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ABSTRACT

Public organizations, including those involved in contingency planning, have tremendous influence over the ultimate scale and scope of an environmental crisis. Yet our understanding of how organizational behavior can either rein in or exacerbate crises continues to lag behind advances in technology. This Article considers the role of public organizations in the blowout of the Macondo well in the Gulf of Mexico. Its theoretical lens is the "paradox of organizing," a frame that I suggest should be applied to interorganizational responses to low-probability, high-consequence events. The struggle to differentiate tasks and subunits and then piece them together during moments of great uncertainty can challenge and strain contingency planning, such as what is envisioned by the National Contingency Plan. Through the paradox of organizing, the organizational roots of a crisis, such as the accidental release of oil or hazardous substances, are recreated and amplified during an interorganizational response to that crisis. I discuss several dynamics that were reproduced by the response system awakened by the Deepwater Horizon *oil spill. They included risk amplification and system degradation due to the structure of the response, through processes including "anarchy," "drift," and "fire fighting." They also involved the tasks of making sense of information within the response effort, which erases detail, limits whether data can be used to detect anomalies, and encourages responders to develop their own plausible rationales for equivocal data so that they can resume interrupted tasks. These dynamics go beyond the narratives that dominate standard regulatory accounts of accidents. They point to how multiagency response can intensify the paradox of organizing.*

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I. INTRODUCTION

Environmental law was borne out of crisis.[1] Our most storied regulatory achievements happened because shocking and often sudden events—among them the burning Cuyahoga River,[2] noxious

1. RICHARD J. LAZARUS, THE MAKING OF ENVIRONMENTAL LAW 58–60 (2004). I focus here on industrial crises, in keeping with Shrivastava's study of situations where "organized industrial activities are the source of major damage to human life, and natural and social environments" that "extend beyond the organization of origin to encompass a broad range of economic, social and political agents and forces." Paul Shrivastava, Ian I. Mitroff, Danny Miller & Anil Miglani, *Understanding Industrial Crises*, 25 J. MGMT. STUD. 285, 287 (1988). More broadly, crises can be viewed as "low probability/high consequence events." Karl E. Weick, *Enacted Sensemaking in Crisis Situations*, 25 J. MGMT. STUD. 305, 305 (1988).

2. The Cuyahoga River saga and other events led to the enactment of the Clean Water Act (CWA), 33 U.S.C. §§ 1251–1387 (2006). *See* Jonathan H. Adler, *Fables of the Cuyahoga: Reconstructing a History of Environmental Protection*, 14 FORDHAM ENVTL. L.J. 89, 94–95 (2002); Sandra Zellmer, *A Tale of Two Imperiled Rivers: Reflections from a Post-Katrina World*, 59 FLA. L. REV. 599, 625 (2007).

chemicals in the basements of Love Canal,[3] deadly plumes of methyl isocyanate in Bhopal,[4] and crude oil strewn across Prince William Sound[5]—catalyzed a nascent movement[6] and helped overcome the collective action problems that stood in the way of social change.[7] In so doing, these focal points[8] and the laws they inspired gave federal and state agencies responsibilities that heretofore had been left to private ordering or local governments.[9] Forty years into this regulatory experiment, the onset of man-made disasters[10]—linked to everything from thermal energy spikes in the lower atmosphere[11] to the spread of unruly technologies[12]—proceeds apace.

Environmental law will continue to revisit these kinds of upheavals, but with unprecedented frequency. James Speth argues

3. Love Canal sparked a heightened interest in hazardous waste sites that led to the enactment of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C. §§ 9601-9675 (2006). *See* Robert V. Percival, *Regulatory Evolution and the Future of Environmental Policy*, 1997 U. CHI. LEGAL F. 159, 173.

4. Bhopal contributed to a legislative atmosphere in which the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA), Pub. L. No. 99-499, §§ 300–330, 100 Stat. 1728 (codified as amended at 42 U.S.C. §§ 11001-11050 (2006)), was passed. *See* Susan G. Hadden, *Citizen Participation in Environmental Policy Making*, *in* LEARNING FROM DISASTER: RISK MANAGEMENT AFTER BHOPAL 92–93 (Sheila Jasanoff ed., 1994); Bradley C. Karkkainen, *Information as Environmental Regulation: TRI and Performance Benchmarking, Precursor to a New Paradigm?*, 89 GEO. L.J. 257, 259 n.2 (2001).

5. Following the *Exxon Valdez* disaster Congress passed the Oil Pollution Act of 1990 (OPA), 33 U.S.C. §§ 2701-2762 (2006). Zygmunt J.B. Plater, *Learning from Disasters: Twenty-One Years After the Exxon Valdez Oil Spill, Will Reactions to the Deepwater Horizon Blowout Finally Address the Systemic Flaws Revealed in Alaska?*, 40 ENVTL. L. REP. 11041, 11043 (2010).

