored by DoD across the U.S. as well as abroad, bring potential employers face-to-face with potential hires.

Some men and women leaving the Services need special preparation for finding a job. The Department of Defense is working with the Departments of Labor and Veterans Affairs to implement the Service Members Occupational Conversion Training Act and other programs that provide on-the-job training to selected veterans. These programs target men and women facing significant obstacles to employment, including those trained in skills having little or no application in the civilian workforce, those who have been unemployed for a specified period of time, and those separated with a disability.

Overall, the Department of Defense's program for separating Service members, known as **Operation Transition**, is helping to ensure that America's armed forces maintain quality personnel with the proper mix of skills and experience. The program's continued development and conscientious implementation will honor the nation's pledge to treat separating personnel and their families fairly and provide them with the support and assistance they need to begin successful civilian careers.

Civilian Personnel. Defense budget reductions and efforts to make government more efficient will lead to significant reductions in DoD's civilian workforce, in addition to reductions in the uniformed services. While there will be some downsizing at the Pentagon and other DoD offices, the population of most concern is the civilian employees at military bases that are slated for closing. When closing bases are located in isolated communities lacking vibrant regional economies, the challenge of finding new employment can be severe. So far, the number of civilian workers displaced by base closings and realignments has been modest, but more will be affected as additional closures take place.

To minimize involuntary layoffs of its civilian employees, DoD is aggressively implementing its separation-pay, or "buyout" program. Under this new program, authorized by Congress in 1992, DoD offers cash incentives -- up to \$25,000 -- to employees who resign or retire. The buyout is available to employees selectively, where it will serve to prevent an involuntary separation or create a vacancy for an employee who would otherwise be separated.

During FY93, DoD reduced its civilian personnel by 70,000, with only 2,000

involuntary separations. Nearly half of all separating civilian personnel took advantage of the buyout program. This program has been particularly useful in helping women and minorities, who generally have less seniority, avoid involuntary separation.

DoD also has programs designed to help civilians find new jobs. The most effective is the Priority Placement Program, an automated system that matches employees who are scheduled to be separated with vacant DoD positions for which they are qualified. When a vacant position matches the skill, grade, and acceptable location of a person registered for the PPP, recruiting stops; usually, the registrant has 24 hours to say yes or no. Since its inception in 1965, the PPP program has placed over 100,000 employees -- roughly half of all registrants. Currently, DoD is placing 700 to 800 people a month through the program. For employees willing to relocate (DoD will help defray moving costs), the probability of getting a new DoD job through PPP is extremely high.

Alternatively, if an at-risk DoD civilian employee finds a job with a civilian federal agency, DoD will pay up to \$20,000 in relocation costs. (The amount is linked to the size of the employee's potential severance pay package.) Only about 100 people have taken advantage of this option so far, and downsizing of the federal workforce will mean fewer openings even in civilian agencies. Nevertheless, this option gives DoD another tool to work with and it illustrates the department's desire to accommodate its employees.

Finally, new federal acquisition regulations give employees at closing bases the right of first refusal on selected contractor jobs. For example, a contract may be awarded to a company to provide physical security at an installation after closure. When that company hires employees to fulfill the contract, federal employees separated from the base may apply. If they are qualified, the company must select them.

Other programs support employees efforts to find new jobs. New administrative rules give civilian employees time on the job to search for new work. As with uniformed personnel, civilian workers have access to resume-writing and job-search seminars, Job Clubs, and Job Fairs at most DoD facilities. In addition, when the closure of a military installation significantly reduces local real estate prices, the Homeowners Assistance Program (HAP), operated by the Army Corps of Engineers, can help both military members and civilian employees recoup losses.

The experience at Lowry Air Base in Denver illustrates how these programs work together to avoid involuntary separations. Lowry had 525 civilian employees when its closure, scheduled for 1994, was first announced. The Air Force offered buyouts to all who had already not resigned or retired, and 217 accepted. More than 150 of the remaining civilians have been placed in other DoD jobs through the PPP, and the Air Force will place another 50 through its own programs. More than a dozen found jobs with other federal agencies. Only about 40 Lowry employees remain to be placed; to create vacancies for them, DoD is offering retirement incentives to employees at nearby installations. Ultimately, fewer than a dozen Lowry employees will have to be separated involuntarily, and even they will

have a significant safety net, including severance pay, unemployment compensation, and eligibility under PPP for up to a year. This success avoiding involuntary separations is echoed at other facilities across the country, including Mare Island Naval Shipyard, where workers thought facing the greatest reemployment challenges are virtually all taking early retirement or finding other DoD opportunities through priority placement.

Proposed Programs. The Department of Defense is also seeking authority to take further steps to make DoD employees more marketable. Most significantly, DoD would pay retraining and relocation incentives up to a maximum of \$10,000. The retraining incentive may be paid to employers to defray retraining costs, while the relocation incentive would be paid to employees to defray relocation costs. Both incentives are contingent upon an employer, public or private sector, agreeing to hire the separating employee at a mutually agreeable salary for a period of twelve months. Should Congress provide the necessary authority -- thus far the House Armed Services Committee has been supportive -- DoD will move ahead vigorously with this program. In addition, due to the tremendous success of the Priority Placement Program, the Administration is exploring the possibility of expanding its scope to include opportunities at other federal agencies.

