Chapter 5

Framing the Meanings of Spaceflight in the Shuttle Era

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Among public policy analysts and pundits, it is conventional wisdom (and has been almost since the Space Shuttle appeared) that the United States lacks a unifying societal consensus about the fundamental purpose or goal of contemporary human spaceflight. Thirty years and more than 115 missions after the first Shuttle orbiter *Enterprise* made its debut in 1976, the debate continues along much the same lines as it began: What purpose justifies the cost and risk of placing people in space? In what intellectual framework does this enterprise make civic sense? Both the proponents and opponents of human spaceflight have struggled to express a credible, broadly persuasive rationale that appeals to or reflects supporting societal values.

Advocates in the Mercury-Gemini-Apollo era of the 1960s were not so tasked. The politics of the time and presidential leadership gave rise to two readily intelligible frames of reference for nascent human spaceflight: a competitive space race with the Soviet Union, and a pioneering venture into a new frontier. Both resonated with the American public's hopes, fears, and values. NASA did not need to craft a compelling rationale for sending people into space; politicians and the media purveyed these messages.

Steeped in cold war anxieties about a possibly mortal adversary, citizens could understand the importance of an all-out thrust into space, especially after the Soviets made the first forays there. There was little disputing whether it was worth the cost and risk; the affirmative response accorded with a people accustomed to victory and anxious about the bomb. A *Time* magazine cover in December, 1968, with an astronaut and cosmonaut sprinting toward the Moon, captured the patriotic urgency of this race against time, perceived as a race for survival against communism.

Likewise, the effort to reach the Moon resonated with a widely held view of America as a pioneering nation with a frontier heritage. President Kennedy and his speechwriters masterfully worked with this deeply ingrained sense of national identity as a metaphor for exploring the new ocean of space. Racing and pioneering merged in triumphant images of the U.S. flag and astronauts on the dim landscape of another world.

But what vision came after? Without a race to win or a frontier to conquer, continued human spaceflight demanded a new purpose that made sense as a national endeavor. How would NASA make the case and what role would the media play in defining its purpose? How would society find meaning in continued spaceflight? Could human spaceflight fit into other frames?

Over the past five decades NASA, the media, and interested sectors (aerospace industry, scientific community, political figures, grass-roots groups, and others) plus thoughtful individuals have engaged in an ongoing process of asserting and contesting the value of human spaceflight by advancing a variety of visions or metaphors meant to answer such questions and sway public opinion. The continual effort to define the purpose of human spaceflight and reach a societal consensus on its value can be viewed as an extended exercise in the social construction of meaning. In the Shuttle era, at least five reference frames have been crafted, promoted, critiqued, refined, accepted, rejected, or transformed in the process of shaping and communicating the meaning of human spaceflight. These frames reveal much about what Americans hope for—and doubt—in our national ventures into space.

FRAME ANALYSIS AS AN INTERPRETIVE TOOL

To pursue these questions about the meaning of Shuttle-era human spaceflight, it is helpful to apply some concepts, terms, and techniques from the literature of "frame analysis" that has become prominent in social science disciplines, especially in media studies and the study of social movements.[1] In this context human spaceflight can be considered a social movement that has an action agenda, an imperative to muster resources, and a need to mobilize public support in order to carry out its agenda. NASA is the hub of this social movement, with aerospace companies, space societies, other government entities, and auxiliaries in the advocacy community, including some in the media.

To analyze how social movements motivate public support, some scholars focus on framing processes, and they use the term "framing" for the "construction of meaning." Framing is the packaging of messages that resonate with core values and appeal to supporters. A "collective action frame" is a construct of ideas and

1. Erving Goffman, *Frame Analysis* (New York: Harper & Row, 1974); William A. Gamson and Andre Modigliani, "Media Discourse and Public Opinion on Nuclear Power," *American Journal of Sociology* 95 (1989): pp. 1–37; William A. Gamson, David Croteau, William Hoynes, and Theodore Sasson, "Media Images and the Social Construction of Reality," *Annual Review of Sociology* 18 (1992): pp. 373–393; Zhongdang Pan and Gerald M. Kosicki, "Framing Analysis: An Approach to News Discourse," *Political Communication* 10 (1993): pp. 55–73; Robert D. Benford and David A. Snow, "Framing Processes and Social Movements: An Overview and Assessment," *Annual Review of Sociology* 26 (2000): pp. 611–639.

meanings based on shared beliefs and values that will motivate support.[2] It is the conceptual analogy to a structural framework or a picture frame. The space race and the space frontier are such conceptual frames.

Frames are "the basic frameworks of understanding available in our society for making sense out of events"; they help to render events meaningful, organize experience, guide action, and simplify and condense aspects of the world.[3] They are intended to motivate support and disarm opposition, to inspire adherents, and to legitimize the activities and campaigns of a social movement. Frames provide context for a proposed action or policy. Opponents may contest or challenge them with counter-frames.[4]

The mobilizing potency of a frame lies in its credibility and resonance. It must be consistent with the facts and goals of the movement, and it must resonate with the beliefs, values, and interests of the targeted support community or constituents. Even more broadly, it should have "narrative fidelity" or coherence with cultural assumptions and myths in the public domain. Activists use cultural resources—beliefs, values, myths—as a "tool kit" to make their cause appealing and believable, and audiences also use them to gauge resonance.[5]

Because framing is an intentional process, frames need not be static. They can evolve as circumstances change, either to account for unexpected events or to better appeal to the target community. To mobilize support, a frame may need to be fairly elastic.[6]

Social movement activists are not the only ones developing frames of meaning. Media discourse also participates in the process of constructing meaning. Analysis of media discourse relative to a variety of social movements (e.g., the women's movement, nuclear power, civil rights) reveals sophisticated frames or "interpretive packages" that are promulgated to make sense of issues and events. Like frames, interpretive packages have a central organizing idea, often presented in shorthand through symbols, metaphors, visual images, and icons. The media provide both an accessible forum for public consideration of issues and for suggested interpretations that help to shape the social construction of meaning.[7]

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2. Benford and Snow, "Framing Processes," cited above, explicate these and other key concepts and vocabulary in frame analysis scholarship.

3. Goffman, *Frame Analysis*, 10; Benford and Snow, "Framing Processes," pp. 613–614.

4. Benford and Snow, "Framing Processes," discuss frame disputes, contested framing processes, and counter-framing, pp. 625–627.

5. Benford and Snow, "Framing Processes," pp. 619–622, 629; Gamson and Modigliani, "Media Discourse," pp. 1–10.

6. Benford and Snow, "Framing Processes," discuss framing processes and dynamics, pp. 622–632; Scott Davies, "The Paradox of Progressive Education: A Frame Analysis," *Sociology of Education* 75, no. 4 (October 2002): pp. 269–286, esp. 270–273, refers to "two faces" (stable and changeable) of frames.