6. *See* Jerry L. Anderson, *The Environmental Revolution at Twenty-Five*, 26 RUTGERS L.J. 395, 414 (1995); Michael P. Vandenbergh, *The Social Meaning of Environmental Command and Control*, 20 VA. ENVTL. L.J. 191, 212 (2001).

7. Daniel A. Farber, *Politics and Procedure in Environmental Law*, 8 J.L. ECON. & ORG. 59, 66–67 (1992). *See generally* Molly J. Walker Wilson & Megan P. Fuchs, *Publicity, Pressure, and Environmental Legislation: The Untold Story of Availability Campaigns*, 30 CARDOZO L. REV. 2147 (2009).

8. *See* Richard H. McAdams, *A Focal Point Theory of Expressive Law*, 86 VA. L. REV. 1649, 1659 (2000).

9. *See* ROBERT L. GLICKSMAN, DAVID L. MARKELL, WILLIAM W. BUZBEE, DANIEL R. MANDELKER & A. DAN TARLOCK, ENVIRONMENTAL PROTECTION: LAW AND POLICY 65–67 (5th ed. 2007).

10. Barry A. Turner, *The Organizational and Interorganizational Development of Disasters*, 21 ADMIN. SCI. Q. 378, 381–82 (1976).

11. For how a modest increase in global temperature might influence geopolitics in various parts of the world, see GWYNNE DYER, CLIMATE WARS: THE FIGHT FOR SURVIVAL AS THE WORLD OVERHEATS 1–2, 29–40, 75–84, 111–21, 215–26 (2010).

12. *See* LANGDON WINNER, THE WHALE AND THE REACTOR: A SEARCH FOR LIMITS IN AN AGE OF HIGH TECHNOLOGY 127–30 (1989).

that environmental regulation may soon become "a law of coping with crisis and urgent remediation."[13] J.B. Ruhl speculates that it might be forced to split into distinct branches: one to address pollution control and conservation and others devoted entirely to mitigation and adaptation.[14] Environmental law is thus revisiting its roots in crisis. This Article explores lessons that regulators have *not* learned as they have uneasily tended to the crises that ushered in the regulations that guide their behavior. Its focus is on environmental crisis management, particularly the contingency planning system that sets out how the government will contain, disperse, and otherwise mitigate releases of oil and hazardous substances. Additionally, this Article addresses the "failure of response systems to improve alongside advances in exploration technology,"[15] such as the systems that plagued deepwater drilling before the *Deepwater Horizon* oil spill and haunted the response effort that followed. Those systems amplify the "paradox of organizing," which can lead to predictable pathologies in the wake of a crisis.

Legal scholars have begun to point to how environmental regulations are of limited use in preparing for crisis. For example, regulations are fragmented and unadaptive,[16] focus on slow-moving rather than sudden events,[17] rely on ill-placed standards and

13. James Gustave Speth, *On One Hand, Danger, on the Other, Security*, ENVTL. F., Nov.-Dec. 2009, at 51.

14. J.B. Ruhl, *Climate Change Adaptation and the Structural Transformation of Environmental Law*, 40 ENVTL. L. 363, 434–35 (2010).

15. Memorandum from the Bipartisan Policy Ctr. to the Nat'l Comm'n on the BP Deepwater Horizon Oil Spill & Offshore Drilling 13 (Aug. 25, 2010) [hereinafter Memorandum], *available at* http://www.scribd.com/doc/36467810/Response-of-the-Bipartisan-Policy-Center-to-the-Oil-Spill-Commission.

16. Alejandro E. Camacho, *Adapting Governance to Climate Change: Managing Uncertainty Through a Learning Infrastructure*, 59 EMORY L.J. 1, 25–26 (2009). Recently, climate-change law, or lack thereof, has been under fire for its failure to prepare for crisis. Without significant legislation to prevent or address global climate change, scholars point to the failure of existing laws to mitigate its effects in the interim. *See, e.g.*, Robin Kundis Craig, *"Stationary is Dead"—Long Live Transformation: Five Principles for Climate Change Adaptation Law*, 34 HARV. ENVTL. L. REV. 9, 35 (2010) (discussing the difficulties of applying the preservation and restoration schemes in current laws to the less predictable outcomes of climate change); Alexandra B. Klass & Elizabeth J. Wilson, *Climate Change and Carbon Sequestration: Assessing a Liability Regime for Long-Term Storage of Carbon Dioxide*, 58 EMORY L.J. 103, 128–32 (2008) (noting the promising nature of carbon capture and sequestration and pointing out deficiencies in the Resource Conservation and Recovery Act (RCRA) and CERCLA with regard to governing the regulatory issues that it would present).