Encouraging Public and Community Service. Many military and civilian personnel leaving the armed services have skills, training and experience that can help meet pressing national needs. These individuals can also be effective role models for our nation's youth. The Administration is encouraging individuals leaving DoD to consider employment in public and community service and, in certain situations, providing incentives that enable these men and women to apply their skills where they are most needed.

DoD encourages military personnel who retire with more than 15 but less than 20 years of service (under the temporary early retirement program) to take jobs in critical, underserved public and community service fields, such as education, health care, and law enforcement. DoD will increase the retirement payments to these individuals by crediting them up to five additional years of military service for their years of public and community service.

The Defense Department also is implementing a program to train former military personnel, DoD civilians, and private sector defense workers to become teachers and teachers aides in elementary and secondary schools serving low-income families. This program builds on previous DoD efforts to promote alternative certification by states of military personnel who want to be teachers. The "Troops to Teachers" program helps selected separating personnel obtain teacher certification, then subsidizes participants' salaries for two years, provided that they teach in schools with a concentration of low-income families.

Under this program, DoD makes former defense personnel affordable, attractive candidates to teach math, science and other critical subjects to low-income children, especially in school districts with severe financial constraints. Troops to Teachers is being implemented currently; new teachers will be in classrooms in needy school districts in the

1994–1995 school year. Based on this model, similar programs are being developed to train former defense personnel for careers in other public service fields where their skills and experience can serve society.

IMPROVING THE DELIVERY OF ECONOMIC ADJUSTMENT ASSISTANCE

Although there are many good assistance programs available to regions hurt by the defense drawdown, the system in place to deliver these services -- both at the federal and community level -- is less than adequate. States and communities that seek defense-related adjustment assistance confront a maze of federal agencies and application procedures. For example, the Massachusetts Industrial Services Program wrote eight different funding proposals to five different federal agencies for defense adjustment assistance in 1992. Many communities find the federal system inaccessible and intimidating.

Federal delay and administrative inflexibility compound the problem of fragmentation and inaccessibility. Communities affected by defense cuts have had to wait a year or more for approval of a grant from the Economic Development Administration, a major source of federal financial assistance. The Department of Labor has also had an arduous funding process; the regulations were not clear, and DOL did not provide enough information and assistance for communities to submit a strong application. That, in turn, became a source of funding delay.

State/community delivery of defense adjustment services to firms and workers is likewise fragmented. Workers face a plethora of training programs and providers. State programs to assist business -- with financing, technology or export assistance -- are generally separate and uncoordinated. The lack of coordination -- which often reflects the absence of a comprehensive readjustment strategy -- also means there are important gaps in the range of services available to firms and workers.

To address these problems, the Clinton Administration has undertaken several initiatives aimed at improving the delivery of defense-related economic adjustment assistance. None of these initiatives will radically improve the delivery system overnight, and some of the initiatives are experiments that may not work. But together, they represent a concerted effort to accelerate and coordinate the process of giving hard-hit regions the tools they need to rebuild their economy.

Agency Reforms. As a starting point, key federal agencies are improving their internal procedures for providing defense reinvestment assistance. The common denominators are increased outreach to inform communities, workers and firms of the funds that are available, less paperwork and speedier processing of applications, and more flexibility as to what activities are eligible for funding.

For example, EDA recently eliminated the requirement that regional offices get agreement from the Washington, D.C., office before approving individual projects. Through this and other improvements, EDA is committed to streamlining the grant approval process.

DoD's Office of Economic Adjustment -- always an agile program -- is responding even more rapidly to hard-hit communities. OEA now processes applications for planning grants in two weeks or less.

OEA also has the potential to provide additional guidance and support to communities dealing with the impact of defense contract reductions or base closures. OEA has long been the key federal point of contact for defense-dependent communities developing adjustment plans, acting as an information "gateway" to other federal programs capable of assisting with economic adjustment and development (grants for training assistance, infrastructure development, etc.). Project managers are assigned to communities by OEA for the duration of a planning project. However, many communities continue to require help locating and coordinating other federal assistance after an OEA project is completed. In order to address this need, OEA project managers will function as "account managers," treating communities as clients who can benefit from ongoing support and troubleshooting assistance. This approach should provide greater continuity and coordination to communities sometimes confounded by the patchwork of federal programs.

The Technology Reinvestment Project, led by DoD's ARPA, has set a new standard for federal outreach; staff from the six agencies involved in implementing the TRP held 19 regional briefings in 1993, attended by 7,000 people. The 1994 TRP outreach effort includes, in addition to regional briefings, two-day conferences on forming consortia, planning workshops on Regional Technology Alliances, information workshops on technology-focus areas and outreach programs to assist small businesses.

