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Organization at the Limit: Lessons From the Columbia Disaster

Edited by William Starbuck and Moshe Farjoun, Malden, MA: Blackwell Publishing, 2005.

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We believe this edited book—written in the Carnegie School tradition of Richard Cyert, James March, and Herbert Simon—to be one of the best books ever published connecting management theory and practice. Well-known management scholars and longtime observers of NASA, William Starbuck (NYU)—who studied at Carnegie—and Moshe Farjoun (York University) take a unique look at a rare empirical phenomenon: total failure of a high-risk, high-reward organization in *Organization at the Limit: Lessons from the Columbia Disaster*.

The National Aeronautics Space Administration (NASA) is a large, elaborate, and mature organization that operates risky and complex technologies in an environment that emits ambiguous signals. In particular, this book considers the disintegration, after completing its 16-day scientific research mission, of NASA's space shuttle *Columbia* 37 miles over northeastern Texas due to a breach in the wing. All seven astronauts on board were killed (Cabbage & Harwood, 2004).

The Columbia Accident Investigation Board (CAIB, 2003) stated that this disaster was a product of NASA's history, cultural traits, and long-term organizational practices. This book would be

an exemplar for use in teaching, a useful research reference for academics, and/or a great casebook for practitioners at similar high-risk, high-reward organizations restricted by regulations, politics, and bureaucracy (e.g., hospitals, government institutions, and nongovernmental organizations dealing with high-social-impact policies). As LSU Chancellor and former NASA administrator, Sean O'Keefe comments in the preface, those looking at the *Columbia* disaster from the outside have the opportunity "to learn from the hard lessons of others without experiencing the pain as deeply for themselves" (Starbuck & Farjoun, 2005, p. xix).

This book emphasizes utilizing multiple observers, interpretations, and evaluation criteria to allow readers to experience history more fully (March, Sproull, & Tamuz, 1991). The multiple perspectives rise out of many contributing factors to the *Columbia* disaster, including technological uncertainty; a can-do culture that minimized safety threats, severe time schedule pressures, budgetary constraints, personnel downsizing, financial uncertainty, political uncertainty, fluctuating priorities, partially inconsistent efficiency and safety goals, mischaracterization of the shuttle as operational rather than developmental, lack of integrated management across program elements, political infighting, communication problems within the hierarchy, dependent and understaffed safety agents, organizational barriers that stifled concerns about safety, and a rule-following culture that took precedence over deference to the expertise of engineers (CAIB, 2003). Perhaps the most important lesson from the *Columbia* disaster is that it can be a grave mistake to try to be all things to all people. Strategy is fundamentally about tradeoffs. High-risk, high-reward organizations such as NASA, need to choose intra- and inter-project priorities (e.g., among criteria such as faster, better, cheaper, and safer).

The early chapters written by Diane Vaughan

(Columbia University), Moshe Farjoun (York University) and Karlene Roberts et al. (University of California, Berkeley) describe the context of the disaster and examine how the working environment increasingly emphasized efficiency goals over safety goals for the purpose of organizational survival (McCurdy, 2001). They also compare NASA's two space shuttle disasters, *Challenger* (Vaughan, 1996) and *Columbia* (Chien, 2006), to emphasize slippery slopes leading to harmful outcomes created by years of technical reports defining away risks by repeatedly normalizing technical anomalies that deviated from expected performance (Starbuck & Milliken, 1988). Authors characterize the period preceding the *Columbia* disaster as a *safety drift,* i.e., the incremental slide into increasing levels of risk in order to stay on schedule (Reason, 1997). Many disasters develop as a result of latent errors that have incubated over long periods (Perrow, 1984; Turner, 1976). Another contributor to the disaster, we learn, is the failure to comprehend the complex interactions among different organizational subunits.