17. Michael B. Gerrard, *Disasters First: Rethinking Environmental Law After September 11*, 9 WIDENER L. SYMP. J. 223, 223–24 (2003). Chemical accidents or terrorist attacks on

triggers,[18] and avoid the land-use planning decisions that would buffer vulnerable citizens against the devastation that follows a disaster.[19] Hurricanes Katrina and Rita unveiled the stunning range of contributors to environmental crisis, from pre-hurricane vulnerabilities to forces that led to unforeseen problems once the

facilities that use or store hazardous chemicals are another area where existing laws fall short in preparing for a crisis. Gerrard argues that we should focus less on incremental environmental hazards, such as those addressed by CERCLA, and more on the sudden events that have more of an impact on human health. *Id.* In the chemical regulatory context, scholars have pointed to weaknesses in the Clean Air Act (CAA), the Occupational Safety and Health Act (OSHA), the EPA's Risk Management Plans (RMPs), and RCRA in their ability to properly secure facilities. *See, e.g.*, Leticia M. Diaz, *Chemical Homeland Security, Fact or Fiction: Is the U.S. Ready for an Attack on Our Chemical Facilities? An Examination of State and Federal Laws Aimed at Immediate Remediation*, 56 CATH. U. L. REV. 1171, 1183–84 (2007). Diaz notes that OSHA, CAA, and EPCRA fail to provide vulnerability assessments for chemical facilities, while RCRA's requirements that facilities have warning signs, controlled entry gates, and surveillance apply to only twenty-one percent of the total number of chemical facilities. *See id.; see also* Timothy F. Malloy, *Of Natmats, Terrorists, and Toxics: Regulatory Adaptation in a Changing World*, 26 UCLA J. ENVTL. L. & POL'Y 93, 110–13 (2008) (noting that EPA's RMP for chemical and petroleum refineries does not include provisions to create inherently safer designs, but instead focuses on risk management).

18. Triggers for regulatory action are often keyed to quantity- or risk-based thresholds that invite unchecked pollution or accumulation of risk up to those thresholds. Triggers also present regulatory gaps that can be exploited by industry, leading to facility expansions and grandfathering older, riskier facilities. *See* Jonathan Remy Nash & Richard L. Revesz, *Grandfathering and Environmental Regulation: The Law and Economics of New Source Review*, 101 NW. U. L. REV. 1677, 1681–82 (2007); J.B. Ruhl & James Salzman, *Gaming the Past: The Theory and Practice of Historic Baselines in the Administrative State*, 64 VAND. L. REV. 1, 42 (2011).

19. *See, e.g.*, Raymond J. Burby, *Hurricane Katrina and the Paradoxes of Government Disaster Policy: Bringing About Wise Governmental Decisions for Hazardous Areas*, 604 ANNALS AM. ACAD. POL. & SOC. SCI. 171, 178–79 (2006) (describing the unintended consequences of pre-Katrina urban expansion in New Orleans); William R. Freudenburg, Robert Gramling, Shirley Laska, & Kai T. Erikson, *Organizing Hazards, Engineering Disasters? Improving the Recognition of Political-Economic Factors in the Creation of Disasters*, 87 SOC. FORCES 1015, 1022–28 (2008) (describing floodplain development in the Mississippi Delta region before Hurricane Katrina and the effects of 100-year flood protection and the Mississippi River Gulf Outlet on development patterns, vulnerability, and the intensity of hurricane damage).

floodwaters began to recede.[20] As a result, legal scholars concerned with crisis are greatly interested in the work of social scientists.[21]

This Article makes a more foundational argument. It is an argument hinted at by investigations of well-known disasters and underscored by the *Deepwater Horizon* oil spill and frantic efforts to kill the Macondo well in the Gulf of Mexico. The notion is deceptively simple: what stands between us and the scale and scope of future environmental crises are organizations.[22] For residents of petrochemical corridors, dense urban areas, and flood-hazard regions, this notion is unsettling for two reasons. First, by virtue of their ubiquity, organizations, both public and private, have "a near-monopoly of control over access to most of the sources of energy which could be discharged to produce disasters."[23] Second, regulators have barely begun to appreciate all that can go wrong in a world governed by such social structures.

By undertheorizing how organizations not only cause but also shape crises, regulators tell similar stories about accidents,[24] disasters,[25] and other events. They respond by passing the same

20. Contributors included man-made channels—dug to ease the flow of commerce and direct storm surges inland toward major populations—and reclamation projects that cleared away protective wetlands. WILLIAM R. FREUDENBURG, ROBERT GRAMLING, SHIRLEY LASKA & KAI T. ERIKSON, CATASTROPHE IN THE MAKING: THE ENGINEERING OF KATRINA AND THE DISASTERS OF TOMORROW 111–34 (2009). Stormwater surges left behind a toxic sludge that accumulated from years of industry and agriculture in the region, along with spills from oil platforms and vessels, leading to widespread allergy-like sinus and respiratory problems. Laura J. Steinberg, Hatice Sengul & Ana Maria Cruz, *Natech Risk and Management: An Assessment of the State of the Art*, 46 NAT. HAZARDS 143, 146 (2008).

