Why research and development are key to national security

by Dr. Steven Bardwell

In the past two years, there has been a fundamental change in the nature of strategic nuclear war. This change involves two components: first, both the Soviet Union and the United States now possess an arsenal of nuclear armed missiles with essentially infinite accuracy. Using satellite guidance systems and sophisticated computers, these missiles can be targeted within 100 feet of their objective after traveling thousands of miles. Since there is no known method for defending any target against a direct hit by a nuclear explosive (past passive defense systems were designed for protection against the effects of blasts occurring one-half to several miles distant from the target), this new level of accuracy means that there is no passive defense system capable of protecting missile silos, airfields, industrial concentrations, or other targeted objectives.

Secondly, as *EIR* reported last week, there now exists, on the drawing boards of U.S. laboratories and in test facilities of the Soviet Union, a design for a directed energy beam weapon capable of destroying strategic nuclear weapons in flight. In the words of a Pentagon official: "[This weapon] has the potential of tipping the battle in favor of the defense for the first time in the history of nuclear warfare." Edward Teller was recently quoted as saying that the latest step in the development of this weapon was the "most significant breakthrough in military technology since the hydrogen bomb" was invented.

These two developments in military technology present a fundamental challenge to the Reagan administration. It must reformulate the war-fighting doctrine it inherited from the McNamara school of the Pentagon; it must reassess the military deployments of the present U.S. force structure with these new realities in mind; it must devise a budget which can deploy a military force capable of fighting a new type of war. But, by far most critically, the new administration must fund and carry out a research and development policy designed for the quantitative changes now taking place in war fighting and capable of meeting the dramatic and largely unforeseeable changes over the next decade.

The budget proposed last week by David Stockman, especially the military components of that budget, fails dismally to meet these requirements. This budget has the same underfunding of R&D that has plagued the U.S. both militarily and in civilian areas, for the past 20 years. It is rigid in conception with insufficient commitment to new technologies. And it is combined with a disastrous series of cuts in the most critical areas of civilian industrial research—cuts in the nuclear fusion research program, massive cuts in the most advanced areas of space research, and a total gutting of science education. Despite significant funding increases, the Stockman-Weinberger budget does not change the *character* of the U.S. military—we remain prepared with too few of the wrong weapons for a type of war that will never be fought.

A defensive budget

The clearest view of the problem facing the Reagan administration was given by the outgoing Undersecretary of Defense for Research and Engineering William Perry, in a statement to Congress on Jan. 20 when he presented the Carter budget:

> The Soviet Union now has about twice as great an effort as we have in military research and development creating a growing risk of technological surprise. . . . The Soviets have applied their investment program to their research and development base, devoting an increasing share of their total defense expenditures to improving their military technology in an attempt to negate our technological lead. . . . We are losing our lead in some key technologies, including electro-optical sensors, guidance and navigation, hydro-acoustic technology, optics and propulsion. Of particular concern is the Soviet concentration on several unconventional technologies at a level far in excess of the U.S. program. Examples include their high-energy laser program and their charged-particle beam program. We estimate that their high energy laser program is roughly five times the size of our own

program. We believe they have made the commitment to develop specific laser weapon systems, while our high energy laser program continues in the technology base.

Faced with this situation, starkly drawn by the U.S. military, Perry went on to describe the U.S. research and development policy as defensive and reactive: new weapons are designed to match their Soviet counterpart, and advanced projects remain in the laboratory until their "cost-effectiveness" can be proven. Perry summarized, "Our strategy is to equip our forces with weapons that outperform their Soviet counterparts."

The Stockman-Weinberger budget does not change this policy in the least. The percentage of the budget going to research and development remains almost exactly constant at slightly over 8 percent. This percentage has held constant since the Carter administration, and Weinberger's budget does not challenge that. There is a slight increase (of less than three-quarters of a percentage point) in the research, development, and engineering budget line, which results from the increased engineering costs of the significantly larger acquisition budget.

The status of innovative programs like the beam weapon remains the same as under the Carter administration. The "feasibility" remains to be proven; the "cost-effectiveness" has not yet been demonstrated; the same arguments are being made by Weinberger's staff as by Carter's Pentagon.

What the Stockman-Weinberger budget does provide is more of the same—only more so. The weapons systems developed over the last 10 years are to be made in greater quantities, but there is no change in emphasis or direction for the whole military effort. The most egregious failing of the military expenditures of the last 20 years remains the central pillar of the Stockman-Weinberger budget: the conservative R&D policy in which new ideas are evaluated on the same systems-analysis cost-effectiveness basis as established (and frequently outdated) systems.

The results of this essentially conservative approach to R&D are evident throughout the U.S. military. Military industrial capability is outdated and inefficient; there is a pervasive barrier to the implementation of new technologies; and there is a bureaucratic inertia that prevents recognition of new scientific potentials.

Since military R&D spending accounts for more than 30 percent of the R&D funding in the United States, and another 20 percent of R&D is federally funded (energy research and space exploration being the largest part of that 20 percent), the character of governmental R&D shapes that of all new technological development in the country. The results of this R&D policy on the U.S. as a whole have been devastating:

1) The United States has the oldest industrial plant of any Western industrial power. This obsolescence is especially marked in the defense industry. Of the Defense Department-owned plants now in use, only about one-third were built in the last 35 years. Most were built during World War II, four were build before 1900, and the oldest still in use were built in 1813 and 1816.