7. Gamson and Modigliani, "Media Discourse"; Gamson et al., "Media Images"; Nadya Terkildsen and Frauke Schnell, "How Media Frames Move Public Opinion: An Analysis of the Women's Movement," *Political Research Quarterly* 50, no. 4 (December 1977): pp. 879–900; Frank D. Durham, "News Frames as Social Narratives: TWA Flight 800," *Journal of Communication* 48, no. 4 (Autumn 1998): pp. 100–117.

This paper applies frame analysis concepts to human spaceflight during the three-plus decades of the Shuttle era. Primary sources for this analysis are selected elements of societal discourse that helped shape or curb public expectations of contemporary spaceflight—in this study, NASA's publicity materials, *The New York Times* (news, editorials, and opinion pieces), and editorial cartoons from a variety of papers. *The New York Times* was selected for its breadth of coverage of Shuttle missions and spaceflight, its often critical editorial stance, and the long tenure of reporter-analyst John Noble Wilford, who often wrestled with the meaning of human spaceflight. Other newspapers, magazines, and electronic media that could be fruitfully explored are not included in this brief study; likewise, speeches, transcripts of Congressional hearings, and other official documents might be examined for a broader study. Among the techniques of frame analysis is close textual study with attention to keywords and themes, a rhetorical approach that is suitable for the sources examined.

FRAMING HUMAN SPACEFLIGHT: A NEW ERA IN SPACE TRANSPORTATION

With the Space Shuttle, NASA introduced a new frame of reference to justify human spaceflight and capture popular interest and political support. It was "A New Era" in space transportation, setting human spaceflight into a long tradition of optimistic, progressive, utopian visions of a brighter future. The cultural context for a new age or new era extends to the origins of America as a new world, a key concept of national identity. The frame of newness also harkened to a history of American innovation in transportation; automobiles and aircraft had already brought about new eras in travel, with widespread social impact. Placing human spaceflight and the Shuttle into this frame—radically different from the pioneering race of the 1960s—gave it a familiar appeal.

NASA promoted this theme through varied channels, including informative, colorful public affairs brochures disseminated to the media and elsewhere. As soon as the decision to develop the Space Shuttle was made in 1972, NASA began to frame the new era for the public. Artist Robert McCall was commissioned to paint scenes of typical Shuttle missions for a brochure that literally framed new ways of doing things in space.[8] A 1977 pamphlet titled *The Shuttle Era* claimed, "Now a new era nears . . . the coming of age in space" when people will be able to do important work there in ways never before possible.[9] At about the same time, the Shuttle contractor Rockwell International began to release public relations materials to promote "A Promising New Era."[10]

8. *Space Shuttle* (Washington, DC: National Aeronautics and Space Administration Educational Publication EP-96, June 1972).

9. *The Shuttle Era*, Space Shuttle Fact Sheet NASA-S-76-815A (Washington, DC: National Aeronautics and Space Administration, March 1977).

10. Rockwell International Space Division, *Space Shuttle Transportation System: A Promising New Era for Earth*, September 1976, and *Space Shuttle: A Promising New Era for Earth*, January 1977.

Crews from several missions in the 1980s relished their role in delivering and repairing satellites, adopting such business-like monikers as Ace Satellite Repair Co. and Ace Moving Co., with "We pick up and deliver" and "The sky's no limit" as mottos.

Routine space transportation was the central tenet of the new era. In this frame, spaceflight would no longer be a pioneering adventure; it would become commonplace and practical, in Earth orbit, not outward-bound. In a burst of metaphors, NASA claimed that people would travel a highway to space in a workhorse shuttle vehicle that would operate like an airliner. That mixed image might have been a clue that the new-era routine transportation frame was strained.

NASA further elaborated the concept of routine access to space with purposes that could appeal to special interests and make sense to the public at large. Commercial enterprise could use the shuttle to cash in on space by launching satellites or developing manufacturing capabilities there. Knowledge would increase as observatories were placed in orbit or scientists conducted laboratory science in space. National security would be enhanced by regular delivery of defense department payloads. All these activities on the Shuttle would lead to practical benefits on Earth. NASA thus plugged into the frame something to appeal to each necessary constituency—business, science, and military—and purposes that moreover would resonate with the public.

With promised economic, scientific, and security benefits, citizens could understand a practical approach to human spaceflight. Add to that the typical American consumer's desire for the latest-model vehicle or the newest technology, as well as Americans' regard for the nation's transportation systems, and the new era of routine space transportation was a potent frame for human spaceflight on the Space Shuttle. In this context, the purpose of human spaceflight was not exploration; it was useful work. The Shuttle served as icon for this whole frame of meaning. To see the stubby-winged shape of the

orbiter or the whole launch configuration with boosters and fuel tank was to recognize the new era—and new meaning—of human spaceflight. Humans were curiously absent from these early depictions; the Shuttle vehicle, often called a spaceplane or a space truck, symbolized the practical new purpose of people in space.

The New York Times director of science news John Noble Wilford was among the first journalists to introduce the Shuttle-era frame of reference to the public. His 1977 feature article, "Another Small Step for Man: Shuttling into Space," laid a bridge from the past to the future as the first Shuttle *Enterprise* engaged in atmospheric flight tests. Echoing Neil Armstrong's famous words on the Moon, Wilford placed the Shuttle on the next rung of the ladder to humanity's destiny in space and recognized it as a revolution in space travel. He foresaw that the "era of the spaceplane" meant hauling orbital freight on regular flights and handling satellites by the three Rs—release, retrieve, repair. The Shuttle would not be used for exploration. But, because it would offer the ability to do new things in space, the Shuttle might have a far-reaching impact, as did the automobile and airplane.[11] At the end of the 1970s decade (just a bit prematurely), Wilford announced a variant of the new era concept: the "Commuting Age Dawns in Space."[12]

When the new era truly dawned in 1981 as Space Shuttle *Columbia* roared into orbit, the new frame of reference crafted by NASA and presented in the media was in place. There might have been a different meaning construction—perhaps a mythic journey or another metaphor—but none other was offered. Already there were skeptics and critics, but the news media in unison trumpeted a new era of routine transportation to space.

Framing Human Spaceflight: A Business

A corollary to the new era of routine space transportation also was promoted: spaceflight as a business. NASA claimed that the reusable Shuttle would lower the cost of spaceflight and make transportation to and from Earth orbit economical. The foundation for Shuttle-era spaceflight would be a business model inspired by the commercial airline industry. NASA managers studied airline operations and sought to drum up the customer market, contracted with payload owners for orbital flights, plotted the mission manifests, and calculated the operating margins to turn spaceflight into, if not a flourishing, at least a break-even business. With a sufficient number of vehicles and frequency of flights, the Shuttle might bring down the cost of spaceflight and pay for itself.

This business-model frame served to defend the Shuttle against critics who argued that the program was unnecessary and too expensive, and it dovetailed well with the

11. John Noble Wilford, "Another Small Step for Man: Shuttling into Space," *The New York Times*, 7 August 1977, Sunday Magazine: pp. 7, 28, 54 ff.