Information Clearinghouse. Many communities and firms lack the basic thing they need in order to begin the process of defense adjustment: information. To help defense-dependent communities, workers and firms learn about the array of government assistance programs and other activities, the Departments of Commerce and Defense have jointly established a "Conversion Information Clearinghouse." The clearinghouse provides access via telephone (800/345-1222) or computer bulletin board (800/345-2949) to regularly updated information on a range of topics, including:

- summaries of federal, state and local programs to assist economic adjustment and defense transition;
- case studies of community responses to base closures and defense industry downsizing;
- bibliographies of articles and resource materials on defense adjustment;
- pertinent laws, regulations and pending legislation.

Users can retrieve information electronically, or in hard-copy form via FAX or mail.

Two resource publications, compiled by the Department of Defense, are available through the clearinghouse: **Defense Reinvestment: A Survival Guide for People, Businesses and Communities**, describes a broad range of federal technology programs as well as transition programs for defense personnel and communities. The **Directory of Federal Reinvestment and Transition Initiatives for Communities, Businesses and People**, provides points of contact for key federal programs.

Simplifying Base Reuse. For communities where a military base is slated for closure or realignment, two features of the Clinton Administration program are designed explicitly to improve federal service delivery and cut through the tangle of red tape. First, every community (including bases on the 1988 and 1991 closure lists) has been assigned a "Transition Coordinator" -- a senior military or government official, who serves as an on-site community advocate and local point of contact with the federal government. Transition Coordinators are charged with speeding property disposal and keeping environmental cleanup on a fast track; they are also working with DoD's Office of Economic Adjustment to help communities identify sources of federal assistance. (See section below on "Revitalizing Base Closure Communities" for more detail.)

One-Stop Centers. Following the Oakland, California, fire and Hurricane Andrew in Florida, ravaged communities set up assistance centers that offered residents "one-stop shopping" for a range of services, from filing of insurance claims to applying for federal disaster relief. So successful were these and other one-stop centers that they have become a model for public service delivery. Even where the services are not centrally located, the term implies an integrated approach to the delivery of high-quality, customized services that are timely and convenient.

In the context of defense adjustment assistance, a one-stop approach requires a community to have both a comprehensive adjustment strategy and integrated delivery of economic assistance; the latter is impossible without the former. To encourage this approach, the Clinton Administration will fund a small number of demonstration projects in communities where large numbers of workers and firms have been affected by defense industry layoffs. Two projects are underway -- in St. Louis and Ft. Worth. Others will be selected on the basis of community interest.

OEA Defense Adjustment Pilot Projects. The Office of Economic Adjustment has underway four "defense adjustment pilot projects" to examine ways to improve the provision of community economic adjustment and diversification assistance. The pilot sites were chosen so as to represent a range of adverse impacts from defense downsizing:

- Meridian, Mississippi: military base dependent community
- New England (MA, CN and RI): defense industry cutback
- Los Alamos: nuclear weapons laboratory downsizing

- Alameda County, California: combination of the above

OEA will provide each pilot site with \$500,000 over 18 months to test new or promising approaches to dealing with defense adjustment. The approaches will be closely evaluated and the results disseminated to other defense-reliant communities. Box I describes the New England pilot project in more detail.

BOX K
THE NEW ENGLAND DEFENSE ADJUSTMENT PROJECT
ECONOMIC REDEVELOPMENT OF A DEFENSE-DEPENDENT REGION

The Southern New England region, comprising Massachusetts, Connecticut, and Rhode Island, was selected in 1993 as one of four locations for Defense Department pilot projects in economic redevelopment of defense-dependent communities. This region is unusually dependent on the private defense industry. In the early 1990s, about 4.8 percent of jobs in the three states were due directly to defense contracts -- twice the national average -- and many more jobs were tied indirectly to the defense industry. Within the region, some communities are far more defense-dependent than the regional average.

Defense production is dwindling in southern New England. From 1989 to 1992, prime defense contract awards dropped 40 percent, from \$15.3 billion to \$9.3 billion, and ripple effects are highly visible in defense-dependent communities throughout the three states. The Defense Department's Office of Economic Adjustment (OEA) is testing two innovative redevelopment strategies in the region, both for the direct benefit to the region itself and for lessons that can be applied to other communities whose economic lifeline is tied to defense production.

Putting together a coordinated redevelopment strategy for three states was in itself a challenge, but economic development planners from each state are now working in harness to make the New England Defense Adjustment Plan (NEDAP) a reality. The plan rests on two principal components. One is the Marine Environmental Technology Initiative, using a new approach to regional development that builds on existing clusters of excellence -- in this case, a combination of marine technology firms (mostly built up for defense purposes) and environmental technology firms. The second component is the Financial Services Initiative, which will try to bridge the information gap between banks and small defense-dependent firms seeking funds for conversion. As a second step, the initiative will test new credit-pooling mechanisms.

The Financial Services Initiative was first out of the gate. In March 1994 NEDAP called for proposals to improve information exchange between the banks and small and medium-sized defense-dependent firms. The firms complain that banks don't understand their operations and are not interested in lending to them; they see lack of access to credit as a key barrier to defense conversion. Banks report that they must comply with stricter federal requirements on terms, collateral, and debt-to-equity ratios for borrowers; they say that small firms lack sophistication in managing their credit needs and meeting the federally imposed requirements for loans.