21. For an overview of social-science research with a focus on disasters' social production, see Kathleen J. Tierney, *From the Margins to the Mainstream? Disaster Research at the Crossroads*, 33 ANN. REV. SOC. 503, 503 (2007).

22. For a similar remark about the capacity of public organizations to prevent further acts of terrorism in the United States, see Steven Kelman, *9/11 and the Challenges of Public Management*, 51 ADMIN. SCI. Q. 129 (2006) (book review). For the purposes of this Article, I define organizations broadly to include "a series of interlocking routines, habituated action patterns that bring the same people together around the same activities in the same time and places." This definition includes public and private organizations. Karl E. Weick, *The Collapse of Sensemaking in Organizations: The Mann Gulch Disaster*, 38 ADMIN. SCI. Q. 628, 632 (1993) (quoting Frances R. Westley, *Middle Managers and Strategy: Microdynamics of Inclusion*, 11 STRATEGIC MGMT. J. 337, 339 (1990)) (internal quotation marks omitted).

23. BARRY A. TURNER & NICK F. PIDGEON, MAN-MADE DISASTERS 133 (1997).

24. An accident is "an unexpected and unintentional event that is the product of chance." Thomas D. Beamish, *Accumulating Trouble: Complex Organization, a Culture of Silence, and a Secret Spill*, 47 SOC. PROB. 473, 473 (2000).

25. Disaster research began with studies of collective behavior under high stress, including conditions as they might exist in a homogeneous public following nuclear war. The

species of laws which address symptoms instead of underlying dynamics. The basic narrative of an environmental crisis presents several themes: production pressures or financial incentives loomed large (the "amoral calculator" argument);[26] these pressures and incentives were not counterbalanced by sufficient enforcement of standards;[27] agencies were captured;[28] untrained individuals made mistakes;[29] government lacked the resources, personnel, and

research was functionalist, concerned with how a community returns to normalcy after a disruption. As such, disasters were viewed as events "concentrated in time and space" and leading to loss of life or property and a disruption in social structure or the provision of social services. Charles E. Fritz, *Disaster*, *in* CONTEMPORARY SOCIAL PROBLEMS 651, 655 (Robert K. Merton & Robert A. Nisbet eds., 1961). Disasters are now treated as ongoing, episodic, socially constructed, and often foreseeable processes. *See generally* BEN WISNER, PIERS BLAIKIE, TERRY CANNON & IAN DAVIS, AT RISK: NATURAL HAZARDS, PEOPLE'S VULNERABILITY AND DISASTERS (2004). A more accurate definition of disaster begins with a "cascade of failures triggered by an extreme event that is exacerbated by inadequate planning and ill-informed individual and organizational actions." *Id.*

26. For a discussion of the "amoral calculator" model as an explanation for managerial misconduct, see Diane Vaughan, *Rational Choice, Situated Action, and the Social Control of Organizations*, 32 LAW & SOC'Y REV. 23 (1998). For a classic debunking of the argument, see DIANE VAUGHAN, THE CHALLENGER LAUNCH DECISION: RISKY TECHNOLOGY, CULTURE, AND DEVIANCE AT NASA 35–39 (1996). *See also* NAT'L COMM'N ON THE BP DEEPWATER HORIZON OIL SPILL AND OFFSHORE DRILLING, DEEP WATER: THE GULF OIL DISASTER AND THE FUTURE OF OFFSHORE DRILLING 125–26 (2011) [hereinafter DEEPWATER HORIZON OIL SPILL COMM'N REPORT] (listing time-saving decisions at the Macondo well by BP, Transocean, and Halliburton).

27. ALASKA OIL SPILL COMM'N, FINAL REPORT: SPILL: THE WRECK OF THE EXXON VALDEZ: IMPLICATIONS FOR SAFE TRANSPORTATION 16, 20–23, 33 (1990) [hereinafter ALASKA OIL SPILL COMM'N REPORT], *available at* http://www.arlis.org/docs/vol1/A/21337991.pdf; DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at 2, 4, 68, 72–74; PRESIDENT'S COMM'N ON THE ACCIDENT AT THREE MILE ISLAND, THE NEED FOR CHANGE: THE LEGACY OF TMI 20–21, 46–48, 55, 63, 66–67 (1979) [hereinafter THREE MILE ISLAND COMM'N REPORT], *available at* http://www.threemileisland.org/downloads//188.pdf; CASS R. SUNSTEIN, AFTER THE RIGHTS REVOLUTION: RECONCEIVING THE REGULATORY STATE 102–04 (1990). *But see* Cary Coglianese & David Lazer, *Management-Based Regulation: Prescribing Private Management to Achieve Public Goals*, 37 LAW & SOC'Y REV. 691, 692, 700–06 (2003).