2) The United States has the lowest growth in productivity of any Western industrialized country. In 1960-1975, Japan's productivity increased at a compounded rate of 10 percent per year; the U.S. at a rate of 3.6 percent per year. The rate of growth of industrial productivity in the U.S. for the last two years has been negative. These productivity statistics are even worse when the directly defense-related industry is studied.

3) Capital investment as a proportion of GNP is lower in the U.S. than in any other Western industrialized country. The rate of new investment in the defense industries is about half that of other industry in the United States. An Aerospace Institute study five years ago showed that the more capital intensive the defense industry, the lower the rate of replacement of new equipment it had and the greater degree of obsolescence. The much-vaunted U.S. aerospace industry was among the most obsolete of any U.S. industry.

4) The inefficiencies of U.S. industry are severe, and worsening rapidly. The lead times for all critical machines parts for military equipment have increased several-fold in the last three years: between December 1975 and August 1979, the lead time for aluminum sheets increased from 14 weeks to 70 weeks, for bearings from 18 to 50 weeks, for nuts and bolts from 7 weeks to 45 weeks, and for titanium sheets from 15 to 76 weeks. A significant amount of electronics in all areas of U.S. industry is now purchased from Japan, because U.S. suppliers cannot provide either the quantity or quality of components needed.

5) There are severe manpower shortages in highly skilled areas like engineering, machinists and technicians. Today, most categories of machinists are 20 percent short; industry projections show a 40 percent shortfall by 1990. The Air Force has more than 7,500 jobs for engineers that remain unfilled for lack of qualified personnel. By contrast, the Soviet Union is graduating six engineers for every one graduating in the United States—a statistic even more frightening since 40 percent of the enrollment in American engineering schools is made up of foreign students.

The 'cost-effectiveness' of R&D

The results were summarized by Gen. Alton Slay, head of the Air Force Systems Command before the House Armed Services Committee: "If you don't have skilled labor you are not going to have capacity to produce; increased lead times because you can't produce at the rate that you need to; increased dependence on foreign sources for processed materials and products; and increased urgency for plant modernization."

As the accompanying study of the economic impact of the "in-width" military buildup proposed by the new administration shows, the industrial base of this country is insufficient to sustain a significant increase in industrial output. The industrial plant and manpower base of the country are too old and too inefficient to increase even the scale of the energy- and capital-intensive goods required by the military. Massive capital investment, innovative management, and new technologies are required. In economic terms, the resurrection of the U.S. economy can only be accomplished by a directed effort at the development and implementation of new industrial technologies. A properly conceived national budget, especially its military component, must stress an aggressive, innovative R&D policy as the centerpiece of a program for national industrial development. There are four essential components to such a program:

- **Advanced energy production.** Nuclear technologies must be funded at an accelerating rate. Advanced fossil fuel technologies like MHD must be funded (the Stockman budget cut the funding for MHD from $76 million to zero). Thermonuclear fusion development must be put on a crash program of the sort mandated by the 96th Congress's passage of the McCormack bill (Stockman's budget cut more than $70 million from the legally required budget of $525 million for fusion research).
- **Space research.** The NASA program for putting a man on the moon resulted in a tremendous boost to the economy. New technologies ("spinoffs"), hundreds of thousands of new engineers, and a national commitment to scientific progress powered the whole U.S. economy through the 1960s. The Stockman budget makes severe cuts in the NASA budget, which will result in delays in the Space Shuttle, a cancellation of all planetary exploration projects, closing of the Jet Propulsion Laboratory, and the delay or cancellation of a multitude of earth-imaging and meteorological programs.
- **Science education.** The most critical component is manpower development. Without scientific and engineering knowhow, economic health is impossible. The longest lead-time item in any bill of materials is the skilled manpower required. The Stockman budget cuts the funding for science education from $112 million to $12 million!
- **A military R&D commitment.** One of the most effective ways to direct a program of national reindustrialization is with a well-conceived, imaginative military R&D policy. Space research, high-energy physics, and plasma technologies are all required for successful military research, and receive task orientation from such research. The essential point is that an expanding, vigorous economy, a large and healthy industrial base, and a strong military are inseparable.

Science & Technology

Europe protests U.S. space budget cuts

by Marsha Freeman

In testimony I attended before the space subcommittee of the House Committee on Science and Technology on March 11, Mr. E. Quistgaard, director general of the European Space Agency, expressed the outrage of the 11 member nations of that agency at the proposed budget cuts in the National Aeronautics and Space Administration (NASA). In particular, the ESA was concerned with the cuts dictated by the Office of Management and Budget in the budget request for fiscal year 1982 for the International Solar Polar Mission (ISPM), which is the largest such cooperative program. Since the project requires two identical spacecraft, and one of them was to be built by NASA, dumping the program on the U.S. side would kill the entire scientific mission.

Quistgaard noted that over the last 10 years, Europe has spent $1.2 billion in cooperative projects with the United States, and never imagined that once NASA had signed a memorandum of understanding on a program that the budget process could simply end it.

Following his testimony, excerpted below, concerned congressmen raised the question of whether the scrapping of the Solar Polar Mission would make the United States an "unreliable partner" in space science cooperation. Mr. Quistgaard emphasized that it would.

My Washington sources report that the European Space Agency has taken its case against the cuts directly to Secretary of State Alexander Haig.

From the Quistgaard testimony

The European director general stated:

"Because it has a bearing on some plain speaking I have to do later, I wish to state at the outset that ESA and its member states are fully committed to the principle of cooperation with the U.S. in space activities. Indeed, over the past 10 years, Europe has spent over $1.2 billion in cooperative projects with NASA.