PubPol 587-002: Organizational Causes of Largescale Technology Failure

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Gas plants explode, planes crash, and nuclear power plants suffer meltdowns. Human beings make mistakes and complex technologies fail in unexpected ways. Often unrecognized in accidents and disasters are the organizational features that made these disasters possible or likely. This course examines the organizational features, system defects, and bureaucratic dysfunctions that contribute to large technology failures. Organizations affect the occurrence of accidents at every level. Internal characteristics like poor communication, loose coupling, and principal-agent problems lead to accidents. External factors like ineffective regulation and enforcement likewise contributes to disaster. Through case studies, sociological analysis, and organizational study this course will help students think more fully about safety and accident in our technologically complex world.

Learning will occur through study of detailed real-world case studies as well as social-scientific analysis of the workings of various organizations and agencies and the actors and to take on a particular accident or failure in order to analyze the incident; identify causes and dysfunctions; and recommend remedies for reducing risk through public policy and corporate organizational change. Examples may include: Katrina disaster relief process, 2011 Mississippi River flooding, the Morandi Bridge collapse in Genoa, Fermi I meltdown, Davis-Besse nuclear power plant near-miss, New England Compounding Center meningitis contamination case, sexual predation scandal at Penn State or MSU.

Assignments

Work in the course is organized around a group project developing a case study of a significant event and an individual policy brief based on a different case. Team members will collaborate in development of a case-study treatment of the event, including organizational, technical, regulatory, and external factors. The case study will make recommendations for organizational policies and changes that would serve to reduce risk, including both internal policies and public policies when appropriate. Teams will make 20-minute group presentations at mid-semester and at the end of the semester. The work product from the team project should be a jointly-authored case report and a slide presentation suitable for a 20-minute presentation of the essentials of the final findings, including policy recommendations based on the case. Each team member will also write an individual 2000-word policy brief on a different example of failure, providing the essentials of the case and offering recommendations for change at the organizational or public policy level. Grades will be assigned according to the following weights: class participation (10% attendance, 10% contributions in class and on Canvas discussion board), group case study (40%), policy brief (40%). The group case study will receive a single grade, which will be shared by all team members.

Course Objectives
*   deepen understanding of organizational dysfunction in large organizations

- examine regulatory regimes in nuclear, chemical, and food industries; identify goals and shortcomings
- gain facility in policy analysis with respect to the management and regulation of large technologies
- gain experience working on multi-disciplinary research team

Course Assignments/Due Dates

September 4	Introduction to the problem: organizational and regulatory causes of large failure Discussion of case-study projects	VIDEO: Longford Gas plant, Andrew Hopkins, Lesson from Longford (link)
September 11	Sociology of organizational accidents	Perrow, *Normal Accidents* (intro, chaps. 1-4) VIDEO: Perrow lecture on *The Next Catastrophe* (link)
September 18	Normal accidents	Perrow, *Normal Accidents* (chaps. 5-7, 9, afterword) VIDEO: *Anatomy of a Disaster* Texas City refinery explosion (YouTube 55 mins) (link)
September 25	Challenger Space Shuttle disaster	Diane Vaughan, *The Challenger Launch Decision* (preface to 2016 edition; chapters 1-5) VIDEO: Challenger disaster: *A Rush to Launch* (YouTube, 50 minutes) (link)
October 2	Challenger Space Shuttle disaster	Vaughan, *The Challenger Launch Decision* (chapters 6-10)
October 9	Regulatory agencies and safety	Charles Perrow, *The Next Catastrophe* (chapters 1-6); Charles Perrow, "Five Assessments of the Fukushima Disaster" (Bulletin of the Atomic Scientists 3/10/14) (link)
October 16	Regulatory agencies and safety	Perrow, *The Next Catastrophe* (chapters 7-9); Perrow, "Nuclear denial: From Hiroshima to Fukushima" VIDEO: Nuclear Accidents: Lessons Learned, Brian Sheron, former NRC research scientist (YouTube link)
October 23	First round of project presentations	
October 30	Public policy and risk assessment	Joan Aron, *Licensed to Kill? The Nuclear Regulatory Commission and the Shoreham Power Plant* Charles Perrow, "Fukushima and the inevitability of accidents", Bulletin of

		Atomic Scientists
		Union of Concerned Scientists, "Nuclear Plant Accidents: Fermi Unit I"
		VIDEO: Kathleen Tierney, Social Science Research on Hazards and Disasters (YouTube 1:06) (link)
November 6	System safety and systems engineering	VIDEO: Nancy Leveson, The Need for a Paradigm Shift in Safety and Cyber Security (YouTube 1:11) (link) VIDEO: James Bagian, Patient Safety (link)
November 13	Organizational and regulatory dysfunctions	Vaughan, D. "The Dark Side of Organization: Mistakes, Misconduct, and Disaster" Little, D., *Consent, Coordination, and Authority: The Social Ontology of Government*, chapters 5, 9 (manuscript)
November 20	Second round of project presentations	
November 27	THANKSGIVING HOLIDAY	
December 4	Wrap up and main findings Project case study and individual briefs due	

<u>FORD SCHOOL OF PUBLIC POLICY INCLUSIVITY STATEMENT</u>

Members of the Ford School community represent a rich variety of backgrounds and perspectives. We are committed to providing an atmosphere for learning that respects diversity. While working together to build this community we ask all members to:
- share their unique experiences, values and beliefs
- be open to the views of others
- honor the uniqueness of their colleagues
- appreciate the opportunity that we have to learn from each other in this community
- value one another's opinions and communicate in a respectful manner
- keep confidential discussions that the community has of a personal (or professional) nature
- use this opportunity together to discuss ways in which we can create an inclusive environment in Ford classes and across the UM community

Accommodations for Students with Disabilities: If you believe you need an accommodation for a disability, please let your instructor know at your earliest convenience. Some aspects of courses may be modified to facilitate your participation

and progress. As soon as you make your instructor aware of your needs, they can work with the Services for Students with Disabilities (SSD) office to help determine appropriate academic accommodations. Any information you provide will be treated as private and confidential.

Student Mental Health and Well-Being Resources: The University of Michigan is committed to advancing the mental health and wellbeing of its students. We acknowledge that a variety of issues, such as strained relationships, increased anxiety, alcohol/drug problems, and depression, directly impacts students' academic performance. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, contact Counseling and Psychological Services (CAPS) and/or University Health Service (UHS). For a listing of other mental health resources available on and off campus, visit: http://umich.edu/~mhealth/

Please review additional information and policies regarding academic expectations and resources at the Ford School of Public Policy at this link:

http://fordschool.umich.edu/academics/expectations