28. *See* ALASKA OIL SPILL COMM'N REPORT, *supra* note 27, at 31, 34, 45; DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at 62, 76–78; MANCUR OLSON, THE LOGIC OF COLLECTIVE ACTION: PUBLIC GOODS AND THE THEORY OF GROUPS 27–28 (rev. ed. 1971); THREE MILE ISLAND COMM'N REPORT, *supra* note 27, at 51–52; Peter L. Kahn, *The Politics of Unregulation: Public Choice and Limits on Government*, 75 CORNELL L. REV. 280, 284–85 (1990); Plater, *supra* note 5, at 11,042 ("The official state and local regulatory agencies often uncritically accepted industry data and assurances on the design and safety of system elements, issued permits without required documentation, did not insist on strict compliance with corporate and federal rules, and on occasions when they attempted to assert regulatory vigilance were resisted, delayed, or overturned by the industry's greater resources and political momentum.").

29. For a discussion of the role of operator error in accounts of disasters, see generally

expertise to monitor, inspect, or audit the setting adequately;[30] and a lack of sufficient redundancy[31] or state-of-the-art technology[32] ushered in ill-fated events.

Lawmakers respond in kind to these narratives with efforts to centralize enforcement as well as emergency response and with calls for closer coordination among agencies.[33] They posit that to counteract agency capture, the new or consolidated agency should be independent and given greater oversight powers.[34] Redundant systems should be brought online, as should next-generation technologies.[35] Data disclosures, real-time monitoring and data logging, unannounced inspections, mandatory personnel levels, and self-regulatory or third-party certifiers should be introduced or ratcheted up to address enforcement gaps.[36] Complacency and

CHARLES PERROW, NORMAL ACCIDENTS: LIVING WITH HIGH-RISK TECHNOLOGIES (1984). For Heinrich's early definition of an industrial accident as the "conjunction of a human error and a chance event," see Rachel Barkan, Dov Zohar & Ido Erev, *Accidents and Decision Making Under Uncertainty: A Comparison of Four Models*, 74 ORG. BEHAV. & HUM. DECISION PROCESSES 118, 118 (1998). *See also* ALASKA OIL SPILL COMM'N REPORT, *supra* note 27, at 24–26; DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at 28, 57, 65, 76–77, 119, 122, 126; THREE MILE ISLAND COMM'N REPORT, *supra* note 27, at 10–11, 20, 22–23, 27, 43–44, 47, 49–50; Everett C. Hughes, *Mistakes at Work*, 17 CAN. J. ECON. & POL. SCI. 320 (1951) (examining mistakes in human work generally).

30. *See* ALASKA OIL SPILL COMM'N REPORT, *supra* note 27, at 13–14, 20–21, 23–24, 32–35, 41–42; DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at 68, 72–75, 126–27; THREE MILE ISLAND COMM'N REPORT, *supra* note 27, at 21–22, 44–48, 55; Dara O'Rourke & Gregg P. Macey, *Community Environmental Policing: Assessing New Strategies of Public Participation in Environmental Regulation*, 22 J. POL'Y ANALYSIS & MGMT. 383, 383–85 (2003).

31. *See* ALASKA OIL SPILL COMM'N REPORT, *supra* note 27, at 32; DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at 97–98; THREE MILE ISLAND COMM'N REPORT, *supra* note 27, at 53, 89.

32. *See* ALASKA OIL SPILL COMM'N REPORT, *supra* note 27, at 17, 32; DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at 56, 135, 251, 269–70, 272–73; THREE MILE ISLAND COMM'N REPORT, *supra* note 27, at 72–73, 81.

33. *See* Benjamin H. Grumbles & Joan M. Manley, *The Oil Pollution Act of 1990: Legislation in the Wake of a Crisis*, 10 NAT. RESOURCES & ENV'T 35, 35 (1995); Anne Joseph O'Connell, *The Architecture of Smart Intelligence: Structuring and Overseeing Agencies in the Post-9/11 World*, 94 CALIF. L. REV. 1655, 1655–57 (2006).

34. *See* Holly Doremus, *Through Another's Eyes: Getting the Benefit of Outside Perspectives in Environmental Review*, 38 B.C. ENVTL. AFF. L. REV. 247, 247, 250–53 (2011); Plater, *supra* note 5, at 11,046.