12. John Noble Wilford, "Commuting Age Dawns in Space," *The New York Times*, 30 December 1979.

concept of routine transportation for useful work in space. Transportation businesses on Earth—interstate trucking, railroads, shipping, as well as airlines—were familiar analogues to give meaning to a space transportation enterprise. This blend of concepts exemplified frame enhancement or frame elaboration, a strategy for broadening the appeal of a social action agenda, often by appropriating some elements of an adversary's position. Human spaceflight in this frame did not mean adventure and exploration; it meant efficiently running a business for practical benefits if not profits.

The business-model frame proved vulnerable to critique by standard business accounting and auditing principles; it invited measurement of costs and gains. NASA had provided the quantifiable metrics for judging the performance of human spaceflight: flight rates and flight costs. As the Shuttle became operational in the 1980s, it was not difficult for stakeholders in the business to do cost-benefit audits and assess the return on investment in human spaceflight. The value of work performed by the astronauts was more difficult to measure quantitatively, so the cost of operating the Shuttle served as the primary measure for judging the value of human spaceflight. Thus, the business frame that was meant to promote also became a frame for critiquing spaceflight.

Reality Check: The Early Shuttle Era in Practice

A brief survey of reporting and editorializing about spaceflight during the first five years of the Shuttle era shows how these two theoretical frames of meaning fared in practice. Reactions to the first 23 Shuttle missions (1981–1985) in *The New York Times* served as "reality checks" for assessing actual spaceflight in the new era within the routine transportation and business frames. Greeting the Shuttle as a bold new approach to human spaceflight and the first mission as a triumphant return to space, the paper proclaimed "Columbia . . . Opening a New Era of Space Flight."[13] Yet chief Shuttle observer John Noble Wilford cautioned from the outset that the future was by no means certain; it might prove difficult to fulfill the optimistic predictions of the new era.

A week before *Columbia*'s first launch, Wilford published another long, thoughtful essay, this one on "Space and the American Vision."[14] Four years had elapsed since his "Shuttling into Space" article—years during which the Shuttle had been plagued with technical problems, cost increases, and delays. Wilford again framed the meaning of the new era of human spaceflight, but now the routine transportation scheme did not seem as plausible or resonant as before, and the Shuttle had not even flown yet. There was a note of ambivalence about the Shuttle

13. Articles in *The New York Times* by Wilford and others, April 1981; headline from 15 April 1981: pp. A21.

14. John Noble Wilford, "Space and the American Vision," *The New York Times*, 5 April 1981, Sunday Magazine: pp. 14 ff, 118 ff.

era in his rhetoric as he tried to reconcile America's spacefaring destiny with the spaceplane's mundane mission of hauling orbital freight.

Because 13 of the first 23 missions were indeed freight-hauling flights to deliver satellites for commercial customers, *The New York Times* reporters generally conveyed Shuttle mission news within the routine transportation frame, featuring the three Rs of space trucking (release, retrieve, repair). But they also made room in stories for questions about the cost of Shuttle missions and reported all manner of technical glitches and delays that belied the concept of routine spaceflight. The terms "failure," "delay," and "problem" repeated frequently in news accounts subtly challenged the accepted frames of reference and sowed doubts about the fit between these frames and reality. Yet the Shuttle came to be understood as a space truck delivering large cargos to orbit—an image that some of the astronaut crews happily fostered—and successive satellite deliveries helped to establish a semblance of routine spaceflight.[15]

Attention to five missions in 1984 and 1985 elevated the space truck to new heights of interest by putting humans squarely in the focus. These missions added a Buck Rogers gloss to the notion of routine work in space and made vivid the role of human spaceflight.[16] The common theme of these servicing and salvage missions was satellites gone awry—humans to the rescue. The drama of astronauts flying away from the Shuttle in jet backpacks, grappling errant satellites, wrestling them into the payload bay, and then conducting repairs, put a human face on the new-era frame. The Shuttle image broadened from delivery truck to tow truck to service station, and the astronauts earned credit as orbital repairmen. Extravehicular activity (EVA) figured heavily in these missions and was a visibly effective way to demonstrate human capability in space. The missions showed off new astronaut tools—the piloted maneuvering unit backpack, the remote manipulator system robotic arm, the power hand tools—that gave working in space a vivid dexterity. The message in the media, and from NASA, was that "nothing like this has ever been done before."

By the end of 1985, with 23 Shuttle missions completed, *The New York Times* (and other news media) had validated the new era of routine space transportation concept as the meaning frame for human spaceflight. However, a noticeable current of critique ran through some of the news reports, and more so in editorials and opinions. Alert journalists noted that about two-thirds of the launches had been

15. Typically *The New York Time*s ran a news article each day of each mission; several in the days just before launch and after landing; at least one article for every delay or significant problem; and occasional analytical pieces. The mission-related coverage during the 1981–85 period totaled hundreds of articles.

16. The five missions were, in 1984, the 10th (STS 41-B), featuring first flights in the Manned Maneuvering Unit; the 11th (STS 41-C), the Solar Max observatory repair mission; the 14th (STS 51-A), the first satellite retrieval to return the Westar and Palapa communications satellites; and in 1985, the 16th (STS 51-D), another satellite delivery mission, and the 20th (STS 51-I) to deliver three satellites and retrieve/repair another. See *The New York Times* articles by Wilford and others in January–April and November 1984, and April and August–September 1985.

The quintessential frames for the meaning of human spaceflight are images of a single astronaut poised against black space, the vivid Earth, or the landscape of another world. They resonate with adventure, risk, courage, heroism, discovery, and beauty.

delayed by weather or technical problems; several missions had been delayed in returning or brought home early for the same reasons; and five years into the new era the launch schedule was always subject to change. By these measures, "routine" transportation seemed ephemeral. Of the satellites deployed from the Shuttle, enough had failed to reach their intended orbits or operate properly that salvage missions were required, making the satellite deployment role for the Shuttle look less rosy. Worrisome repeated problems such as damaged tiles, fluid leaks, computer malfunctions, locked brakes, and blown tires also clouded the picture of routine transportation. Occasional serious anomalies discovered after landing—evidence of a fire and explosion in the engine compartment, a large hole in a wing with partial melting of the structure—gave pause for observers to wonder how safe the Shuttle really was.[17] Despite the frequency and variety of missions in this new era, evidence mounted that human spaceflight was not yet routine.