The first step in the Financial Services Initiative is to help small and mid-sized defense-dependent firms understand the information that banks require, and to help banks understand the challenges and opportunities of dealing with these small firms as they move into commercial markets. The second step is to study the possibilities for establishing a multi-state, multi-bank credit pooling mechanism that would provide greater access to capital for small defense firms trying to convert. A pooling mechanism could help to lower the transaction costs banks face in analyzing and processing small loans. Advice on forming such a pool will be sought from banks in the region and the Boston Federal Reserve Bank. Actual creation of the mechanism is farther down the road.

BOX K (cont.)
THE NEW ENGLAND DEFENSE ADJUSTMENT PROJECT
ECONOMIC REDEVELOPMENT OF A DEFENSE-DEPENDENT REGION

Meanwhile, NEDAP is also working on the Marine Environmental Technology Initiative. The idea is to link firms with separate capabilities in marine and environmental technologies, and to help them find growing markets, here and abroad, that can reward their combined capabilities. Some of the possibilities for growing markets are in developing environmental safeguards for offshore oil drilling; testing and monitoring methods for disposal of waste in the ocean; monitoring and ameliorating coastal and estuarine water quality; improving knowledge about and protection of marine biological resources, as near-shore fisheries become depleted.

NEDAP plans to work through business associations and professional organizations in attempts to link defense-oriented marine technology firms and smaller, more entrepreneurial environmental businesses. NEDAP also envisions building links between the firms and the many excellent universities and marine research organizations in the area, including the renowned Woods Hole Oceanographic Institute.

REVITALIZING BASE CLOSURE COMMUNITIES

The closure of a military base presents special problems and opportunities for a community. While the task of remaking the economic foundation of a community is never easy, a closed base can be a community's single greatest asset in charting a different future. An airfield, a port, or the land, buildings, machinery and equipment on a base can be the catalyst for local economic development. Experience indicates that communities that lost a base in the 1960s and 1970s have used the property and facilities to create, on balance, more new jobs than were lost, and even recent base closures have already produced success stories. (See Box L.)

Strong local leadership is critical for rapid reemployment of facilities and workers no longer needed by the military. Plans for economic renewal must come from the community organizations, firms, and workers with a stake in an affected region's future. Together they can create a vision based on their understanding of the community's local endowments.

Although base closure communities lack some of the advantages of defense industrial regions, they typically possess several factors that can foster economic development. These include tremendous physical assets -- land, buildings and other property -- made available for productive reuse; a skilled, dedicated, and trainable workforce; and potential new market opportunities associated with the closure of the base, including opportunities to apply new environmental technologies and techniques to clean up the base.

The best role for the federal government is to support the development and implementation of a community reuse plan by making it easier for the community to utilize newly available assets. The government can do this by funding the planning process, transferring property at an affordable price, investing in infrastructure improvements to make property more attractive, paying for training that gives workers skills needed in the local economy, and fully funding environmental cleanup. These federal contributions will attract and complement private sector capital investment in new business activity on the closed base. Together these public and private investments, guided by local planning, can help realize an economic vision appropriate for the region.

In spite of some outstanding base reuse successes, the federal government has not done a very good job of closing bases in the past. Communities were forced to cope with a jarring economic upheaval without adequate tools or resources. Many bases were heavily polluted, and the cleanup seemed to take forever. And the disposal of the property on bases was slow, cumbersome and penny-pinching.

BOX L
ENGLAND AIR FORCE BASE
A BASE CLOSURE SUCCESS STORY

The conversion of England Air Force Base into the England Industrial Airpark and Community demonstrates the success that can be achieved when a local community comes together to plan aggressively for the reuse of closing military facilities.

The decision to close England AFB was approved by Congress in the Fall of 1991, creating enormous anxiety about the future of its host community of Alexandria, located in rural Central Louisiana. England was the largest employer in the area, with 3,000 military and 700 civilian jobs. A study done by the Louisiana State University (LSU) Department of Economics estimated at the time that closure would result in a decline in area sales of \$119 million, a reduction of household earnings of \$127.6 million, and a loss of 6,393 jobs overall.

Even while local leaders were mobilizing throughout 1991 to fight the proposed closure, the cities, surrounding parish, and businesses of the region began to think about ways to reuse the base in the event it closed. They established the England Authority and made it responsible for converting the base into the "England Airpark and Community," a planned unit development. The England Authority's goal is to create 10,000 jobs by the year 2000. From the outset, it aggressively pursued potential tenants for the base's facilities, not waiting for the flag-lowering ceremony that officially closed the base in December 1992. The Authority also fought hard to retain base property that might help lure tenants, persuading the Air Force to leave \$20 million worth of movable equipment such as trucks and furniture.

Three months before closure a major lease was signed with J.B. Hunt Transport Inc. to use portions of the former air base as a truck driver training school. The school trains 200 drivers each month and provides 276 jobs on-site thus far. This one contract alone has added \$20 million in payroll in Central Louisiana.

