The Columbia Space Shuttle disaster: science and the profit system

Part 3—Political and economic causes underlying the accident

Joseph Kay
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On February 1, 2003, the Space Shuttle Columbia was destroyed upon reentry into the earth's atmosphere, killing all seven crew members. Shortly after the incident, the Columbia Accident Investigation Board (CAIB) was set up to investigate the causes of the disaster. The board summarized its findings in a report released on August 26. This series of three articles analyzes the report and the accident itself.

Part 1 *discussed the physical cause of the accident—a breach in the orbiter's Thermal Protection System caused by a foam strike during the shuttle's launch. The* second part *analyzed schedule pressures and the reaction of shuttle engineers and management after the launch. The third and final part looks at the underlying cause of the accident: the subordination of the scientific purposes of the shuttle to a political and economic system dominated by the demands of private profit.*

The report is available at the CAIB website: http://www.caib.us. *All numbers in parentheses refer to page numbers of the report.*

The previous articles in this series have looked at two of the factors involved in the demise of the Space Shuttle *Columbia* and its crew. The immediate physical cause of the accident was a breach in the Reinforced Carbon-Carbon section of the orbiter's Thermal Protection System, which caused the orbiter to burn up upon reentry. This occurred within the context of enormous schedule pressure placed upon NASA by the Bush administration, which encouraged NASA management to sacrifice safety in order to keep launches from falling behind.

There is a broader context in which these developments took place. From its very inception, the manned space program has been warped by political and economic pressures—pressures that have subordinated the scientific mission of the program to geopolitical and profit interests. The large-scale privatization of the shuttle program over the past decade, combined with sharp cuts in NASA's budget, have exacerbated these pressures and paved the way for the *Columbia* accident.

History of the Space Shuttle program

The Shuttle program was born in the wake of the Apollo project, which placed the first man on the moon in 1969. After Apollo, NASA hoped to construct a low-orbit space station that would serve as a jumping off point for more exhaustive exploration of the moon and eventually Mars and beyond. The Space Shuttle was originally intended as a component of this broad space system.

But the end of the 1960s and the beginning of the 1970s was a period of economic crisis, with the costs of the Vietnam War escalating. Neither President Lyndon Johnson nor Richard Nixon was interested in funding NASA's ambitious space station project. "Nixon rejected NASA's ambitions with little hesitation," the CAIB report notes, "and directed that the agency's budget be cut as much as was politically feasible. With NASA's space station plans deferred and further production of the Saturn V launch vehicle cancelled, the Space Shuttle was the only manned space flight program that the space agency could hope to undertake" (22).

By promoting the shuttle as an all-purpose vehicle that could be used to launch military and commercial satellites in addition to conducting scientific investigation, NASA was able to justify the cost to the Nixon administration. But this meant presenting the shuttle as a vehicle capable of regular and sustained use, rather than a "developmental" project still in its early stages.

The space shuttle also continued to serve a geopolitical function within the context of the Cold War. While not so important to the American government for propaganda purposes as was the moon landing, the government could not afford to abandon manned space flight, leaving the field to the Soviet Union.

The first shuttle—*Columbia*—was not launched until April 1981. President Ronald Reagan said in 1982, "Beginning with the next flight, the *Columbia* and her sister ships will be fully operational, ready to provide economical and routine access to space for scientific exploration, commercial ventures, and for tasks related to the national security" (23).

This was simply false. As the report notes, the shuttle was by no means in operational mode. It was still a developmental vehicle, that is, it still had to go through rigorous experimentation and careful oversight. The goals that had been set for the agency—including 50 launches per year—were truly impossible given this experimental character. However there was a constant push to increase launches while keeping ballooning costs low.

The *Challenger* disaster on January 28, 1986 threw NASA into crisis. The Commission that was set up to investigate the accident produced a report that whitewashed the role of the Reagan administration, which had pushed the launch for political reasons [see The Columbia shuttle tragedy: Lessons of the Challenger inquiry]. The commission called for a number of changes in the way safety issues were handled at NASA, including the creation of an independent Office of Safety, Reliability, and Quality Assurance, but made no attempt to transform the basic problems responsible for the disaster in the first place—the contradiction between the political and economic considerations promoted by the Reagan and previous administrations and the logical evolution of space exploration as a scientific enterprise. These contradictions have become even more intense over the course of the last two decades.