Only a few of the early Shuttle missions provoked editorial commentary in *The New York Times*, which began to challenge the concepts of routine space transportation and useful human spaceflight. A skeptical editorial—"Is the Shuttle Worth Rooting For?"—appeared on the eve of the first Shuttle launch. While acknowledging the Shuttle as "an unquestionable technological achievement," the editors noted that it was "a technology in search of a mission" that might become a white elephant. The

17. Ninth mission (STS-9, 1983), aft compartment fire upon landing; 16th mission (STS 51-D, 1985), damaged wing.

reason for their ambivalence: uncertainty that the Shuttle would really cut the cost of operating in space.[18] A few days later, the editors tempered their end-of-mission congratulations with the question, "Now that we own a successful space shuttle, what do we do with it?" Their standard: "What can a reasonable society afford?"[19] The next editorial on the Shuttle suggested limiting the number of spaceplanes to allow for continued planetary exploration.[20]

To mark the third successful Shuttle mission, *The New York Times* acknowledged that *Columbia* "almost succeeded in placing the stamp of routine on shuttling into space," but charged that NASA was not using the magnificent machine with sufficient style. It deserved a purpose greater than trucking freight. In this instance, reality fit within the routine transportation frame but the frame itself was challenged as unimaginative. However, no alternate frame was tendered.[21]

The tension between spacefaring and freight-hauling was a latent stress on the new-era routine transportation and business frames of reference. Wilford's occasional reflections on the Shuttle missions showed the stress fractures in these frames, and revealed how they were becoming dissonant, rather than resonant, with some important societal values. "This is no adventure in exploration; this is a freight run," he wrote upon witnessing the eighth launch. It did not inspire the same thrill as a mission to the Moon. He began to try to reframe human spaceflight by defining for it a purpose worthy of a spacefaring people with a tradition of exploration. With NASA under pressure to make spaceflight an economical business, he argued that the nation should aspire to a new vision of its future in space. Although the Shuttle and a future space station would expand human activities in space, he looked to the robotic voyages of discovery in the solar system as the model for inspiring wonder and rekindling the spirit of the Apollo era.[22]

Before 20 missions had flown, Wilford wrote a piece measuring actual performance against promise, in effect measuring the fit between the routine space transportation frame and reality. Using such metrics as number of missions projected vs. accomplished and number of satellites scheduled vs. orbited, he showed the large gap between hopes and reality. These discrepancies were prompting a reevaluation of the Shuttle program by its customers and critics, and even its proponents. Regardless of spectacular achievements, the frame for human spaceflight in the Shuttle era was getting out of alignment with reality.[23]

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18. "Is the Shuttle Worth Rooting For?" *The New York Times*, 9 April 1981: p. A22.
19. "Down to Earth," *The New York Times*, 14 April 1981: p. A30.
20. "What Does the 'S' in NASA Mean?" *The New York Times*, 4 November 1981: p. A30.
21. "Too Fine a Machine," *The New York Times,* 31 March 1982: p. A30.
22. John Noble Wilford, "Big Business in Space," *The New York Times*, 18 September 1983, Sunday Magazine: pp. 46–47 ff., 50, 83.
23. John Noble Wilford, "Gap Between Early Hope and Present Accomplishment Grows Large; Space Shuttle Re-evaluated," *The New York Times*, 14 May 1985: p. C1.

Other observers also subjected Shuttle-era human spaceflight to a cost-benefit analysis and found that the numbers did not add up to economical space transportation. Historian of technology Alex Roland published one of the most strident critiques of this type in the popular magazine *Discover*. In "The Shuttle: Triumph or Turkey?" he appraised its cost, technical failures, maintenance demands, uncertain schedule, deployment mishaps, and other shortcomings against the promises of routine space transportation, and found the sophisticated, versatile Shuttle wanting. "Judged on cost, the shuttle is a turkey .... It costs too much to fly .... And cost is the principal criterion by which it should be judged." In setting a cost-benefit frame over the Shuttle, Roland was not reframing human spaceflight itself; indeed, he did not comment on the value of the missions or crews. Rather, he faulted the vehicle—the icon of human spaceflight—to attack the credibility of NASA's new-era and business frames for the unrealized promise of routine, reliable, economical space transportation.[24]

Editorial cartoons from this period also had perspectives on the new-era frame of reference, as they quite literally distilled an idea or opinion within an inked frame. Editorial cartoonists across the country treated the Shuttle and human spaceflight as subjects.[25] In the early 1980s many of them responded to the concept of routine space transportation with pride or humor. They tended to treat the first Shuttle mission as a patriotic and technical triumph, featuring Uncle Sam and the U.S. flag on track toward America's destiny in space. Some depicted passengers lined up with a Shuttle timetable, waiting for pickup. Others drew the Shuttle as a space truck and astronauts as handymen on the satellite delivery and servicing missions. They depicted the foibles of launch delays and technical problems—a Shuttle on the launch pad covered in cobwebs, suited astronauts growing old while waiting to fly, tiles falling off the Shuttle, a tanker truck of superglue at the pad, a countdown clock with a ridiculously high number.

The editorial cartoonists, inspired by the news and their own idiosyncratic perspective on things, independently endowed the Shuttle and human spaceflight with meaning inside the frames they drew.[26] Their charter for the Shuttle, as for other topics, was to distill the essential meaning of things stripped of hype. Perhaps earlier than others, they began to see (and lampoon) a misalignment of NASA's frame of reference and reality.

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24. Alex Roland, "The Shuttle: Triumph or Turkey?" *Discover* (November 1985): pp. 29–49; quotes, 45.

25. The NASA Historical Reference Collection at NASA Headquarters in Washington, DC, contains many cartoon files catalogued by year and topic in the series Cartoons.

26. Various scholars have examined editorial cartoons as effective keys to frames of meaning: William A. Gamson and David Stuart, "Media Discourse as a Symbolic Contest: The Bomb in Political Cartoons," *Sociological Forum* 7, no. 1 (March 1992): pp. 55–86; Edward T. Linenthal, *Symbolic Defense: The Cultural Significance of the Strategic Defense Initiative* (Urbana, IL: University of Illinois Press, 1989); Thomas H. Bivins, The Body Politic: The Changing Shape of Uncle Sam," *Journalism Quarterly* 63 (Spring 1987): pp. 13–20; Roger A. Fischer, "Oddity, Icon, Challenge: The Statue of Liberty in American Cartoon Art, 1879–1986," *Journal of American Culture* 9, no. 4 (Winter 1986): pp. 63–81.

REFRAMING HUMAN SPACEFLIGHT: SCIENTIFIC RESEARCH

Social movement scholars have defined several processes for invigorating or strengthening a contextual frame to make it less vulnerable to criticism and more appealing to supporters. Clarification and expansion of the concept (frame amplification and frame extension) can be effective strategies for protecting a core concept and expanding its appeal to a broader community.[27]

As editorial and opinion writers began to critique the practice and meaning of human spaceflight in the Shuttle era, NASA did what social action movements often do to maintain support. It began to extend the frame, stretching its elastic boundaries to include other appealing elements. As soon as the Shuttle became operational, NASA began to retool for another big engineering project. Presidential approval to begin development of an orbital station complex came in 1984. Human spaceflight now encompassed not only the Shuttle but also a space station, promoted as "the next logical step" to a "permanent presence" in space.[28]

This expanded package of meaning protected the Shuttle as essential to the assembly and routine supply of the space station, and both were deemed essential for the continuation of human spaceflight. However, to avoid a completely circular justification for the Shuttle and station, NASA elaborated the purpose of human spaceflight to include scientific research, a dimension of useful work that would bring benefits through new knowledge. This elaboration evolved in relation to three human spaceflight programs: Spacelab, Space Station *Freedom*, and the International Space Station.

