



Redefining safety in commercial space: Understanding debates over the safety of private human spaceflight initiatives in the United States



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ARTICLE INFO

Article history:

Received 3 April 2013

Received in revised form

24 February 2014

Accepted 5 March 2014

Available online 13 April 2014

Keywords:

Space exploration

Commercialization

NASA

Tornado/abortion politics

Boundary objects

Human spaceflight

Tacit knowledge

Technocracy

ABSTRACT

In 2009 President Obama proposed a budget for the National Aeronautics and Space Administration (NASA) that canceled the Constellation program and included the development of *commercial* crew transportation systems into low Earth orbit. This significant move to shift human spaceflight into the private sector sparked political debate, but much of the discourse has focused on impacts to “safety.” Although no one disputes the importance of keeping astronauts safe, strategies for *defining* safety reveal contrasting visions for the space program and opposing values regarding the privatization of U.S. space exploration. In other words, the debate over commercial control has largely become encoded in arguments over safety. Specifically, proponents of using commercial options for transporting astronauts to the International Space Station (ISS) argue that commercial vehicles would be safe for astronauts, while proponents of NASA control argue that commercial vehicles would be unsafe, or at least not as safe as NASA vehicles. The cost of the spaceflight program, the technical requirements for designing a vehicle, the track record of the launch vehicle, and the experience of the launch provider are all incorporated into what defines safety in human spaceflight. This paper analyzes these contested criteria through conceptual lenses provided by fields of science and technology policy (STP) and science, technology, and society (STS). We ultimately contend that these differences in definition result not merely from ambiguous understandings of safety, but from intentional and strategic choices guided by normative positions on the commercialization of human spaceflight. The debate over safety is better considered a proxy debate for the partisan preferences embedded within the dispute over public or private spaceflight.

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1. Introduction

With the retirement of the space shuttle in 2011, the United States entered an uncertain era in American spaceflight. Despite a lack of consensus, President Obama announced a policy to privatize human spaceflight to low Earth orbit [1], displacing the next generation of NASA launch vehicles. The move toward commercialization has generated a complex controversy, involving numerous actors with divergent interests and values [2] p. 20). In this paper, we focus on one aspect of this debate – the implications of commercialization for spaceflight safety – and demonstrate that

this seemingly narrow and technical controversy paradoxically sheds little light on how best to ensure safe spaceflight. Our analysis of media coverage and Congressional testimony shows that all of the involved actors value spaceflight safety, but they define safety in very different ways. We contend that these differences in definition result not merely from ambiguous understandings of safety. Spaceflight safety is a flexible concept that allows for a great deal of ambiguity, but the variations in definition are more productively viewed as intentional and strategic choices guided by normative positions on the commercialization of human spaceflight.

In order to analyze the debates over safety, we engage Pielke's (2007) distinction between tornado and abortion politics which encourages attention to the ways in which scientific uncertainty and values consensus interact during science and technology policy debates. In “tornado politics” all actors share a commitment to the same goal (values consensus), and thus reducing scientific

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uncertainty will aid in policy decisions. In the classic example, everyone values their life (values consensus); if meteorologists warn that a tornado is coming (reducing scientific uncertainty), the policy decision of taking cover is obvious and uncontested. In contrast, actors in “abortion politics” have differing values, which nullifies the impact of additional scientific knowledge. To illustrate, the “pro-choice” vs. “pro-life” debates will not be settled by more exact biological knowledge about the beginning of human life – when actors deploy such arguments they are masking more significant values debates [3] p. 43]. By engaging this framework, we will show how the debate over the safety of commercializing human spaceflight represents a case of abortion politics: data pertaining to safety do little to create consensus because of underlying values differences regarding preferences over commercial spaceflight.

Although participating actors tend to characterize the debate as pro-commercial vs. pro-government [4] p. 133], this question cannot be disentangled from the question of who, within the commercial sector, is allowed to participate – established aerospace contractors or newer aerospace startups. As such, when we refer to “commercial” spaceflight or “commercialization,” we are generally referring to the switch from the model of vehicles operated and built under the auspices of a traditional NASA contract (e.g. the space shuttle and United Space Alliance) to new models of NASA as customer, patron, and an assortment of other fairly complicated and ambiguous relationships (e.g. the NASA Commercial Orbital Transportation Services program, the NASA Crew and Cargo Program, and private spaceflight services such as Virgin Galactic and others). This transition includes both the issue of control and of who can participate.