Reagan responded to the disaster by declaring that the shuttle would no longer be used for military and commercial transportation, undermining one of the major reasons that the government had continued to fund the

program.

After a long period of inactivity, the shuttle again came into operation in September 1988. It was now primarily focused on scientific projects, including the construction of the International Space Station (ISS).

Privatization of the shuttle program

During the 1990s, the shuttle program was subject to a wave of privatization and cost cutting. The goal promoted by the Clinton administration—in particular by Vice President Al Gore—was to reduce budget costs by opening up previously government-run operations to private corporations. Indeed, one of the main reasons the shuttle program has not been completely eliminated is that there are significant vested interests involved, particular of the giant defense contractors Boeing and Lockheed Martin.

The move to privatize the space program—NASA is now the most privatized federal agency—was bound up with a whole epoch of American capitalism that began in the 1970s. As the economic expansion of the postwar period came to the end, any restrictions on private capital were systematically eliminated, a process that continues to this day. Regulated industries—electricity, transportation, etc.—have been deregulated. Areas where the government once played a dominant role have been privatized for the benefit of giant corporations. NASA has always used contractors, but never to the extent that it does today.

A team led by Christopher Kraft—former director of the Johnson Space Center—issued a report in 1995 that formed the basis for the move to privatization. The Kraft report called for the transfer of most operations out of the hands of NASA and into the hands of a single private entity. In particular, the report denounced the additional safety measures that had been put in place after the *Challenger* accident.

"As a result of the Challenger accident," the report concluded, "a 'safety shield' philosophy has evolved creating a difficult management situation. Managers, engineers, and business people are reluctant to make decisions that involve risk because of the fear of persecution.... Restructuring and streamlining [Safety, Reliability, and Quality Assurance] throughout the Shuttle Program, maintaining only the necessary checks and balances, must be accomplished to achieve significant cost reduction" (quoted from the Kraft report, http://www.fas.org/spp/kraft.htm).

The Kraft report led to the granting of a major contract to Lockheed Martin and Rockwell. The latter has since been bought up by Boeing. "The contract also rewarded any cost reductions that United Space Alliance [the Boeing-Lockheed joint venture] was able to achieve, with NASA taking 65 percent of any savings and United Space Alliance 35 percent" (108). The total value of the contract over the six-year period from 1996 to 2004 is estimated at $12.8 billion, but the contractors have a clear incentive to cut costs as much as possible.

United Space Alliance is responsible for processing the components of the shuttle, designing shuttle missions, training astronauts, operating and maintaining shuttle-related facilities, among other things. Other components—including the construction of the external tank and the RCC panels—are performed by Lockheed or Boeing separately. Plans for the complete privatization of the shuttle have been delayed by the *Columbia* accident.

A 2000 study cited by the board indicated some of the consequences of privatization: "Five years of buyouts and downsizing have led to serious skill imbalances and an overtaxed core workforce. As more employees have departed, the workload and stress [on those] remaining have increased, with a corresponding increase in the potential for impacts to operational capacity and safety" (110).

The role of NASA in safety was reduced to providing "insight" to the private contractors, who were given direct responsibility for quality assurance. "Collectively, this eroded NASA's in-house engineering and technical capabilities and increased the agency's reliance on the United Space Alliance and its subcontractors to identify, track, and resolve problems. The contract also involved substantial transfers of safety responsibility from the government to the private sector; rollbacks of tens of thousands of Government Mandated Inspection Points; and vast reduction in NASA's in-house safety-related technical expertise..." (179).

Instrumental in the privatization of the shuttle program was the Clinton-appointed NASA administrator, Daniel Goldin, who served from 1992 to 2001. Goldin championed the phrase, "faster, better, cheaper" for the new style of NASA and advocated that NASA conform to the corporate management principles of Edwards Deming, including decentralization of authority and the elimination of checks and balances.

What did this mean in practice? That the corporate contractors of NASA would be delegated primary responsibility for safety and maintenance and NASA would perform merely a supervisory role over the private sector. "Goldin rejected the criticism that he was sacrificing safety in the name of efficiency. In 1994 he told an audience at the Jet Propulsion Laboratory, 'When I ask for the budget to be cut, I'm told it's going to impact safety on the Space Shuttle.... I think that's a bunch of crap'" (106).