Scientific research was a secondary theme in the early Shuttle era. Just four of the first 25 Shuttle missions had focused on science instead of commercial or national security payloads.[29] In the 1990s science became a major focus on half of the missions, with some 30 flights completely dedicated to research and other flights carrying at least a few experiments. The Spacelab suite of laboratory module and instrument pallets, developed by the European Space Agency and installed in the payload bay, effectively turned the Shuttle into a temporary orbital research station generally staffed by Ph.D.'s. These missions included experiments in various disciplines where flight crews could carry out research with the goal of pushing the frontiers of knowledge.[30]

A primary scientific objective was to study space motion sickness and adaptation

27. David A. Snow, E. Burke Rochford, Jr., Steven K. Worden, and Robert D. Benford, "Frame Alignment Processes, Micromobilization, and Movement Participation," *American Sociological Review* 51, no. 4 (August 1986): pp. 464–481, esp. 469–473.

28. *Space Station Freedom Media Handbook* (Washington, DC: NASA, May 1992).

29. Spacelab 1 (STS-9, 1983), Spacelab 3 (STS 51-B, 1985), Spacelab 2 (STS 51-F, 1985), and Spacelab German D-1 (STS 61-A, 1985), the 9th, 17th, 19th, and 22nd shuttle missions. See *The New York Times* articles November–December, 1983; April–May and July–August, 1985.

30. Examples of public affairs material framing human spaceflight as scientific research are the NASA Marshall Space Flight Center pamphlet *Spacelab*, 13-M-883, which describes the facility and its uses, and the NASA Information Summaries PMS-008A (Hqs), "Space Station," August 1988.

to weightlessness—topics that put the spotlight on the role of humans in space. Another was to investigate the properties of materials and processes in microgravity. Investigations in life and materials science included both basic and applied research. These Shuttle missions refined the ability of astronaut crews to collaborate with scientists on the ground while carrying out experiments, thus opening the space environment to hundreds of researchers. Enabling members of the worldwide scientific community to participate directly in space missions broadened the appeal of human spaceflight in those disciplines based on laboratory methods. Astronomers and space physicists generally were not persuaded that human spaceflight was necessary; automated instruments and satellites were more effective and less expensive means for conducting their research.

NASA and the media began to stretch the human spaceflight frame beyond the Shuttle, seeing the Shuttle-borne laboratory as a precursor to a space station. The new-era frame now began to imply a very long-term, perhaps permanent human presence in space. The effort to promote a space station, known first as *Freedom* and then as the International Space Station, relied on the key ideas of orbital research, "cutting-edge science," a "world-class laboratory," "frontiers of knowledge," and other superlatives to bolster the meaning of continued human spaceflight. The purpose of human spaceflight on the space station was to advance science, which would yield discoveries for benefits on Earth and enable future exploration. If the stretch occasionally seemed improbable—that research on the space station might lead to cures for cancer or AIDS or osteoporosis—it also showed that NASA was seeking new constituencies, especially women, to garner public support for an expensive new program.[31]

The New York Times editorial column stridently challenged this framing of human spaceflight on the grounds of cost, size, purpose, utility, scientific potential, necessity, and logic. Especially during the precarious years of the late 1980s and early 1990s when the space station program was in political trouble, *The New York Times* urged its cancellation and a redirection of human spaceflight. Calling the proposed orbital research station an extravagant folly and the arguments for a permanent human presence there specious, the editors found in it no compelling national purpose or social value. *The New York Times* attempted to reframe its meaning as a grandiose fiasco. Only when the station was scaled down in size and purpose did the editors briefly give it credence but never full support.[32]

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31. NASA Press Release 92-92, "Goldin Says America Needs Space Station Freedom Now," 24 June 1992; NASA Press Release 92-119, "NASA, NIH Sign Agreement on Joint, Space-Related Research," 21 July 1992; Boeing, "The Space Station Brochure," early 1990s; "Space Station Freedom: Gateway to the Future," NASA publication NP-137, 1992; "The International Space Station: The NASA Research Plan," NASA NP-1998-02-232-HQ, 1998.

32. Examples of strident critiques of the space station basis for human spaceflight that appeared in *The New York Times* include "NASA's Black Hole in Space," 29 March 1990: p. A22; "Space Yes; Space Station No," 6 June 1991: p. A24; "NASA's Untouchable Folly," 14 July 1991: p. E18; "The Wrong Space Station," 29 July 1992: p. A20; "Is NASA Among the Truly Needy?" 6 March 1995: p. A14. Two qualified exceptions were "How to Put Space in Its Place," 12 December 1990: p. A22 and "Space, In Proportion," 6 March 1991: p. A24.

Influential voices outside *The New York Times* also doubted the value of the space station and the meaning of human spaceflight in scientific research. Space scientist James A. Van Allen was one of the earliest and most earnest critics. He made the point, often repeated in *The New York Times*, that "the overwhelming majority of scientific and utilitarian achievements in space have come from unmanned, automated and commandable spacecraft." Robotic satellites and planetary probes had advanced the frontiers of knowledge quite successfully and at far less cost than people could. Van Allen argued that the space station would seriously *diminish*, not expand, opportunities for scientific advances. He found the human spaceflight-for-science frame to be disingenuous and the high value placed on piloted flight to be excessive.[33]

Van Allen suggested that the cultural obsession with human spaceflight defied reason when the motive was science, but he granted the power of popular interest in science fiction and the space program's potential for creating real adventure. Arguments of scientific productivity, however, did not derail the space station and, 20 years after Van Allen wrote, his critique has been partly vindicated. Instead of "the tidal wave of basic science" that NASA had predicted for the space station, a trickle has flowed.[34] Circumstances have required crews to spend more time operating and maintaining the International Space Station than exploiting its capabilities for laboratory science. If there have been discoveries from cutting-edge experiments aboard the station, they have not been well advertised. A reality check of this frame now would likely show it out of alignment with its premises and less resonant with societal values than at its origin.

Frame Shift: Human Spaceflight as Heroism

Scholars of meaning construction in social movements and the media note that occasionally an event creates some perturbation in the prevalent meaning frame of an issue. Such a crisis may provoke reconsideration or even reconstruction of meaning. A crisis becomes a critical discourse moment that can change the basis of meaning, introduce new values, and prompt a shift to a new frame of meaning.[35] Such a critical moment occurred in January, 1986.