35. *See generally* Grumbles & Manley, *supra* note 33, at 36; Mark A. Latham, *Five Thousand Feet and Below: The Failure to Adequately Regulate Deepwater Oil Production Technology*, 38 B.C. ENVTL. AFF. L. REV. 343 (2011).

36. *See* Karkkainen, *supra* note 4 (evaluating in a comprehensive manner EPA's Toxics Release Inventory (TRI) program); Saule T. Omarova, *Wall Street as Community of Fate: Toward Financial Industry Self-Regulation*, 159 U. PA. L. REV. 411, 447–50 (2011).

neglect should be met with proposals to consider worst-case scenarios and engender ill-defined "cultures" of safety.[37]

These concerns are relevant subjects of inquiry, and an effort has been made to point out the bureaucratic causes of, for example, capture and inadequate enforcement.[38] But the importance of organizations as units of analysis has not received adequate attention in the regulatory response to environmental crisis. Some accounts, including the President's commission to investigate the causes of the British Petroleum (BP) oil spill, point out that crises occur within complex social systems.[39] Other accounts hint at the managerial problems that arise from such complexity or call for improvements to the "culture" of an offshore drilling operator or other entity.[40] But concern for the deviant, "routine by-product[s]" of social systems[41] and their influence over the emergency response architecture that grew out of the *Exxon Valdez* spill, lags well behind advances in social science.

Early attempts to understand how organizations function, survive, and influence society have yielded a thriving constellation of scholars in sociology, management, public administration, and other disciplines[42] who are committed to Talcott Parsons' mandate that we

37. *See* Oliver A. Houck, *Worst Case and the Deepwater Horizon Blowout: There Ought to Be a Law*, 40 ENVTL. L. REP. 11033, 11036 (2010) (describing OPA's required facility response plans for worst-case scenarios); Rena Steinzor, *Lessons from the North Sea: Should "Safety Cases" Come to America?*, 38 B.C. ENVTL. AFF. L. REV. 417, 417 (2011).

38. *See* Eric Biber, *Too Many Things to Do: How to Deal with the Dysfunctions of Multiple-Goal Agencies*, 33 HARV. ENVTL. L. REV. 1, 9 (2009) (explaining how land management agencies with multiple goals will systematically overperform on those that are complementary or easier to measure); Michael E. Levine & Jennifer L. Forrence, *Regulatory Capture, Public Interest, and the Public Agenda: Toward a Synthesis*, 6 J.L. ECON. & ORG. 167 (1990) (discussing the role of slack in agency capture); David B. Spence, *Managing Delegation Ex Ante: Using Law to Steer Administrative Agencies*, 28 J. LEGAL STUD. 413, 415–17 (1999) (describing how organizational structure can influence susceptibility to agency capture).

39. *See* ALASKA OIL SPILL COMM'N REPORT, *supra* note 27, at 15–30; DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at viii–x, 223–24; THREE MILE ISLAND COMM'N REPORT, *supra* note 27, at 63–64.

40. *See, e.g.*, DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at ix, 217–25; NAT'L COMM'N ON TERRORIST ATTACKS UPON THE U.S., THE 9/11 COMMISSION REPORT: FINAL REPORT OF THE NATIONAL COMMISSION ON TERRORIST ATTACKS UPON THE UNITED STATES 353–57; 416–18 (2004).

41. Diane Vaughan, *The Dark Side of Organizations: Mistake, Misconduct, and Disaster*, 25 ANN. REV. SOC. 271, 274 (1999) ("Organizational deviance, in its generic form, can be understood as routine nonconformity: a predictable and recurring product of all socially organized systems.").

42. For an overview, see W. Richard Scott, *Reflections on a Half-Century of Organizational Sociology*, 30 ANN. REV. SOC. 1 (2004).

examine "the role of organizations in the larger sociocultural system."[43] These networks include a smaller, innovative group of scholars focused on the organizational roots of crisis, breathing added life and complexity into Philip Selznick's work on how organizations become "institutionalized" and take on lives of their own in ways that divert them from their formal missions.[44] The events of 9/11, Hurricane Katrina, the BP oil spill, and other man-made disasters pose a challenge to this theoretical outpost, as well as to environmental law: how do we take what we know about the uniquely organizational contributors to crises[45] and devise regulations that more effectively guide how we respond to those crises?

This Article considers the *Deepwater Horizon* oil spill in order to set out the contours of this necessary conversation. I demonstrate that the institutional and administrative arrangements that encourage crises are reproduced during the response period.[46] This happens because the cross-organization plans in use during an emergency response provide a more expansive canvas on which the structural and cognitive problems of organizing are magnified. Finally, I discuss several puzzles in the organization theory literature that should be addressed if we are to avoid intensifying the paradox of organizing during the next crisis.