The cuts in workforce over the past decade—both at the contractors and at NASA—have been staggering. Since 1993, the total contractor shuttle workforce declined from 26,310 to 15,744 and the NASA workforce declined from 3,781 to 1,718.

The transfer of significant control to contractors no doubt played a role in the shuttle's demise. As pointed out in the first article of this series, there were correctable problems with both the external tank and the RCC paneling. The profit interests of these corporations in cutting costs and labor substantially reduced the amount of attention given to testing and safety considerations.

At the same time as the program has been largely privatized, NASA's budget has been reduced substantially. "With inflation taken into account, over the past decade, there has been a reduction of approximately 40 percent in the purchasing power of the program's budget, compared to a reduction of 13 percent in the NASA budget overall" (104). The shuttle program, moreover, has been forced to compete for resources within the overall NASA allowance. The amount of money going to the shuttle program declined from $5.5 billion in 1990 to $3.1 billion in 2001.

Subordination of science to the profit system

In explaining the underlying cause of the *Columbia* accident, the CAIB report often cites the role of NASA's "culture." "Organizational culture," states the report, "refers to the basic values, norms, beliefs, and practices that characterize the functioning of a particular institution. At the most basic level, organizational culture defines the assumptions that employees make as they carry out their work." This culture supposedly caused NASA to fail to properly heed safety warnings. "Within NASA centers, as Human Space Flight Program managers strove to maintain their view of the organization, they lost their ability to accept criticism, leading them to reject the recommendations of many boards and blue ribbon panels, the Rogers Commission among them" (101-2).

The CAIB's repeated invocation of the "culture of NASA"—which has become the primary focus in news reports—is really a red herring. It suggests that NASA was somehow different in its internal atmosphere from the giant corporations which operated the United Space Alliance and

from corporate America as a whole. But there is no large organization in American capitalist society which encourages rank-and-file workers to alert top management over potential safety dangers, workplace hazards, or even about problems which could wreck an entire enterprise, especially if that involves confronting management with its own failures and negligence. As the daily experience of tens of millions of workers testifies—to say nothing of the wave of corporate scandals of the past two years—the conformism and "keep your mouth shut" atmosphere in NASA only reproduces what prevails more generally in American capitalism.

The purpose of the cultural explanation is to avoid making any serious criticism of the economic and political system responsible for creating conditions in which an accident was entirely predicable. This is clear from the CAIB report, which ends with a number of meager recommendations that stand in stark contrast to the material presented in the report itself. Included are such platitudes as: "Leaders create culture. It is their responsibility to change it" and "Strategies must increase the clarity, strength and presence of signals that challenge assumptions about risk" (203).

Besides short-term recommendations to fix the specific material problems that caused the accident—the foam on the external tank and the RCC panels—the main proposal is for an independent Technical Engineering Authority and for a more independent safety system. Such organizational reforms are no different in essence from the proposals made by the investigation into the *Challenger* accident.

The board does not directly indict those responsible for the shuttle accident and therefore for the deaths of the astronauts on board: contractors who skimped on safety, members of both the Democratic and Republican parties who pushed privatization while cutting funding, and the Bush administration which put enormous schedule pressure on NASA in spite of evidence of safety lapses.

The board likewise does not and cannot address the more systemic problems which arise clearly from the report itself. Ultimately, the *Columbia* accident was a product not of the "culture" of NASA, but of the capitalist system. It is impossible to meet the requirements of such a complicated and risky undertaking as human space flight within the framework of an economic and political system in which the overriding concern is the self-enrichment of a tiny elite. Modern science is by its very nature a social enterprise, requiring vast amounts of resources and international coordination. It demands conscious and rational control, with decisions on such things as funding, schedules and safety requirements determined by human requirements and the logic of the science and technology itself.

The achievement of human space flight is an extraordinary testament to modern science and technology. Its progressive content—the ever greater reach of human knowledge and exploration—must be continued and expanded. Whether this will require human space flight per se in the years to come is difficult to say. As things stand, the space shuttle program has become so warped by private economic and political interests that it is nearly impossible to determine what is necessary from a scientific perspective. What is clear is that the future of human space flight cannot be rationally considered within the present social system.