Challenger Space Shuttle Disaster Bibliography

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Description

A bibliography looking at engineering ethics, organizational, and policy aspects of the Challenger Space Shuttle Disaster.

Body

Case Studies and Teaching Materials

National Academy of Engineering, Online Ethics Center for Engineering and Science. Roger Boisjoly & the Challenger Disaster.
A collection of materials on the Challenger Explosion, including a guide to a seven-part discussion that guides the user through Roger Boisjoly's analysis his role leading up to the explosion, and allows them to choose what answer they would suggest, and receive feedback on that answer. The collection also includes memos from key stakeholders in the case, organizational charts, videos, and instructional modules on the case.

Department of Philosophy and the Department of Mechanical Engineering.

1992. The Space Shuttle Challenger Disaster.
This case, developed through a National Science Foundation grant, provides a summary and introduction to the facts of the case, a list of key people and dates, instructor guidelines, and questions for class discussion.

Overview and Continuing Coverage

Broad, W. 1996. Challenger's Legacy: Risks remain despite NASA's rebuilding. *New York Times* (January 28).
A decade after the Challenger explosion, NASA has made major changes to increase the safety of their shuttle missions. But experts agree that current risks are greater than generally assumed, at least partially due to declining budgets and the declining number of personnel at the agency who remember the lessons of the accident.

JWM Productions. 2001. Challenger Go for Launch [video].
Produced 15 years after the Challenger explosion, this documentary takes the viewer through the minute by minute detail of the launch decision, including the politics, and the science and human factors that lead to the decision to launch.

McConnell, M. 1987. *Challenger: A major malfunction*. Garden City, NY: Doubleday.
This book is a journalistic account of the Challenger explosion, exploring what was known about the accident by 1987. The author stresses the immediate causes of the accident, the pressure to launch, and the internal debates between engineers and managers.

NASA. Challenger STS 51-L Accident.
A collection of materials including movie clips, an image library, transmissions of the mission's voice recorder, and official reports and statements on the Challenger explosion. The site also includes a number of non-NASA sites with more information related to the explosion.

NASA. Complete NASA Footage of Challenger Space Shuttle Explosion [video].
This is the entire video of the launch as released by NASA, including the lift off, explosion, and debris hitting the ocean.

Pinkus, Rosa Lynn, et al. 1997. *Engineering Ethics: Balancing cost, schedule and Risk- Lessons learned from the Space Shuttle.* New York:

Cambridge University Press.
Using the space shuttle program as its framework, this book examines the role of ethical decision making in the practice of engineering. In particular, the authors consider the design and development of the main engines of the space shuttle as a paradigm for how individual engineers perceive, articulate, and resolve ethical dilemmas in a large, complex organization.

Spaceflight Now. The Challenger Accident Timeline.
A timeline of events from the Challenger explosion.

Vaughan, Diane. 1996. The Challenger Launch Decision: Risky Technology, Culture, and Deviance at NASA, University of Chicago Press: Chicago.
The author recreates the history of the Challenger Launch Disaster, and tries to answer the question of why NASA managers, who not only had all the information prior to the launch but also were warned against it, decided to proceed with the launch. Through interviews and meticulous research, Vaughn looks at how the decision unfolded through the eyes of the managers and the engineers, and how insiders in NASA were able to repeatedly ignore the evidence given to them. This is an extremely well-written, detailed account of this well-known engineering case study.

Engineering Ethics

Bell, T. and K. Esch. 1989. The space shuttle: A case of subjective engineering. *IEEE Spectrum* 26(6): 42-46.
NASA's approach to risk management, which until the Challenger accident focused on design-oriented techniques rather than probabilistic risk analysis. Political factors that have played a large role in shaping NASA's decisions, along with its traditional-engineering-based corporate culture, are examined, and implications for the future Space Station are also considered.

Davis, M. 1996. Some Paradoxes of Whistleblowing. *Business and Professional Ethics Journal, 15*(1), 3-19.
The paper first describes the "standard theory of whistle-blowing" (DeGeorge's). The standard theory seeks to justify whistleblowing by its ability to prevent harm. The paper then argues that the standard theory is paradoxical, i.e., that it is inconsistent with what we know about whistle-blowers, for example, that whistle-blowers seldom

prevent significant harm. The paper then offers a less paradoxical theory of whistle-blowing, one emphasizing obligations arising from complicity in wrongdoing and tests it using one classic case of whistle-blowing, Roger Boisjoly's testimony before the Presidential Commission investigating the 'Challenger' disaster.