In addition to much-needed jobs, the J.B. Hunt lease provided early momentum for the reuse effort. The Authority built on this progress in December 1992 by winning a U.S. Army contract to serve as the Intermediate Staging Base (ISB) for the Joint Readiness Training Center. The facility processes 60,000 soldiers through the Airpark each year on their way to train at nearby Fort Polk, giving an estimated \$4 million annual revenue boost to the community.

The ISB contract enabled the England Authority to reopen the airfield less than eight months after closure, establishing one of only three 24 hour control towers in the State. In July, 1994, the Rapides Parish Airport Authority formally resolved to move its commercial airport operations to the base in the near future. This action will facilitate a requested FAA public benefit transfer of the base to the Authority later in the year.

Thus far, the England Authority has 15 tenants, which have created over 800 permanent jobs for the Central Louisiana region. And a number of public needs are being addressed, including establishment of a magnet elementary school and a branch of LSU, opening a comprehensive State public health facility at the former base hospital, and public operation of the golf course. Private sector job creation will continue (several lease requests are pending), especially after the Authority acquires the entire base on October 1, 1994.

BOX L (cont.)
ENGLAND AIR FORCE BASE
A BASE CLOSURE SUCCESS STORY

Already, results have defied pessimistic economic projections. Housing prices in Alexandria have risen since 1991 rather than declining as expected, and sales tax revenue for the city increased 10% from 1991 to 1993. Alexandria was chosen one of America's ten "All-American Cities" for 1994 by the National Civic League, in recognition of outstanding cooperative efforts to overcome economic adversity through successful base reuse.

All of these accomplishments have occurred in less than three years. Why has the England Authority has been so effective? The keys may be its dynamic mix of business and community leaders; the quality of the facilities available to develop and market, typical of those on many closing bases; its embrace of a realistic and flexible strategy to develop a wide range of projects suitable for the local economy; and, perhaps most significant, its aggressive approach to taking control of the base and finding potential tenants.

In a departure from the past, the Clinton Administration is giving top priority to early reuse of the bases' valuable assets by the host communities. Rapid redevelopment and creation of new jobs in base closure communities are the major goals. Toward this end, the President on July 2, 1993 announced a five-part program to revitalize these communities.

In the Fall of 1993, Congress endorsed the President's new approach by authorizing Title XXIX of Public Law 103-160, Base Closure Communities Assistance -- often called the "Pryor Amendment" because of the leadership of Sen. David Pryor of Arkansas, who chairs the Senate [Task Force on Defense Transition]. Title XXIX provides the legal authority to carry out the President's plan by, among other things, authorizing conveyances of real and personal property at or below fair market value to local redevelopment authorities, and sharing profits on subsequent sales and leases. Public Law 103-160 requires the Secretary of Defense to prescribe regulations implementing the new law; the Department of Defense developed these regulations during the Spring of 1994. After extensive consultation with affected communities and other interested parties, DoD is finalizing these regulations to ensure that the promise of the President's five-part plan is realized.

A. JOBS-CENTERED PROPERTY DISPOSAL

Disposal of the land, buildings, and movable property on military bases has been bureaucratic and penny-pinching. Many businesses wanting to locate on a newly-closed base have been unable to get an interim lease because of Pentagon red tape. And disputes over "fair market value" of military property have resulted in the worst of both worlds: land and buildings that could support commercial activity and create jobs sit idle, while DoD continues to pay to maintain property it doesn't need.

To make property available for reuse as quickly as possible, the Administration is implementing a new, job-centered disposal process with six key elements:

1. Discount and No-Cost Transfers for Economic Development.

--Until recently, federal law required the Department of Defense to charge full price when closed bases were to be used for job-creating economic development. Yet it was allowed to transfer bases for free for a variety of "public" uses, including recreation, aviation, education and health.

--At the Administration's request, Congress changed the law to enable DoD to transfer property at zero or low cost for economic development purposes, when communities have a viable plan to create jobs. That legislation also allows for federal recoupment of a portion of eventual profits.

2. Interim Leases.

--Even before base property is ready for sale or transfer, it can provide jobs for the community. Interim leases, with temporary tenants, can be the key to rapid economic redevelopment. DoD will encourage interim leases in a variety of ways, including arrangements that allow tenants to lease rent-free in exchange for maintaining the property.

3. Delegation of Authority.

--Previously, interim leases and simple land transfers had to be approved by the Deputy Secretary of Defense. In July 1993, DoD delegated that authority to base commanders. This step can cut processing time by three months or more.

4. Pre-Screening Conference and Property Screening.

--Federal law requires DoD to first offer base property to other federal agencies -- a process that has taken months and even years in the past.

--Under the Administration's new policy, the Military Departments are meeting with community leaders and local planners to explain the screening process and to discuss the community's interest in specific parcels of land.

--DoD will look to the community reuse plan to guide the disposition of base property when federal agencies seek portions of a base. DoD has also shortened the period during which agencies can express interest in property.

