American creation

The limits of the markets in visionary projects. BY MARK WILLIAMS

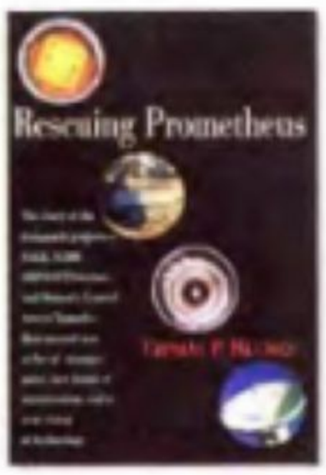
Rescuing Prometheus
By Thomas P. Hughes
372 pages, $28.50
Pantheon Books

The Future and Its Enemies: The Growing Conflict Over Creativity, Enterprise, and Progress
By Virginia Postrel
288 pages, $25
Free Press

WE KNOW that ancient Egypt concentrated its powers on building great pyramids and that medieval Europe achieved its aspirations by constructing great cathedrals. Likewise, claims Thomas P. Hughes in *Rescuing Prometheus*, "[h]istorians someday will see the similarities between the half-century history of the military-industrial-university complex since World War II and other memorable eras of human creativity."

What? Even Dwight Eisenhower (who, after the military types, favored rich industrialists as golfing buddies) warned us against the American military-industrial complex in his 1961 farewell address to the nation.

Mr. Hughes's analysis doesn't occur naturally to us. Yet the U.S. interstate freeway system, the ARPAnet (the original network on which the Internet was based), and the *Apollo* moon landings are culminating instances in human history. And they are just a few examples of 20th-century America's preëminence in collective enterprises—enterprises that needed coördination of vast and heterogeneous technological and human resources. Mr. Hughes, a professor emeritus of the history and sociology of science at the University of Pennsylvania, maintains that managerial knowledge was as crucial in these undertakings as any specific technological breakthroughs.



DEFENSE MECHANISMS

Providing case histories of four American megaprojects in which this "systems engineering" expertise evolved, Mr. Hughes reminds us that in the '50s the best scientists, engineers, and administrators often *sought out* national-defense work—not solely for financial gain or professional advancement, but because they believed it their duty to help counter the Soviet Union's threat to the United States and the human future. Thus the Semi-Automatic Ground Environment (SAGE) defense system involved the Massachusetts Institute of Technology, the Air Force, the Department of Defense, the Rand Corporation, and major companies like IBM. It innovated a continental network of computers capable of real-time information processing and control. And the Atlas intercontinental ballistic missile project, begun in 1954, required 200,000 suppliers, 18,000 technical experts (including the mathematician John von Neumann), and a workforce of more than 70,000.

"A nation does not walk away unchanged from its large technological projects," Mr. Hughes observes. In the '60s, with the transfer of technology from military to civilian sectors, SAGE and Atlas alumni spread out across the United States. During the Kennedy and Johnson administrations, systems advocates tried to engineer the Great Society. General Bernard Schriever, who had headed the Atlas project, started a corporate consortium called Urban Incorporated. Vice President Hubert Humphrey explained that "the systems analysis we have used in our space and aeronautics program ... is the approach that the modern city of America is going to need if it's going to become a livable institution."

TUNNEL VISION

But in confronting messy sociopolitical complexities rather than the clear objectives of aerospace programs, systems-oriented managers grew frustrated by failure; Defense Secretary Robert McNamara's technocratic management style made the war in Vietnam a bloodier fiasco. Only in the light of the subsequent national disillusion with top-down systems approaches, Mr. Hughes says, should two later federal megaprojects—the Boston Central Artery/Tunnel Project and the ARPAnet—be considered.

When it is finished in 2004, the Boston Central Artery/Tunnel Project—the biggest public works program in the

United States today and the world's largest underground highway—will complete the interstate system begun under Eisenhower. Its chief engineer, Frederick Salvucci, has treated the project as an open system: diverse interests, including environmentalists, downtown business owners, neighborhoods, and advocates for the poor, have helped shape it; engineers have been hired to propose alternative designs for some sections.

Mr. Hughes believes that the ARPAnet's development as a flexible network of autonomous nodes sharing resources in a nonhierarchical fashion derives from a similar instinct: the design "can be attributed to the counterculture values that spread in the 1960s." In this horizontal ethos—and in the embrace of public participation by the Boston tunnel's planners—Mr. Hughes sees the way forward for builders of giant systems that address "the messy environmental, political, and social complexity of the postindustrial world." Hence his book's title, *Rescuing Prometheus*.

Whatever one thinks of Mr. Hughes's thesis, it is salutary to be reminded of our origins: that the whole edifice of Silicon Valley was erected

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and maintained for decades on federal research subsidies and Pentagon purchases of advanced technology. Some people are in denial about this fact.

The rest of us adopt something like Virginia Postrel's tack in *The Future and Its Enemies:* "The Internet('s) ... origins as a Defense Department program are far less significant than its bottom-up growth and development."

True enough. Yet I have qualms with Ms. Postrel's formulation: she is tidying away the historical facts. The Internet's bottom-up development was possible only because of the decentralized design of the ARPAnet, which was bequeathed to us by government planners and funded with federal monies.

Still, Ms. Postrel is correct in her central thesis. The division in our culture isn't between conservatives and liberals: increasingly, the far right is uniting with the far left in demanding, for example, that government enact policies to restrict trade and immigration. Rightists would restore some traditional ideal; leftists would impose old-style technocratic social planning. But both, in reacting against unmanaged change, are "stasists," in Ms. Postrel's

estimation. "Dynamists," on the other hand, embrace the spontaneously developing future, she says: it's the end of the world as they know it, but they feel fine—and they don't want anyone in charge.

MARKET ORDER

Ms. Postrel makes some astute points about this culture divide. Convinced of the general superiority of evolution to legislation, she quotes Friederich von Hayek persuasively on the virtue of free markets: "[W]ithout an order being issued, without more than perhaps a handful of people knowing the cause, tens of thousands of people ... move in the right direction."

It's the accepted wisdom of our time, of course, as the technocrats' was in theirs. And markets *are* preferable to edicts from some elite. But Ms. Postrel's assumption that this is the final wisdom, never to be superseded, seems, well, stasist. Our nation's technocrats reached the moon but lost the inner cities and Vietnam. We will presumably find that markets have their own limits.

Free markets are efficient in giving us what we want—which isn't necessarily what we need. Markets aren't effective in certain large, crucial spheres. *The Future and Its Enemies* tends to disdain those who seek to create public forums and to democratize participation in large projects. But how else would we maximize open, market-driven processes in these contexts? It may be that the largest megaprojects—those extending our civilization's infrastructure—may in reality remain beyond full privatization.

During the next century we *will* see more megaprojects, and we will face challenges comparable to the Cold War. (Think of what will be needed when global warming kicks in!) These projects will be essential to our survival.

That's how they have always been justified, of course. Cold War technocrats believed the space program necessary for our physical survival: America had to reach the strategic high ground, before the enemy put up orbital missile platforms and lunar bases. Yet Hubert Humphrey's assertion that the technology that took Americans to the moon would save American cities strikes us now as the quaintest rationalization.

The Egyptians built pyramids and the Europeans cathedrals as matters of spiritual survival. This may be closer to the truth. Pyramids, cathedrals, moon landings, the Internet: none is practically necessary, but all were executed because human beings require large, visionary projects. Great, *cool* things.

Many of the really important things that humans do, we do only because they're cool. And even free markets are finally too limited—insufficiently dynamist, if you will—to account for and sustain colossal projects. But we undertake them anyway.

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