Davis, M. 1997. Better Communication between Engineers and Managers: Some Ways to Prevent Many Ethically Hard Choices. ***Science and Engineering Ethics, 3*****(2), 171-212. doi: 10.1007/s11948-997-0008-4.**
Using the Challenger disaster as an example, the author looks at some ways to improve communication between engineers. Frequent, two-way conversation, can often help prevent some of the ethical issues faced by professional engineers. The article concludes with empirical evidence on the ways in which technical communication can break down, and makes nine recommendations for organizational change to help prevent this kind of breakdown from occurring.

Dombrowski, P. M. 1991. The lessons of the Challenger investigations. ***Professional Communication, IEEE Transactions on, 34*****(4), 211-216. doi: 10.1109/47.108666.**
This article investigates how, both in methodology and in findings, the investigations of the Challenger disaster by a Presidential Commission and by a Congressional committee demonstrate that even in highly technical matters meaning is socially constructed. It is found that both investigations emphasized procedural concerns while largely neglecting personal judgment and responsibility, even though the evidence suggests a key role for personal and social judgment.

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 endeavor in which reflection and judgment is as important as measurement and observation.

Feynman, R. 1986. Personal observations on the reliability of the Shuttle. (Appendix to Rogers Commission Report).

Feynman’s observations on the Challenger explosion, relating to differences of risk assessment when performed by different stakeholders.

Gladwell, M. 1996. Blowup. New Yorker (January 22): 32-36.

Who can be blamed for a disaster like the Challenger explosion, a decade ago? No one, according to the new risk theorists, and we’d better get used to it.

Harris, C. E., Jr. 1995. Explaining disasters: the case for preventive ethics. *Technology and Society Magazine, IEEE, 14*(2), 22-27. doi: 10.1109/44.393043.

In 1986, the space shuttle Challenger exploded during launch, taking the lives of six astronauts and one teacher. The disaster virtually stopped U.S. space exploration for two years. How should this disaster be explained? The article discusses three types of explanation and considers the application of preventive ethics. People should be informed about unusual dangers to which they might be subjected, and given the chance to consent or not consent to the dangers.

Hall, J. 2003. Columbia and Challenger: organizational failure at NASA. *Space Policy* 19: 239-247.

The National Aeronautics and Space Administration’s flagship endeavor—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.

Harrison, E. F. 1993. Challenger: the anatomy of a flawed decision. *Technology in Society, 15*(2), 161-183. doi: 10.1016/0160-791X(93)90001-5.

Challenger was an avoidable disaster waiting to happen. This paper deals with the

Challenger case as a study in flawed decision making.

Pinch, Trevor J . and Harry Collins. 2008. The Naked Launch: Assigning Blame for the Challenger Explosion. In Johnson D.G. and J.M. Wetmore (eds.) ***Technology and Society: Building or Sociotechnical Future.*** **Cambridge, MA: MIT Press.**
Article goes back to the facts of the Challenger Explosion and explores the pressures, dilemmas and uncertainties at the time of the fateful launch decision. The authors discuss that while it is easy to assign the roles of heroes and villains after the fact, a close examination of the situation shows how hard it is to accurately assign blame in cases such as this.

Werhane, P. H. 1991. Engineers and Management: The Challenge of the Challenger Incident. ***Journal of Business Ethics, 10*****(8), 605-616.**
The Challenger incident was a result of at least four kinds of difficulties: differing perceptions and priorities of the engineers and management at Thiokol and at NASA, a preoccupation with roles and role responsibilities on the part of engineers and managers, contrasting corporate cultures at Thiokol and its parent, Morton, and a failure both by engineers and by managers to exercise individual moral responsibility. The author argues that in the Challenger case organizational structure, corporate culture, engineering and managerial habits, and role responsibilities precipitated events contributing to the Challenger disaster.

Winsor, D. A. 1988. Communication failures contributing to the Challenger accident: an example for technical communicators. ***Professional Communication, IEEE Transactions on, 31*****(3), 101-107. doi: 10.1109/47.7814.**
Examination of all the public documents on the Challenger explosion shows that a history of miscommunication contributed to the accident. This miscommunication was partly caused by engineers and managers interpreting data from different perspectives and the difficulty of believing and then sending bad news, especially to superiors and outsiders. The author writes to show how understanding the work dynamics of the Challenger case can help engineers and engineering managers to reduce miscommunication in their own companies.

Contributor(s)

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Resource Type

Bibliography

Topics

Catastrophes, Hazards, Disasters
Communicating Science and Engineering
Employer/Employee Relationships
Engineer/Client Relationships
Ethics and Society
Research and Practice
Safety
Workplace Ethics

Discipline(s)

Engineering
Aerospace Engineering