5. McKinney Act Screening.

--The McKinney Homeless Assistance Act requires screening of federal property for possible use by the homeless. The Military Departments have reached out to advocates for the homeless in order to identify their needs early in the process. The Administration also is encouraging local redevelopment authorities to work with homeless providers and address their needs within the reuse planning process.

6. Related Personal Property.

--Although DoD has historically taken most of the movable property out of a closing base, such property -- everything from furniture to fire trucks -- can be a significant inducement to a prospective tenant or owner. The Administration requested, and received, a change in the law that will make equipment ~~not~~ needed for specific military purposes available to the community when it can enhance the future potential uses of the real property being considered in its redevelopment plan.

B. FAST-TRACK CLEANUP

When the military departs a closed base, it often leaves behind polluted property. This can both threaten the health and safety of the community -- and act as a roadblock to economic revitalization.

Environmental contamination on military bases can be extensive, requiring massive cleanup efforts. Under current schedules, environmental reviews frequently take more than three years to complete before cleanup even begins. Community groups are rarely given early access to important information about the nature and extent of contamination, slowing the economic redevelopment planning process even further. Without effective public involvement in the cleanup process, skepticism grows about the government's effort and the future of the site.

The Clinton Administration is committed to a fundamental redesign of the way the government cleans up closing military bases. It is replacing the current slow, uncoordinated, Washington-driven approach with a common sense approach to protecting public health and the environment that emphasizes speedy assessment, government teamwork and responsiveness to community needs. The key elements are:

1. Establish a Cleanup Team at Every Base

--Teamwork is critical to being smarter about the way we cleanup bases. Instead of working separately and at different stages in the cleanup process, environmental experts from EPA, DoD, and the state environmental agency are working together.

--Professional cleanup teams will be stationed at each site. Just after closure is announced the Cleanup Team will conduct a "bottom-up review" of all schedules and plans for cleanup.

--The cleanup team will also be empowered to accelerate cleanup by conducting reviews at the same time rather than in a sequence. Together these steps will significantly speed the planning, construction, and full implementation of an appropriate cleanup remedy so that property can be turned over for economic development.

2. Make Clean Parcels Available in Half the Current Time

--Under the President's plan, environmental assessments will be performed quickly enough to identify all clean parcels of property on a base within 18 months so they can be available for reuse.

--For parcels with an identified user, the assessment will be done within 9 months. During this study and cleanup phase, the community will be able to lease property

that's on the way to full cleanup.

--Interim remedial actions will be used to get rid of "hot spots" and to give priority to parcels with potential for quick reuse. Future land-use scenarios will be factored in to the cleanup process in accordance with existing law.

3. Speed the National Environmental Policy Act Process

--The National Environmental Policy Act (NEPA) protects communities from the dangers of environmental contamination and degradation. Meeting its strict standards should not be an impediment to effective reuse of closing military bases. The Clinton Administration is committed to completing documents required by NEPA within 12 months from the date a community submits its final reuse plan.

--A single NEPA document will be used for both closure and reuse, and the NEPA analysis will be based on a community's reuse plan. NEPA documents historically have taken anywhere from 24 to 48 months to prepare.

--The Environmental Protection Agency has become a cooperating agency in the NEPA process at closing bases. EPA staff have been detailed to this task in order to guarantee speedy compliance.

4. Indemnification

--Working with the Defense authorization and Appropriations committees, the Administration revised language in the FY93 act to clarify future liability for contamination.

C. TRANSITION COORDINATORS

In the past, communities affected by base closings faced a tangle of government agencies and overlapping programs. In particular, the DoD was too often unresponsive on issues relating to environmental cleanup and property disposition. Unfortunately, DoD's representative on the scene was often of little help. Base commanders lacked training or experience in closing bases, and the Services did not encourage commanders to take community needs into account.

To bring the transition to the community level, the Clinton Administration named a corps of on-site advocates to cut red tape and slash through bureaucratic thickets.

1. Fulltime Community Advocates

--The Department of Defense on July 9, 1993, designated a senior government official at each closing base to serve as the "Transition Coordinator." In August, those individuals received a week of training in all aspects of base closure, and they have been on the job since September 1993.

--The Transition Coordinators -- most of them previous residents of their community -- serve as fulltime community advocates and local points of contact with the federal government.

2. Cut Through Red Tape on Property Disposal.

--In the early stages of base closure planning, the Transition Coordinator works with the community to identify its reuse needs -- e.g., which parcels of land it would like to develop first and which facilities it would like to consider for interim use.

--These community needs can then be accommodated, wherever possible, in DoD's plans for drawing down and closing the base. The Transition Coordinators can also cut through DoD red tape to get interim leases issued quickly to businesses that want to locate at the base.

--In addition to advocating community needs within the Pentagon, the Transition Coordinators work with other federal agencies to speed the screening and disposal of base property.

3. Keep Environmental Cleanup on a Fast Track

--Transition Coordinators also work with federal and state agencies to keep environmental cleanup on a fast track. Among other things, these individuals ensure that information concerning the nature and extent of contamination is made available to community planners as early as possible, and they push for priority treatment of parcels of land with the potential for rapid redevelopment.