The next section, with contributions from William Ocasio (Northwestern University), Sally Blount (NYU) et al., and Angela Buljan and Zur Shapira (NYU), focuses on factors that influence decision making. The authors examine the interplay between language and culture in the *Columbia* disaster and focus on the meaning of the vocabulary of "safety of flight," which became viewed as a minimal constraint to satisfy rather than a goal to be improved. They also examine time pressure and ambiguous information as contributing factors in the *Columbia* disaster, as well as the intense attention to production scheduling that undermined safety in the *Columbia* launch.

Once the *Columbia* disaster has been placed in context, the next set of chapters examines a particular situation where NASA managers ignored, denied, or downplayed the images regarding breach of the wing. Expertise is provided by Karl Weick (University of Michigan), Scott Snook and Jeffrey Connor (Harvard University), Roger Dunbar (NYU) and Raghu Garud (Pennsylvania State University), and Amy Edmondson et al. (Harvard University). Here, the authors consider how a management style that routinely does not ask or

listen to engineers hampers effectiveness of interpretation, making NASA less "mindful" (Weick & Sutcliffe, 2001). Furthermore, the authors look at a specific situation—the fact that engineers' frequent requests for foam strike imaging was denied by program managers—and put it in the context of two seemingly different tragedies: Children's Hospital in Boston, where a patient died due to mismanaged care, and friendly fire in northern Iraq (Snook, 2000). These events all draw attention to the concept of "structurally induced inaction": Despite the large number of experts present, nobody acts at a crucial moment due to audience inhibition (e.g., embarrassment and fear of ridicule), social influence (e.g., if others are not acting, this must not be an emergency), and diffusion of responsibility (Latane & Darley, 1970). In all of these cases, researchers find that despite the fact that parts of the distributed knowledge system wanted to find out more about breach, the overall system prematurely stopped exploration efforts. In high-risk situations, the emergence of such data indeterminacy creates blind spots that can have disastrous consequences, i.e., consequent inaction. This section also introduces the concept of the recovery window—a time period between a threat and a major disaster (or prevented disaster) in which constructive collection action is feasible—to examine how high-risk organizations deal with ambiguous threats. In the case of the *Columbia* disaster, the recovery window was the time period between the launch of the shuttle (when shedding debris presented an ambiguous threat) to the disastrous outcome 16 days later (in which collective actions were systematically under-responsive). In particular, the problem of organizational defensive routines that create a lack of learning (Argyris, 1990) is highlighted.

The final section by Nancy Leveson et al. (MIT), David Woods (Ohio State University), William Starbuck (NYU), and Johnny Stephenson (NASA) moves beyond the imaging episode—in which engineers' requests for imaging were ignored by program managers—to a big-picture explanation. This section offers a framework drawn from engineering systems and organization theory to understand disasters and safety in a more

comprehensive way. We learn that five classic patterns seem to characterize these types of disasters (Hollnagel, 1993): (1) drift toward failure as defenses erode in the face of production pressure, (2) past successes as a reason for confidence instead of investing in anticipating the changing potential of failure, (3) a fragmented distributed problem-solving process that clouds the big picture, (4) failure to revise assessments as new evidence accumulates, and (5) breakdowns at the boundaries of organizational units that impede communication and coordination. *Resilience engineering* is suggested to combat these classic patterns through buffering capacity, flexibility, margin, and tolerance.

In the final chapter of this section, Henry McDonald (former Center Director at NASA and Professor at the University of Tennessee) ties the *Columbia* disaster to theory: "As an engineer turned manager for a time, I shared many in the science community's skepticism of organizational theory. . . . Observing NASA management struggle with the shuttle and space station, I have gained a better appreciation of how these theories can help structure a more effective high-reliability learning organization in a complicated high-technology environment replete with ambiguous safety signals" (p. 346).

