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Columbia Disaster Bibliography

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Description

A bibliography looking at the engineering ethics and policy issues of the Columbia Shuttle explosion of 2003.

Body

Overview

Butler, D. 2003. Shuttle inquiry to piece disaster together from the ground up. *Nature, 421*(6924), 677. doi: 10.1038/421677a.
This article focuses on the progress of the investigation into the Columbia shuttle disaster and emphasizes the use of reverse-engineering analysis called ballistic trajectory to plot the trajectories of the pieces of debris.

Chen, Phillip. 2006. *Columbia, final voyage: the last flight of NASA's first space shuttle*. New York: Copernicus Books.
This book describes not only the days and hours leading up to the launch of the Challenger and its fatal explosion, but also the training of the crew members aboard, the delays that plagued the mission, the technological and safety issues faced by

NASA, and the ingenuity of the scientists who d designed Columbia’s experiments.

Langewiesche, W. 2003. Columbia's Last Flight. The Atlantic Monthly (November).

A detailed account of the moments before during, and after the Columbia explosion.

Lawler, A. 2003. Shuttle Disaster Puts NASA Plans in Tailspin. *Science, 299* (5608), 796-797. doi: 10.1126/science.299.5608.796.
The disintegration of the Columbia space shuttle heralded not only disaster but also an unwelcome era for thousands of engineers and scientists around the globe. Beyond the terrible human toll, the 1 February disaster abruptly halts construction of the international space station, cripples life and physical sciences research, and calls into question NASA's plans to move beyond Earth's orbit.

Space Shuttle Columbia and Her Crew (NASA)
A tribute to the crewmembers killed during the Columbia shuttle explosion.

PBS. 2008. Space Shuttle Disaster. [video]
An investigation uncovers the human failures and design flaws between the 2003 Columbia Tragedy.

Engineering Ethics & Policy Issues

Brong, J. 2004. Learning From Columbia. *Quality Progress, 37*(3), 38-45.
This article studies causes of disintegration of the space shuttle Columbia. A 1.67 pound slab of supercooled insulating foam from an external tank struck the wing of the Columbia 81.7 seconds after its launch on January 16, 2003. The foam hit the leading edge of the left wing where it angles away from the fuselage. Sixteen days later, at the lime the shuttle was beginning its landing approach, the damage allowed superheated gas into the wing. Findings from the accident have significance in all operations because organizational culture, management systems and effective thinking are required in all fields. The accident confirmed why quality professionals must be placed at decision making levels in their organizations.

Cass, S. 2003. How to Fix the NASA Disaster. *IEEE Spectrum, 40*(10), 10-12. doi: 10.1109/MSPEC.2003.1235615.
Discuses the findings of the Columbia Accident Board’s investigation and its

conclusion that NASA's safety culture has become complacent and under a major conflict, as individuals who were in charge of safety were also under pressure to get projects completed on time and on budget.

Davis, Michael 2003. Columbia, Hamlet, and Apollo 13. *Teaching Ethics.* 4(1): 77-79.
Almost seventeen years to the day after the space shuttle Challenger came apart during launch, another space shuttle, the Columbia, came apart during re-entry. While the details differ much, the main characters are familiar: the shuttle itself; an old problem suddenly more severe; the pressures of a public-relations-based schedule; managers, who are also engineers, disregarding engineers concerned with safety; an absence of hard evidence that would have forced everyone to agree; and a disaster confirming the engineers' worst fears. The author considers what seems new in the Columbia disaster. In seventeen years, much an organization learns must be lost unless incorporated into procedures. Youth brings energy, daring, and innovation, but not the peculiar caution of those who have suffered. That the veterans of 1986 would have avoided the mistake Ham made, we cannot know. What we can know is that they should have found it easier to avoid than she did.

Dombrowski, P.M. 2007. The Evolving Faces of Ethics in Technical and Professional Communication: Challenger to Columbia. *IEEE Transactions on Professional Communications* 50:306-319.
Our view of ethics in professional and technical communication has evolved, paralleling developments throughout society. Earlier views on ethics and values have grown into a broad perspective of complex gradations with people at many levels affecting eventual practical outcomes. The organizational culture of NASA, for example, was specifically identified by the Columbia Accident Investigation Board (CAIB) as one of the causes of faulty communication leading to a terribly tragic event. The Challenger investigations of 20 years earlier, on the other hand, focused primarily on physical events, secondarily on professional judgments, and only little on the social and cultural context of the disaster. We learn by failures but also by self-examination. As we see how ethics and values impact technical events, we understand that technological progress is ultimately a human endeavour in which reflection and judgment is as important as measurement and observation.

Donovan, A. and Ronald A. Green. 2003. Setup for Failure: The Columbia Disaster. *Teaching Ethics* 4(1):69-76.