II. DEEPWATER BLOWOUTS AND THE PARADOX OF ORGANIZING

The paradox of organizing embraces the notion that organizations are open systems. Our concept of the organization has evolved over decades of inquiry as processing power and theory developed, from a research setting where engineers draft

43. W. Richard Scott, *The Mandate Is Still Being Honored: In Defense of Weber's Disciples*, 41 ADMIN. SCI. Q. 163, 163 (1996).

44. *See* Philip Selznick, *Institutionalism "Old" and "New,"* 41 ADMIN. SCI. Q. 270, 271 (1996).

45. For key earlier works on the organizational roots of crisis, see THIERRY C. PAUCHANT & IAN I. MITROFF, TRANSFORMING THE CRISIS-PRONE ORGANIZATION (1992); PERROW, *supra* note 29; BARRY A. TURNER, MAN-MADE DISASTERS (1978); Robert P. Gephart, *Making Sense of Organizationally Based Environmental Disasters*, 10 J. MGMT. 205 (1984); Paul Shrivastava, *Industrial Crisis Management: Learning from Organizational Failures*, 25 J. MGMT. STUD. 283 (1988); Karl E. Weick, *The Collapse of Sensemaking Organizations: The Mann Gulch Disaster*, 38 ADMIN. SCI. Q. 628 (1993).

46. For a discussion of the stages of disaster including the response phase, see David A. McEntire, Christopher Fuller, Chad W. Johnston & Richard Weber, *A Comparison of Disaster Paradigms: The Search for a Holistic Policy Guide*, 62 PUB. ADMIN. REV. 267 (2002).

management principles and experimentally arrange workers and tasks,[47] to a more ethnographic space,[48] to the unit of analysis itself. With this transition came an understanding of the organization as a natural[49] and, later, open[50] system, one with less clearly-defined boundaries with its external environment. Far from the series of formal structures that occupied industrial psychologists in the first half of the twentieth century, the modern theorist accounts for an organization's social structures and their place in a sea of institutions

47. *See, e.g.*, FREDERICK WINSLOW TAYLOR, THE PRINCIPLES OF SCIENTIFIC MANAGEMENT (1911).

48. The Human Relations Movement followed Scientific Management. Relying on field studies and other anthropological techniques, it introduced social motives and group dynamics to organization theory. *See, e.g.*, F.J. ROETHLISBERGER & WILLIAM J. DICKSON, MANAGEMENT AND THE WORKER (1939). For examples of field studies, see KURT LEWIN, FIELD THEORY IN SOCIAL SCIENCE (1951); W. LLOYD. WARNER & J.O. LOWE, THE SOCIAL SYSTEM OF THE MODERN FACTORY (1947). These research techniques, particularly situated observation, predominated into the 1950s and were used to craft some of the key works in industrial sociology. *See, e.g.*, PETER M. BLAU, THE DYNAMICS OF BUREAUCRACY (1955); ALVIN W. GOULDNER, PATTERNS OF INDUSTRIAL BUREAUCRACY (1954); CHARLES R. WALKER & ROBERT H. GUEST, THE MAN OF THE ASSEMBLY LINE (1952).

49. The "natural systems" view of organizations examines the interplay of formal structures, created in the pursuit of efficiency, and informal structures, which embody a variety of expressions of human sentiment, including communication, reciprocal bonds, and the expectations that arise from an individual's role. *See, e.g.*, CHESTER I. BARNARD, THE FUNCTIONS OF EXECUTIVE (1938); GEORGE C. HOMANS, THE HUMAN GROUP (1950); ROBERT K. MERTON, SOCIAL THEORY AND SOCIAL STRUCTURE (1957). Philip Selznick best captured the natural systems view of organizations, demonstrating that they embody instrumentalist as well as adaptive qualities. Over time, organizations develop their own character, apart from their use as goal-achieving instruments. They become "infused with value beyond the technical requirements of the task at hand" as they struggle to survive. PHILIP SELZNICK, LEADERSHIP IN ADMINISTRATION 17 (1957).

50. The "open systems" perspective followed the rise of operations research and systems engineering after World War II. It also grew out of efforts to stem the siloing of knowledge within physics, biology, and the social sciences by focusing on the systems qualities of each discipline's key areas of inquiry. *See* W. RICHARD SCOTT, ORGANIZATIONS: RATIONAL, NATURAL, AND OPEN SYSTEMS 82–99 (5th ed. 2003). An organization-as-open-system is a series of inputs, processes, and knowledge stocks set within environments of varying levels of stability and uncertainty. Organizations respond to the interdependencies between them and their environment with a range of strategies, including variation (specialization among subunits that subsequently require greater coordination) and enactment, the structuring of activities "as loosely coupled systems of repeated, contingent, interlocked behaviors that establish a workable level of certainty . . . but also allow variation in interpretation and action as organizational members selectively attend to their environments." Joel A.C. Baum & Tim J. Rowley, ***Companion to Organizations: An Introduction***, ***in*** COMPANION TO ORGANIZATIONS 1, 6–7 (Joel A. C. Baum ed., 2002). For an account of the variation strategy, see PAUL LAWRENCE & JAY LORSCH, ORGANIZATION AND ENVIRONMENT (1967). For the enactment perspective on organizing, see KARL E. WEICK, THE SOCIAL PSYCHOLOGY OF ORGANIZING (1969).