4. Support OEA

--Although Transition Coordinators focus on fixing what's "broke" in the closure process -- namely, property disposal and environmental cleanup -- they also work with DoD's Office of Economic Adjustment to help communities identify sources of federal assistance. OEA has been very effective over the years at drawing federal resources into communities affected by a base closure. The Transition Coordinators will supplement and support OEA's efforts.

5. One for Every Community

--Every community with a base slated for closure or major realignment (including bases on the 1988 and 1991 lists) has been assigned a Transition Coordinator. Sixty-seven Transition Coordinators are in place, reporting directly to the Office of the Secretary of Defense.

D. LARGER ECONOMIC ADJUSTMENT PLANNING GRANTS

When a base shuts down, communities are often faced with a new and unfathomable task -- turning a local mainstay into an engine of economic development.

DoD's Office of Economic Adjustment has over 30 years of experience and a good record in helping communities develop a base reuse plan and an economic adjustment strategy. OEA planning grants are used to evaluate alternative proposals for base reuse (e.g., Is a commercial airport viable?), develop a marketing strategy, prepare management plans and site layouts, and other tasks.

In the past, this well-regarded program has suffered from inadequate resources. The Clinton Administration is giving OEA the resources and support to do its job even better -- to begin helping communities sooner; to provide larger grants; and to go beyond its traditional focus on planning and help communities get started on their redevelopment activities.

1. Jump-Start the Process

--The sooner a community starts planning for local economic redevelopment, the sooner it is on the road to recovery. OEA has expedited the approval of initial planning grants: Once a community creates a local, representative organization to plan and manage the base reuse and adjustment process, OEA approves its grant within two weeks.

2. Provide Larger Planning Grants

--In order to give communities the tools necessary to plan for their future, OEA is providing larger planning grants than in the past.

--These grants will average \$1 million per community over five years. For the hardest hit communities, usually those host to a complex set of several closing DoD facilities, OEA will provide up to \$3.5 million over five years.

--OEA began awarding more generous grants in FY93, as part of the Clinton Administration's defense reinvestment and conversion initiative: Grants to communities on the 1988 and 1991 closure lists averaged around \$300,000 in FY93, up from \$200,000 in FY92 and \$100,000 in FY91. [update for FY94]

3. Go Beyond Planning

--OEA was traditionally limited to supporting only planning activities. But it has been granted new authority to move beyond planning and help communities start up their redevelopment activities.

--Among other things, OEA can now support the staffing-up of the organization responsible for implementing the reuse plan and adjustment strategy.

E. TRANSITION ASSISTANCE FOR BASE CLOSURE COMMUNITIES AND WORKERS

Communities that suddenly lose their lifeline need help to adjust and recover. Even with the very real asset of a military base, the job of nurturing and growing new businesses is a tough one for communities to undertake. The Federal government has a responsibility to assist workers and cushion communities through this wrenching period.

Too often in the recent past, the federal government has only grudgingly played this role. The Clinton Administration's program enables the Departments of Commerce and Labor, among other agencies, to play an active role in economic development and worker retraining.

1. Major Sources of Assistance are Targeted to Base Closure Communities

--The Economic Development Administration has \$500 million for the period FY94 through FY97 for defense diversification activities; historically, about 40 percent of these funds have gone for base closure-related development.

--The Federal Aviation Administration will spend \$40 million a year in a program to fund conversion of military airports to civilian use.

2. Other Community Assistance Programs

--The Technology Reinvestment Project is funded at over \$2 billion for FY94 through FY97. The TRP's Regional Technology Alliance and Manufacturing Extension programs are particularly appropriate for regional revitalization.

--The Small Business Administration offers guaranteed loans and the "Section 504"

debt financing program.

3. Transition and Retraining Assistance for Workers

--DoD benefits for civilian employees, including voluntary separation incentives, counseling, transition assistance, and job search and relocation assistance are estimated to be funded at nearly \$2 billion for FY94 through FY97.

--Worker retraining and reemployment programs in the Department of Labor that can be expected to be used to assist displaced defense workers are estimated to be funded at \$710 million for FY 94 through FY97. In October and November 1993, a DOL-led team of federal and state economic development and human resource specialists visited bases that had been designated in July 1993 for closure; these "SWAT" teams provided communities with information on what kind of job-search help is available and where to go for it.

--As early as two years before closure, DOL offers a full range of reemployment services, including counseling and skills assessment; help in resume writing and job search strategies; and training to upgrade or renew skills.

--Training may include upgrading of basic skills, occupational skills retraining, and enterprise training for people wanting to start their own business; income support is also available if necessary to complete training.

--The Administration's Reemployment Act of 1994, which the President sent to Congress in March, would build on and expand the benefits described above, ensuring that all dislocated workers get adequate assistance to transition to a new career.

--See Box M for more detail.

BOX M
WHAT HAPPENS WHEN A BASE CLOSES?