We begin the paper with an historical review of the human spaceflight program under the George W. Bush administration, the transition initiated under Obama, and the beginning of the recent privatization debate. After describing our methodology, we outline the four definitions of spaceflight safety that emerged in our study of the debate in the media and Congressional testimony. Next, we analyze who uses these four definitions and for what purpose, how these patterns relate to concepts of technocracy and perceptions of spaceflight expertise, and how actors deploy “safety” as a technical argument to mask more significant values disputes. Finally, we argue that the “proxy” status of the spaceflight safety debate may both inhibit direct discussions about privatizing human spaceflight and distort the necessary and useful conversations over how best to minimize the dangers in human spaceflight.

2. Background

2.1. The Constellation program

The Constellation program, a component of President George W. Bush’s 2004 Vision for Space Exploration, aimed to return humans to the Moon by 2020 as a stepping stone to Mars exploration. NASA was charged to develop two new launch vehicles (Ares I and the Ares V Heavy Lift), a crew capsule (Orion), and a lunar landing module (Altair) [5].

The Constellation program was, in large part, a response to growing safety concerns after the Columbia shuttle tragedy [6]. President Bush’s space policy called for the cancellation of the space shuttle in 2010, leaving a four year “spaceflight gap” in which the United States would rely on the Russian Soyuz for human spaceflight, until a Constellation program replacement could be finished. Despite the unpopular notion of the spaceflight gap, the Columbia Accident Investigation Board (CAIB) recommended that the shuttle should not be used past 2010 without recertification.

2.2. The Augustine Committee

In 2009, the Obama administration convened the Review of U.S. Human Spaceflight Committee (Augustine Committee) to analyze plans for human spaceflight and recommend program options. The Augustine Committee argued that financial support for NASA made the Constellation program untenable. In particular, they were critical of Ares I [7] p. 16]. Instead, the committee presented a broad spectrum of eight major alternatives, two of which would use government vehicles for transporting crew to low Earth orbit and six of which engaged various models of commercializing human spaceflight.

Key to our analysis, the Augustine Committee members took spaceflight safety as *sine qua non*; they analyzed only the least risky policy options and assumed that any program based off of their recommendations would maximize spaceflight safety. Some actors have since criticized this aspect of the Augustine Committee’s analysis for not taking seriously enough the complexities of spaceflight safety [8,9]. The Augustine Committee’s unqualified assumption, as well as the nature of the criticism, support our assertion that high values consensus exists regarding spaceflight safety, at least at the most basic level.

2.3. Obama’s NASA policy proposal

President Obama’s policy proposal for NASA very closely resembled the Augustine Committee’s “Flexible Path” recommendation [7] p. 17]. Specifically, Obama’s space policy proposal would cancel most components of the Constellation Program, proposing to retire the space shuttle in 2011 as planned, but increasing the operational span of the ISS from 2015 to at least 2020 [10]. Additionally the policy increases R&D funding by \$200 million (150% of the allocations planned under Constellation) and technology demonstration funding by \$1.5 billion (400% of the allocations planned under Constellation) [11]. Obama also set long term goals for NASA to finalize a design and begin building a new heavy lift rocket for the sole purpose of deep space exploration by 2015. NASA was to use this rocket to send astronauts on deep space missions culminating in a human landing on Mars sometime in the 2030s [1].

The most contentious aspect of Obama’s proposed policy was the commercialization of human spaceflight for which Obama proposed to increase NASA’s budget by \$6 billion over the next five years. Members of Congress and traditional aerospace contractors have voiced concern over these plans for commercialization (e.g. [12,13]), as these actors have a great deal of capital – political and financial – invested in the traditional model of launch vehicle development and operation. Other influential parties within the space community have expressed disappointment with the traditional model and have supported the exploration of new interactions with smaller scale, entrepreneurial aerospace companies (e.g. [14,15]).

3. Methodology

While actors on both sides of the commercialization debate agree on the importance of safety to human spaceflight, they do not agree about what constitutes safety. This paper investigates these definitional differences and their implications for the future of human spaceflight.

We began our research by consulting approximately 25 media sources to identify the scope of the debate over commercial spaceflight safety. From this preliminary reading, we formulated four categorical definitions of spaceflight safety invoked by participants in the debate, discussed in detail in the next section.

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