4. When Errors Occur: Failure Reports/Public Failures

**Deborah Dysart Gale, Peter Grogono, Concordia University, Montreal**

**Introduction**

In recent years, the social importance of technology and the technogenic nature of social problems have highlighted the need for engineers’ active participation in the democratic deliberative process. But, as noted by civil engineer and author Samuel Florman, “At a time when we need engineers who are leaders, and leaders who understand engineering, we are not producing either” (1996, p. xiv). Engineering educators and accreditation boards seek to remediate this problem by introducing new skills into the curriculum, including awareness of the “non-technical implications of engineering practice” (European Network for Accreditation of Engineering Education, 2008), “broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context” (American Accreditation Board for Engineering and Technology, 2012), and engineering’s “interactions . . . with the economic, social, health, safety, legal, and cultural aspects of society” (Canadian Engineering Accreditation Board, 2008).

Such curricular inclusions prepare engineers to participate as experts and engaged citizens in public debate about technology-related issues. The pedagogical question is how to provide engineering students with the skills to communicate effectively with the general public, beyond the rhetorical culture of engineering. The project uses the trope of *failure* to explore the rhetorical culture of engineering. In particular, we examine how the *Failure Reports* of the international development organization Engineers without Borders, while presented as transgressive discourse, affirm and reinforce the dominant discourse of engineering.

**Rhetorical Culture**

As all professions, engineering is organized around a corpus of knowledge and practices, as well as norms, beliefs and values, which together characterize engineering’s rhetorical culture. Cyphert (2001) describes “stable rhetorical culture” as possessing “a matrix of moral presumption, prudent politics, common sense, and public decency . . . enforced by a securely knotted web of rhetorical norms” enabling community response to exigencies and productive decision-making (p. 379).

The rhetorical culture of engineering is stable, not static, continuously adjusting to internal and external exigencies. Its rhetorical rules are flexible enough to accommodate plurality of views, but strong enough to ultimately maintain organizational and professional stability. De Certeau characterizes the discursive that maintain this balance as strategies and tactics (1988). Strategies reinforce power relationships, while tactics challenge and resist the status quo. Citing Foucault, however, Fassett and Warren (2004) observe that because power circulates throughout a community, tactics paradoxically reinforce the power structure by acknowledging its dominance.

As a means of exploring the strategies and tactics of the rhetorical culture of engineering, we explore the use the trope of *failure*. As noted by Samuel Florman, the public view of
engineers has alternated between benefactors of mankind and the authors of technological malevolence, depending on the perceived goodness, effectiveness, and benefit of engineering products. Failure becomes a crucial trope for engineers, in the profession and wider society.

**Failure as Trope**

In general social discourse, failure presents an occasion for rhetorical repair of image. Rhetorical tools for this purpose are summarized by Edwards (2008):

- Denial (including blaming victims)
- Mortification (accepting full responsibility)
- Evading responsibility (an accident or derailing of best intentions)
- “Reasonable practitioner” response to provoked
- Reducing offensiveness, associating act with less offensive acts or differentiating from something worse.

Corrective strategies may include:

- Offering a form of symbolic compensation (such as accepting responsibility or blame)
- Reimbursing or repairing the damage
- Outline steps to prevent recurrence

By successfully combining these discursive tools, the competent rhetor moves the incidence of failure to a positive conclusion. While these rules obtain in general discourse, they are not utilized in the rhetorical culture of engineering. Rather, failure is viewed as inevitable and, if properly appreciated, the main catalyst of improvement, an essential part of the engineering process:

> Everything designed has its limits and its flaws . . . designers are constantly criticizing the world of things, which is what leads to new designs for new things . . . failure is the key to design (Petroski, 1985, p. 42).

Within the rhetorical culture of engineering, failure is not an occasion to acknowledge responsibility and promise to prevent recurrence, but rather as the key to progressive engineering practice. This obligation is professional and collective, not moral or individual. Engineering work occurs within teams. Individuals, insofar as they can be held responsible for an engineering failure, may not be the proper agent to assess or remediate it. Assessment falls to forensic engineers, publishing in journals such as *Engineering Failure Analysis* and *Journal of Failure Analysis and Prevention*, in which failure is presented as a function of methods and materials rather than to engineers personally.

The difference in use of *failure* in general and engineering discourse is a cogent illustration of incommensurability between the two discursive communities. While general discourse seeks personal responsibility and acknowledgement of the harms brought by failure, engineering discourse looks only to structure, methods and materials. This incommensurability finds expression in the assertion that engineers are detached from the negative social and human impacts of their practice.
Failure Reports as Rhetorical Resistance

There are, of course, voices of dissent within engineering, whose tactical discourse calls for greater attention to the human impact of engineering. Such voices are heard from Engineers Without Borders (EWB), a nationally coordinated volunteer group with chapters at major universities, pursues sustainable, community-focused development projects in Africa. Since 2008, EWB Canada has submitted annual Failure Reports. It also instituted admittingfailure.com, a website inviting members of the development community to share stories of failures as a means “towards humility, innovation and learning”. These efforts aim to “establish new levels of transparency, collaboration and innovation within the development sector.”

Such tropes as humility and collaboration position EWB in opposition to dominant engineering discourse, a position tactically pursued in the Failure Reports. There the trope failure is used in the general discursive sense. The contributors, it is asserted, speak in term of personal failing and responsibility rather than on materials and methods. The reports themselves are organized with an introduction, followed by a forward by a mid-level EWB officer, a table of contents, and finally stories of failure written by returning field workers or even prominent EWB personalities. The introductions, written by non-engineers, symbolically link public and engineers. Bill Gates, Sr., in the 2010 issue, called the reports an act of “bold leadership”, while Sarah Elizabeth Lewis, in her introduction to the 2011 issue, called them “courageous”, citing EWB’s “humility, transparency, and self-criticality.”

In the content of the reports, the authors accept personal responsibility for failure in a number of situations: poor preparation for critical meetings with politicians, incomplete understanding of complex local power structures, hubris and impatience in moving forward public projects without adequate local support. Such reports transgress dominant engineering discourse and evidence many of the characteristics of the rhetorical management of failure found in general discourse, especially accepting personal responsibility, acknowledging harm and consideration of appropriate redress.

However, while the reports deviate from the rhetorical culture of engineering in admitting personal responsibility for failure, they return to their rhetorical roots when proposing corrective strategies. Here, the authors become forensic engineers, critiquing their performance as “failed parts”. A poorly prepared meeting with a politician becomes an occasion for “improved knowledge management”, inappropriate advocacy of a prototype is a problem of project management with premature scale-up.

Conclusion: Hybrid Rhetoric

The rhetorical strategy of the Failure Reports thus represents an interesting hybrid. On one hand, it transgresses the dominant discourse of engineering by reflecting directly on the role of the individual engineer in the negative impact of his or her practice. In so doing, this rhetoric forms a collaborative link with the general public, explicitly rejecting failure as the opportunity for improvement. On the other hand, the discourse of the Failure Reports reverts to dominant engineering discourse on the subject of remediation/redress, treating human failure as the subject of engineer processes.

This hybrid rhetoric offers a positive, “best of both worlds” model: the moral reflection prescribed by general discourse, together with the outcomes-focused problem solving approach of engineering discourse.
References