This case study looks at the details of the Columbia Disaster of 2003 and discusses the tensions that can exist between managers and engineers in organizations.

Hall, J. 2003. Columbia and Challenger: organizational failure at NASA. *Space Policy* 19: 239-247.
The National Aeronautics and Space Administration’s flagship endeavour—human spaceflight—is extremely risky and one of the most complicated tasks undertaken by man. It is well accepted that the tragic destruction of the Space Shuttle Challenger on 28 January 1986 was the result of organizational failure. The surprising disintegration of the Space Shuttle Columbia in February 2003—nearly 17 years to the day after Challenger—was a shocking reminder of how seemingly innocuous details play important roles in risky systems and organizations. This paper outlines some of the critical features of NASA's organization and organizational change.

Kauffman, J. 2005. Lost in space: A critique of NASA's crisis communications in the Columbia disaster. *Public Relations Review, 31*(2), 263-275. doi: 10.1016/j.pubrev.2005.02.013.
The explosion of space shuttle Columbia on 1 February 2003 threatened to destroy the image and confidence NASA had labored years to restore in the wake of its poor handling of the Challenger disaster. This paper examines NASA's crisis communications regarding Columbia's explosion. It argues that the space agency did most things right in responding to the crisis, but it made errors that reflect serious and long-standing problems with its organizational culture. It proposes that the space agency must fix flaws with its organizational culture, or it may be forced into the unenviable position of relying on crisis communications to protect its image and reputation.

Lawler, A. 2003. After Columbia, a New NASA? *Science, 299*(5609), 998-1000. doi: 10.1126/science.299.5609.998.
This article reports on U.S. National Aeronautics and Space Administration (NASA) Administrator Sean O'Keefe's plans to build a complement to the destroyed space shuttle Columbia, with hopes of receiving funds, on its surviving current investigations, as of February 14, 2003.

Mason, R. O. 2004. Lessons in Organizational Ethics from the Columbia Disaster:: Can a Culture be Lethal? *Organizational Dynamics, 33*(2), 128-142. doi: http://dx.doi.org/10.1016/j.orgdyn.2004.01.002.

Using coverage of the explosion and the results of the final investigation of the accident, the author discusses some failures of organizational cultural and NASA that contributed to the disaster, and, discusses how NASA and other organizations can begin building an organization culture that overcomes hubris and carelessness.

Niewoehner, R. J., & Steidle, C. E. 2009. The Loss of the Space Shuttle Columbia: Portaging Leadership Lessons with a Critical Thinking Model. *Engineering Management Journal, 21*(1), 9-18. doi: 10.1080/10429247.2009.11431793.

This article evaluates the suitability of Richard Paul's Critical Thinking model as a template for evaluating engineering enterprise thinking habits and organizational behavior, using the Columbia Accident Investigation Board (CAIB) report as a case study. With minor refinement, Paul's model provides a powerful vocabulary for complicated case study analysis; familiarity with the model provides participants with both a mechanism for analysis and a means for portaging lessons to other professional situations and organizations.

Seife, C. 2003. Columbia Disaster Underscores The Risky Nature of Risk Analysis. *Science* 299:1001-1002. doi: 10.1126/science.299.5609.1001.

The breakup of the space shuttle Columbia, the second such catastrophe in 113 flights, suggests that NASA's most recent official risk estimate of 1 failure in 250 is off. Why can't NASA get it right? The answer lies in a field known as probabilistic risk assessment.

Sumpter, R. S., & Garner, J. T. 2007. Telling the Columbia Story: Source Selection in News Accounts of a Shuttle Accident. *Science Communication, 28*(4), 455-475. doi: 10.1177/10755470073022306.

This content analysis of newspaper stories seeks to answer three questions about the Columbia space shuttle disaster: What sources did journalists cite in telling the Columbia story? What did those sources say? Which sources were heard most often? Sources most often communicated "neutral" facts and observations while not placing blame for the accident or evaluating the shuttle program's progress. Astronauts and their relatives, NASA contractors who built and maintained the shuttle fleet, and government accident investigators from agencies other than NASA or the Columbia Accident Investigation Board rarely appeared in the stories. Journalistic routines call for reporters to balance their story narratives with sources representing different viewpoints. In the Columbia story, however, this was not

necessarily the case.

Van der Voort, H., & de Bruijn, H. 2009. Learning from Disasters: Competing Perspectives on Tragedy. *IEEE Technology & Society Magazine, 28*(3), 28-36. doi: 10.1109/MTS.2009.93416.
The article offers ways on how to manage disaster and implement safety standards. It highlights the investigation reports from Holland regarding a fire that killed 11 persons in a detention center at Schiphol airport and the reports from the U.S. on the 9/11 attack and the Space Shuttle Columbia Accident. It presents the strengths and weaknesses of those approaches used by decision-makers.

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