The year began with news that the Voyager 2 spacecraft had reached the neighborhood of Uranus, its first planetary encounter since leaving Saturn five years earlier. Images from the spacecraft showed new moons, rings, colors, mountains, craters, and other intriguing features. As NASA and the media hailed this ongoing mission

33. James A. Van Allen, "Space Science, Space Technology and the Space Station," *Scientific American*, 254, no. 1 (January 1986): pp. 32–39.

34. NASA administrator Daniel Goldin quoted in NASA Press Release 92-92, "Goldin Says America Needs Space Station Freedom Now," 24 June 1992.

35. Gamson and Modigliani, "Media Discourse and Public Opinion," and Benford and Snow, "Framing Processes."

of discovery, *The New York Times* published two editorial odes to Voyager as space exploration "at its most intelligent and productive" and "at its best." By comparison, human spaceflight seemed adrift, with NASA flying politicians and a teacher to hold public attention. In a terrible coincidence, the second of these pieces appeared on January 28, the morning of *Challenger*'s final launch. Its barbed closing line chided, "If NASA wants lasting public support for a vigorous space program, the wonder of seeing new worlds will do it a lot more good than soap opera elevated to Earth orbit."[36]

What happened that morning, witnessed by millions of television viewers, was nothing as trivial as a soap opera. The catastrophic loss of the Shuttle and death of seven crewmembers barely a minute after liftoff seared the nation, shaking national pride and confidence about the technology and safety of human spaceflight. The dimensions of the tragedy broadened and deepened during the weeks of investigation, with stunning revelations of flawed technology and questionable decision making within NASA.

The *Challenger* accident shattered the new-era frame of routine spaceflight. What some had suspected suddenly became clear—space transportation was not yet routine, measured not by a dry financial cost-benefit analysis but by the cost of human life. The risk of spaceflight had been absent in the new-era frame of reference. That this was a basic freight-hauling mission to deliver a satellite—a task that did not inherently require a human crew—made their deaths even more tragic. Spaceflight deemed as routine as airline flight implied safety. As the pace of Shuttle missions had quickened, the public had understandably become complacent about spaceflight, perhaps the inevitable result of the frame of reference that had given meaning to the Shuttle era.

With the accident and loss of life, the disparity between reality and the conceptual frame of meaning for human spaceflight was too great to hold. It lost credibility and resonance in the shock of tragedy. The astronauts' deaths demanded greater significance than the space truck rationale could provide. Both the Shuttle and human spaceflight would be questioned and revalued, first to make sense of the tragedy and then to reconceive America's future in space.

The public search for meaning immediately defaulted to the 1960s frame of pioneering exploration and heroism on the space frontier. From President Reagan's consoling remarks to media coverage, official tributes, and personal mourning, the theme was courage and sacrifice in the cause of exploration.[37] The very purpose that the Shuttle did *not* actually have—exploration—became the cause for which the *Challenger* crew sacrificed their lives. Invoking the quest of exploration elevated the *Challenger* mission to a noble cause and valued the deaths as heroic. The routine space transportation frame could not bestow that meaning.

36. "Adrift in Space," *The New York Times*, 7 January 1986: p. A20 and "On to Neptune," *The New York Times*, 28 January 1986: p. A24.

37. Transcript of President Reagan's statement to the nation, reprinted in *The New York Times*, 29 January 1986: p. A9.

The New York Times reported the details of the accident and subsequent investigation and also immediately began to offer perspective on the news. An analysis piece "Should U.S. Continue to Send People Into Space?" appeared as soon as January 30 under a heading "Issue and Debate." John Noble Wilford's articles included reflections on human vulnerability, trust in technology, and the unrelenting dangers and risks of exploration as germane to a reappraisal of spaceflight. This bleak time in the space program was an opportunity to set new goals and a clearer mission for the Shuttle and beyond. He noted that human spaceflight was bound to continue, because "With the loss of the *Challenger* and its crew of seven, we learned, to our surprise, how much these adventures into space, into the future, mean to us as a people."[38]

Editorial cartoons telegraphed the societal impact of spaceflight as scores of cartoonists responded to the *Challenger* tragedy.[39] The primary themes, as in the president's address, were national sorrow and heroism, variously depicted as Uncle Sam with head bowed, the flag on the Moon at half-mast, or an eagle shedding a tear. Some cartoonists framed the accident in a spiritual dimension, showing the Shuttle as a constellation, the astronauts as new stars, or the Shuttle and crew entering heaven. There were no cartoons featuring a space truck or astro-delivery-nauts, no suggestions of routine spaceflight. A few editorial artists who also wrote about responding to the *Challenger* accident described the meanings they sought to distill within their drawings as the fragility of mankind's wings, shattered faith in space technology, or inexpressible sorrow for a profound loss to the nation.[40]

Framing the *Challenger* accident within the heroic cause of exploration—really a return to the meaning frame of the 1960s—was powerful, perhaps instinctive. It gave meaning to a shocking tragedy and resonated with societal values of patriotism and faith that offered consolation for the present and hope for the future. The exploration frame appealed to public sentiment, which translated into expressions of increased public support for the space program. In the immediate aftermath of the *Challenger* accident, the supportive public and the Shuttle's critics seemed to be oddly in accord in revaluing the meaning of human spaceflight as exploration, not freight-hauling and similar practical work.

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38. David Rosenbaum, "Should U.S. Continue to Send People Into Space?" *The New York Times*, 30 January 1986: p. A18; John Noble Wilford, "Faith in Technology Is Jolted, but There Is No Going Back," *The New York Times*, 29 January 1986: p. A7; John Noble Wilford, "The Challenger's Fate, the Shuttles' Future," *The New York Times*, 2 February 1986: p. E1; John Noble Wilford, "America's Future in Space After the Challenger," *The New York Times*, 16 March 1986: p. 85 ff.

39. Files in the History Office at NASA Headquarters in Washington, DC, contain some 150 *Challenger*-related cartoons published in 1986.

40. Examples include Garner's drawing in *The Washington Times*, 19 January 1986: 11A; Swann's drawing in *The Huntsville Times*, 19 January 1986; Marlette's drawing in *The Charlotte Observer*, 28 January 1986 and in Doug Marlette, *Shred This Book!* (Atlanta: Peachtree Publishers, 1988), pp. 86–88; Ohman's drawing in *Newsweek*, 10 February 1986: p. 21, and in Jack Ohman, *Back to the '80s* (New York: Simon & Schuster, 1986), pp. 136–137.

The new-era routine spaceflight frame had originated with NASA and then was promoted to the public. However, the reframing of human spaceflight after the *Challenger* accident seems to have arisen outside the Agency. *The New York Times* became a forum for reappraising the state of human spaceflight by publishing its own perspectives and those of several prominent citizens. Immediately after the accident, a *New York Times* editorial addressed "The Challenge Beyond Challenger" with thoughts for reordering the nation's priorities in space. The coincidence of the Shuttle's destruction and Voyager's success illustrated a need to establish goals in space and use humans only when necessary. As most of the tasks for the Shuttle crews could be performed better by rockets or automation, a better goal for human spaceflight might be a mission to Mars to "satisfy humanity's sense of adventure." This surprising proposal, given that robots could also explore Mars, was a concession that humans might have some role in space more justifiable than then-current roles.[41]

For weeks, *The New York Times's* editorials and op-eds reflected on both the routine spaceflight reference frame and the need to reorient the role of human spaceflight. In their quest to find a justifiable purpose for sending people into space, the only one tentatively suggested was a piloted mission to Mars.[42] As a critical discourse moment, the *Challenger* accident prompted a shift from the routine spaceflight frame to its direct opposite: exploration.