Guided by the book's editors, the reader can close with the picture of an organization that pursues challenging and often inconsistent long-run goals to satisfy multiple constituents in a politically charged environment. At the time of the disaster, NASA was facing tight budgetary constraints; personnel downsizing; severe scheduling pressures; leadership turnover; and technical, political, and financial uncertainty. In understanding what pushes organizations beyond their limits, possible factors include large size, fragmentation (in fact, NASA was formed from ten autonomous centers [Klerkx, 2004]), turbulent environments, complex technology, slow learning, a weak prioritization of goals, a lack of respect by personnel across function areas, managerial facades, and constraints that render problems unsolvable.

While the book is written and edited with superb care and scholarship by multiple well-informed and thoughtful writers, it does not provide sufficient attention to the important question of "When does an organization reach its limits?" Providing these principles would enable managers to think more strategically about preventive measures. Nonetheless, the book does provide us with important lessons. When an organization reaches its limits, problems and errors keep emerging, solutions become ineffective or lag, and risks escalate. Individuals are more likely to err, and their errors are more likely to go undetected and uncorrected. And while general principles are not fully developed, the book does provide valuable prescriptive advice to help keep organizations from exceeding their limits. Organizations can increase their resilience, reliability, and effectiveness by navigating mindfully, improving learning, unlearning bad habits, and managing complexity systematically.

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A Very Short, Fairly Interesting and Reasonably Cheap Book About Studying Leadership

By Brad Jackson and Ken Parry, Thousand Oaks, California: Sage Publications, 2008. 168 pages, paperback, $25.95.

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This is the fourth entry in a new Sage series. Like the first (Grey, 2005), this book's stated goal is to avoid being a traditional academic text in favor of providing an easy overview for anyone curious about the field of leadership. As such, this book is equal parts polemic and broad-brush literature review. This makes it conspicuously vulnerable to standardized critiques (e.g., definitional precision, supporting evidence, theoretical development), but it would be unfair to condemn this book on these grounds. The goal of this book is breadth and accessibility rather than depth and rigor. It is the academic equivalent of a sample platter in a restaurant serving foreign food. It is meant to provoke interest and further exploration, not to teach the culture.

The book has four basic sections. The first concerns what the authors call "leader-centric" models, which are the current core of modern leadership theory. Along with discussion of personality, gender, and concerns about the so-called "dark side" of leadership, this section is primarily focused on transformational and charismatic leadership. The authors note that these approaches share the common features of having emerged in the 1980s; putting primary attention on the leader; and conceptualizing leadership as the management of meaning, rather than simply interpersonal influence.

This characterization is reminiscent of the larger field of organization theory at the turn of the century. Davis and Marquis (2005) observed that organization theory had been dominated by several paradigms that emerged in the 1970s (e.g., organizational ecology, resource dependency), all of which focused on the organization as the primary unit of analysis. Jackson and Parry describe a comparable situation for leadership, wherein the paradigms developed in the 1980s became dominant, creating an almost exclusive focus on the leader as an individual. If the comparison is valid, there should be exciting developments ahead for leadership research. In the past decade, organization theory has moved away from paradigmatic research toward more mechanism-based explanations and alternative units of analysis (Davis & Marquis, 2005). One wonders if equally revolutionary changes lie ahead for leadership, with a trend away from the dominant paradigms toward mid-level, mechanism-driven theory and varying levels of analysis.

After describing the mainstream in the first section, the authors use the next two to consider competing perspectives on leadership. These two sections are the primary strength of the book. The first concerns followers and the relational nature of leadership (including leader-member exchange [LMX] theories). The authors make the obvious but often overlooked point that leaders need someone to lead, and then note how little attention has actually been paid to followers in the study of leadership. They review what is known about followers, and do so surprisingly thoroughly. In fact, their chapter on followers is longer than the one about leader-centric models and has more citations, despite the relative scarcity of followership research. While it maintains the chatty, accessible tone, this section provides an excellent consideration of followership, including the strengths and weaknesses of what has been researched as well as noting some promising areas for future development.

The third section addresses critiques and alter-