Closure Announcement

Outplacement Assistance Begins

Job Fairs

Counseling

Resume Preparation

Employees Can Accumulate Unlimited Annual Leave

Closure Minus 2 Years

Accelerated Outplacement Assistance Begins

Defense Outplacement Referral System (DORS)

Office of Personnel Management (OPM) Programs

Training/Retraining Efforts Begin

Job Training Partnership Act (JTPA)

Phased Reductions May Begin

Early Retirement Benefits

Other Incentives

Closure Minus 1 Year

Accelerated Outplacement Assistance Continues

Early Priority Placement Program (PPP)

Relocation Assistance/Outplacement Subsidy

Post Closure Hiring Preference

Job Swaps and Placement Agreements

Training/Retraining Efforts Continue

Closure Minus 120 Days

Reduction in force (RIF) Notices

Accelerated Outplacement Assistance Continues

Mandatory PPP

Post Closure Hiring Preference

Expanded Early Retirement

Expanded Incentives

Closure

Employee Assistance

Severance Pay

Unemployment Compensation

Continued Health Insurance

Outplacement Assistance

PPP (Closure plus 1 year)

OPM Placement Programs

NEW NATIONAL INITIATIVES

For half a century, defense spending not only provided for the Nation's military security but also conferred substantial economic benefits: advances on the frontiers of technology, support for knowledge-intensive, wealth-generating industries, and the creation of productive well-paid jobs. Although greater civil-military integration can preserve some of these benefits, some will certainly vanish as military spending winds down in the post-Cold War era.

At the same time, the lessening of the defense imperative could open the way for the adoption of new peacetime initiatives to meet widely agreed public needs. The legacy from the last twelve years of a greatly swollen national debt constrains the choices; deficit reduction has to be a top priority of this Administration. But so is investment in programs that meet urgent public needs while contributing to technology advance, economic growth, the creation of high quality jobs -- and, so far as possible, the use of human talents and institutions formerly devoted to defense. This is "defense conversion" in the broadest sense: through public investment and public-private partnerships, promote the kind of growth that opens satisfying new opportunities for the workers, ex-soldiers, managers, scientists, and engineers who did so much to win the Cold War.

An obvious candidate for a peacetime initiative is improved protection of the environment. This covers a vast area. It encompasses the cleanup of chemical and nuclear wastes from years past, control of pollutants coming out of smokestacks and tailpipes, and -- most important and most promising -- preventing pollution in the first place. Pollution prevention itself is a very broad field. It includes such things as design of products so they can be recycled rather than put into waste dumps or auto graveyards; use of closed loop industrial processes so that materials, including hazardous materials, are re-used instead of released into air, land and water; manufacturing methods that use energy and materials frugally; design of transportation systems to conserve energy and reduce emission of pollutants to the minimum; and doing all of this in cost-effective ways.

The public benefits from environmental cleanup and pollution prevention are clear. Less obvious perhaps but equally important are economic benefits. The very same energy- and materials-conserving manufacturing processes that protect the environment often save money as well. These cost savings can boost the competitive performance of individual companies and whole industries. And green products and processes are themselves increasingly attractive in international markets. For example, Japanese industrial machinery designed to save energy is selling extremely well worldwide; so are the efficient, reliable end-of-pipe pollution control devices made in Japan and Germany.

The world market for environmental goods and services is estimated at \$200 billion a year -- and growing at an annual rate of 5 or 6 percent, faster than the growth rate of any of the world's industrial economies. In the United States alone, sales were \$120 billion in 1991

and growing at 7 percent a year; employment was nearly 1 million and was expected to reach 1.5 million within five years. Besides these business and employment opportunities, there is great potential for using advanced technology in improved environmental protection. Much of the technology used in environmental cleanup today is rudimentary. The best methods for both assessment and remediation of environmental problems require sophisticated computer modeling and simulation and the use of advanced materials and sensors; such advanced technologies are even more central to industrial processes that prevent pollution.

Transportation is a sector ripe for greater investment for public purposes, because it is such an enormous user of energy, especially in the United States. U.S. oil consumption per capita is the highest in the world; two-thirds of this oil is used for transportation, and over half of it is imported. Cutting oil consumption can not only reduce air pollution and the emission of greenhouse gases but also lessen the political tensions arising from world trade in oil. At the same time, cars are ingrained in American culture, and the auto industry is near the top of the list in economic importance.

The potential for great public and economic benefits from a new generation of cleaner cars, less dependent on oil, is the reason for the Clinton Administration's commitment to a public-private partnership to achieve this goal. The competitive opportunities are great. The whole world is interested in affordable cars that perform well but emit little or no local pollution, do not add to the world's burden of greenhouse gases, and do not depend on a fuel that many countries don't possess and can't afford to import.

While the potential rewards for building a cleaner car are very large, the technological challenges are formidable. The basic technology is available. New fuels and new propulsion systems have been developed in the last ten years that could eventually replace the gasoline-powered internal combustion engine. Converting that technology to use in practical vehicles that are as safe, perform as well, and cost no more to drive than today's autos is the challenge -- one that can only be met with adequate funding for research and development, incentives for private investment in the technologies, and leadership from U.S. industry.