Frame Transformation: Human Spaceflight as Exploration

From 1986 into the 1990s, and then again after the 2003 *Columbia* accident, considerable energy went into transforming the meaning of human spaceflight. Shuttle flights continued to carry out satellite delivery and science missions, and then preparatory and actual space station missions. Human spaceflight continued within the meaning frames of transportation and science, but on another track a new frame—exploration—was taking shape through various task force/advisory committee studies and media discourse. The framers shaped this concept largely in antithesis of the others, a counter-frame based on opposition to the status quo. Their purpose was to transform the meaning of human spaceflight by situating it within a different set of traditions and values.[43]

41. *The New York Times*, 31 January 1986: p. A30.

42. "Risk and Routine," *The New York Times*, 7 February 1986: p. A34; Tom Wicker, "Icon and O Rings," *The New York Times*, 18 February 1986: p. A23; "The Seal on NASA's Fate," *The New York Times*, 22 February 1986: p. A22; "The Frailties of Machines and Men," *The New York Times*, 2 March 1986: p. E22; "How to Regain Face in Space," *The New York Times*, 28 May 1986: p. A22.

43. Frame transformation is discussed in Benford and Snow, "Framing Processes" and Snow et al., "Frame Alignment Processes."

Within weeks of the *Challenger* accident, an alternative plan for human spaceflight appeared. The National Commission on Space, created by Congress and appointed by the president, released a report of its year-long project to develop an exciting vision and goals for the twenty-first century. Ambitious and optimistic, it was an antidote to the malaise spawned by the accident. This new vision was crafted in public dialogues around the country as the commissioners sought to hear what citizens expected of their space program. In a word—exploration.

The advisory commission's report, *Pioneering the Space Frontier*, focused on exploration and settlement within the solar system as the extended home of humanity. American leadership could open this new frontier to science, technology, and economic enterprise. The elaborate plan envisioned a massive infrastructure: space station, different types of vehicles and spaceports, a lunar outpost, a Mars base, and related technologies. The Shuttle era was confined to an orbital beltway near Earth, but in the future era humans would move out on a "highway to space" and a "bridge between worlds," to set up residence and do useful work producing propellants and other life- necessary resources. This vision was a hybrid of the familiar frontier and transportation frames for human spaceflight applied to a new setting and purpose. Colorful cover art and illustrations engagingly framed this rather industrialized vision of the space frontier, published as a report dedicated to the *Challenger* crew, who in President Reagan's words were "pulling us into the future."[44]

NASA also engaged in its own reappraisal of the future of human spaceflight. Astronaut Sally Ride chaired an internal agency planning group that prepared a report on *Leadership and America's Future in Space*.[45] It, too, proposed an eventual human mission to Mars, but at a more measured pace and scale than the national commission had proposed. These and other studies were gestures toward a transformational vision of human spaceflight beyond the Shuttle era, but they were not converted to action plans.

Near the one-year anniversary of the *Challenger* accident, an encouraging piece by space scientist Carl Sagan appeared in *The New York Times*. "It's Time to Go to Mars," he wrote, in a systematic program of exploration advancing from robotic rovers to sample-return missions and then to "the first human footfalls on another planet." Unlike the national commission's vision of productive industry on Mars, Sagan's vision focused on the values of adventure, excitement, inspiration, valor, prestige, and purpose in the space frontier. He argued that exploration of Mars for the sake of knowledge could revitalize the moribund space program and make possible a new goal, "establishing humanity as a multiplanet species."[46]

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44. *Pioneering the Space Frontier: The Report of the National Commission on Space* (New York: Bantam Books, 1986).

45. Sally K. Ride, *Leadership and America's Future in Space* (Washington, DC: NASA, August 1987).

46. Carl Sagan, "It's Time to Go to Mars," *The New York Times*, 23 January 1987: p. A27.

Variants of the exploration of Mars arose as forces inside and outside NASA tried to reframe the purpose of human spaceflight. The Mars goal seemed a worthy commitment for astronauts, and it might align the human and robotic flight programs in a complementary rather than competitive enterprise. It could also reassert American leadership in space in an inspiring, challenging adventure. By spring, 1987, John Noble Wilford could report in *The New York Times* that "momentum is building in the space agency and among . . . leaders to make Mars the next major goal of the American civilian space program."[47] Exploration, specifically the exploration of Mars, had gained credibility and resonance as the future meaning of human spaceflight.

The 20th anniversary of the Apollo 11 landing highlighted the discrepancy between current human spaceflight and aspirations for a new purpose. President George H. W. Bush marked the anniversary in 1989 by endorsing a spacefaring initiative to return to the Moon and move on to Mars. Apparently formalizing the frame shift from Shuttle-era concepts to exploration, the announcement was more rhetoric than mandate, for he set no schedule and made no funding commitment for such an enterprise. It met with skepticism among political leaders and space policy analysts as too costly. *The New York Times* dismissed it as "Mr. Bush's giant step back in space . . . a failure of imagination" because it sounded like Apollo redux without a compelling reason.[48] The president's new frame for the meaning of human spaceflight seemed rickety but it did authorize NASA to chart a path out of Earth orbit through a new space exploration initiative.

Despite the ferment, the transformation process was slow, and in the meantime human spaceflight was still riding the Shuttle and preparing a space station. The New York Times published numerous impatient, frustrated editorials on the theme "stuck in Earth orbit for no good reason." The editorial page framed the Shuttle as fragile, vulnerable, neither fully safe nor fully reliable, with nowhere to go. The planned space station was decried as an extravagant folly, a "black hole," a fiasco, purposeless or a "potpourri of purposes," grandiose, unsuitable for anything except being a place for the Shuttle to go. The space agency was "an aged and faltering institution," ailing and "pinched in scope and vision." The drumbeat message: Cancel the space station and do something more imaginative than carry astronauts and cargo to low Earth orbit.[49] *The New York Times's* editorial position framed human spaceflight as properly

47. J. N. Wilford, "Exploration of Mars Is Advised as Goal for NASA," *The New York Times*, 18 March 1987: p. B6 and "The Allure of Mars Grows as U.S. Searches for New National Goal," *The New York Times*, 24 March 1987: p. C1.

48. "Mr. Bush's Giant Step Back in Space," *The New York Times,* 21 July 1989: p. A28.

49. Typical *The New York Times* editorials in this vein include "NASA's Black Hole in Space," 29 March 1990: p. A22; "Rethink Space," 21 July 1990: p. 20; "Those Hisses on the Launching Pad," 19 September 1990: p. 22; "Space Yes, Space Station No," 6 June 1991: p. A24; "NASA's Untouchable Folly, 14 July 1991: p. E18; "The Wrong Space Station," 29 July 1992: p. A20; "Is NASA Among the Truly Needy?", 6 March 1995: p. A14.

grounded in wonder, imagination, excitement, frontiers, discovery, and a clear goal worthy of risking human life.

As momentum built in the media and advisory and advocacy bodies for missions to the Moon and Mars, NASA began to elaborate and extend the space station concept to more explicitly embrace exploration.[50] In the 1990s the Agency started describing the orbital research center as a stepping-stone or a bridge to future exploration. The language of future spaceflight borrowed from the builder's lexicon, as planners worked on "blueprints" and "architectures" for exploration. Adding an overlay of exploration to the space station partially reframed it to disarm critics and strengthen support.

The New York Times editors disagreed with that gloss, as did another NASA critic, science journalist Timothy Ferris, writing for the op-ed page. *The New York Times* charged that the space station was not designed to be a way station to other worlds, a launching pad for planetary exploration, or a stepping-stone to anywhere. "The shocking surprise is how little the station would contribute to the nation's long-range space goals," really only life science research.[51] The week before the first element of the International Space Station was placed in orbit in 1998, Ferris wrote a critical op-ed piece titled "NASA's Mission to Nowhere." In his view, the station "touted as a giant leap into space and a step toward the stars in truth . . . is little more than a Motel 6 in low [E]arth orbit . . . . [I]t will be of almost no use in getting to Mars, the Moon, or anywhere else—except into debt." Ferris argued that a far better plan would be to abandon the space station and mount "an international effort to put a colony on Mars" to make humanity a two-planet species. It could have great scientific value and also be a grand adventure, a future where we "really get somewhere."[52]

With effort focused on assembling and operating the space station, the space exploration initiative withered until another critical discourse moment forced the issue again. The second Shuttle tragedy, the loss of *Columbia* and crew during reentry in February 2003, again thrust the purpose of human spaceflight into the media spotlight for debate whether this type of orbital mission was worth the risk and cost of human lives. Again the public responded to the tragedy by revering the astronauts as heroic explorers, and editorial cartoonists depicted the apotheosis of the Shuttle and crew as stars in the heavens.[53]

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50. Other reports from this period included *Report of the Advisory Committee on the Future of the U.S. Space Program* (Augustine Committee) (Washington, DC: U.S. Government Printing Office, 1990) and *America at the Threshold: America's Space Exploration Initiative*, Report of the Synthesis Group (Stafford Committee) (Washington, DC: U.S. Government Printing Office, 1991).

51. Space Yes; Space Station No," *The New York Times,* 6 June 1991: p. A24; "NASA's Untouchable Folly," *The New York Times*, 14 July 1991: p. E18; "The Wrong Space Station," *The New York Times*, 29 July 1992: p. A20.

52. Timothy Ferris, "NASA's Mission to Nowhere," *The New York Times*, 29 November 1998: p. WK9.

53. Cartoon series file 2003 in the NASA Historical Reference Collection at NASA Headquarters.

As the exploring Voyager mission starkly contrasted with the earlier Shuttle tragedy, the call of distant worlds also beckoned after the *Columbia* tragedy. *The New York Times* responded to the tragedy not with a call to halt human spaceflight but to redirect it to exploration. "Curiosity and the quest for knowledge . . . make it inevitable that humans will continue to venture into space . . . to engage in the sheer thrill of exploration and new discoveries."[54] Soon robust robots roaming on Mars captured public attention with the vicarious thrill of exploration, in contrast to the handicapped human spaceflight program. Editorial cartoonists depicted the Shuttle as physically decrepit, geriatric, on life support, with the astronauts idled on Earth while robots explored Mars.[55]

In 2004 President George W. Bush urged a new vision for space exploration for the future beyond the Shuttle and space station. Like the space exploration initiative 15 years earlier, this presidential charter stimulated planning studies inside and outside NASA. But this time NASA took the challenge seriously enough to reorganize for action, aiming for a transformation of both the rhetoric of human spaceflight and the agency itself. Emphasizing sustained and affordable programs to satisfy the spirit of discovery, planners have been careful not to make exaggerated claims about the benefits of exploration. Human spaceflight now is being framed not as a practical or a business enterprise but more lyrically, as exploration resonant with mystery, curiosity, adventure, and reinvigoration after a long stay in Earth orbit.

NASA's slogans for the space exploration vision, "The New Age of Exploration" and "A Renewed Spirit of Discovery," herald a return to a cultural tradition of exploration that expands knowledge and fuels wonder. This framing approach differs rhetorically from the previous initiative; publicity materials depict people on Mars as explorers, not as miners, and prose addresses compelling questions of scientific and societal importance more than technology. It is too early to know if or how that renewal will occur, but the current vision for space exploration seems to be reasonably framed for broad appeal. It takes human and robotic explorers out of competition and elevates scientific discovery as their shared goal. More modest in promises than earlier frames yet potentially more heroic, exploration aims at the worthier purpose that critics and advocates of human spaceflight have long demanded.[56]

54. "The Call of Distant Worlds," *The New York Times*, 9 February 2003: WK14.

55. Cartoon series files 2003–2005 in the NASA Historical Reference Collection at NASA Headquarters.

56. *The Vision for Space Exploration* (Washington, DC: National Aeronautics and Space Administration, 2004).

CONCLUSION

This frame analysis of the Shuttle era has focused on the social construction of meanings for human spaceflight. Five meaning frames have been probed: a new era of routine transportation, business, scientific research, heroism, and exploration. NASA was the primary, but not sole, shaper of these meanings; the media, represented here by *The New York Times*, and the public also exerted a strong influence by critiquing the fit between frames and reality. When a frame became dissonant with societal expectations, either NASA subtly revamped it or the media and public pressured for change.

The varied meanings of human spaceflight in the Shuttle era can be interpreted as arising from processes of frame development, frame extension, frame shifts, and transformations—all strategies used by social action movements to appeal to and sustain their supporters and also used by media to give readers a context for thinking about issues. These frames helped society make sense of the costly, risky endeavor of human spaceflight by anchoring it in traditions and values that matter to citizens. Curiously, the keenest consensus about the meaning of human spaceflight arose not from its successes but from the two Shuttle tragedies. These critical moments forced a societal discourse about the defining purpose of human spaceflight that prompted reframing and transformation. It seems ironic that robotic planetary missions also inspired efforts to reframe the meaning of human spaceflight as exploration.

That in the course of more than 30 years the meaning of human spaceflight has been malleable may attest to societal wisdom and adaptability to changing circumstances, or it may indicate a restless desire to try something new. In any case, human spaceflight remains anchored in American culture and resilient in meaning.