that influence what was once viewed as self-contained.[51] Organizations respond to this interdependence through strategies such as variation and enactment, which are discussed below. Through these responses, organizations allow risks to accumulate and make predictable mistakes.

The turn to open systems analysis was the Cambrian moment in organization theory, launching several projects to explain the organization's struggles to adapt to and survive within its environment.[52] Each has its own way of navigating the paradox of organizing, which received a good amount of attention midcentury. The paradox is twofold. First, the bureaucratic structures that are formed to address problems have unintended consequences.[53] Second, any solutions experience an uneasy duality as they are used to control, while at the same time they are influenced by, their institutional environment.[54] This means that for organizing to occur, calculable manipulation and contingent embeddedness must coexist.[55] Two of the most important bodies of work on the organizational roots of crises, normal accident theory and enacted sensemaking, emerged directly from the open systems perspective.[56] Its concern with information flows and their self-limiting qualities is important for understanding the post-*Valdez* regulation of crisis through contingency planning.

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51. W. Richard Scott, *Reflections on a Half-Century of Organizational Sociology*, 30 ANN. REV. OF SOC. 1, 4–5 (2004).

52. *See, e.g.*, Mie Augier, James G. March & Bilian Ni Sullivan, *Notes on the Evolution of a Research Community: Organization Studies in Anglophone North America, 1945–2000*, 16 ORG. SCI. 85 (2005); James G. March, *Continuity and Change in Theories of Organizational Action*, 41 ADMIN. SCI. Q. 278 (1996); William McKinley, Mark A. Mone & Gyewan Moon, *Determinants and Development of Schools in Organization Theory*, 24 ACAD. MGMT. REV. 634 (1999).

53. Robert K. Merton, *The Unanticipated Consequences of Purposive Social Action*, 1 AM. SOC. REV. 894, 895 (1936).

54. John W. Meyer & Brian Rowan, *Institutionalized Organizations: Formal Structure as Myth and Ceremony*, 83 AM. J. SOC. 340, 341 (1977).

55. *See* Philip Selznick, *Foundations of the Theory of Organizations*, 13 AM. SOC. REV. 25, 34–35 (1948).

56. *See, e.g.*, CHARLES PERROW, NORMAL ACCIDENTS: LIVING WITH HIGH-RISK TECHNOLOGIES (1999); Barbara Czarniawska, *Karl Weick: Concepts, Style and Reflection*, 53 SOC. REV. 267, 271–272 (2005). Both of these perspectives add to our understanding of crisis because they speak to different kinds of threats to the form and structure of a social system. *See* Timothy Hynes & Pushkala Prasad, *Patterns of 'Mock Bureaucracy' in Mining Disasters: An Analysis of the Westray Coal Mine Explosion*, 34 J. MGMT. STUD. 601, 602 (1997).

Wielding the organization-as-open-system to implement an emergency response involves overcoming the paradox of organizing. The assembly of "ongoing interdependent actions into sensible sequences"[57] is a contradictory enterprise.[58] An organization must balance exploratory activities, such as discovery and innovation, with exploitative activities, such as production and efficiency, keeping inertia at bay while fostering economies of scale.[59] Existing approaches must share a space with attempts to innovate.[60] Short-term performance must be pursued with long-term adaptability in mind. Balancing these interests begins with the twin structural projects of differentiation and integration: "The act of organizing creates distinctions of roles and responsibilities, which must be coordinated and integrated to achieve an overall goal."[61]

As with a living organism, an organization develops greater complexity as it grows, its parts "requir[ing] increasing mutual interdependence."[62] Subunits are created in response to external constraints, but they must be pieced together to address certain tasks.[63] This is complicated by the fact that subunits do not relate to one another in a unified way. They exhibit different levels of interdependence, and their members develop different attitudes and orientations over time.[64] Each form of interdependence requires its own coordination methods, including standardization, planning, and mutual adjustment.[65] Whether it is BP, the Coast Guard, a regional response team, or a group of rescue workers banding together for the first time, an organization must articulate distinctions among its members and identify linkages across newly constituted groups in

57. KARL E. WEICK, THE SOCIAL PSYCHOLOGY OF ORGANIZING 3 (1979).

58. JAMES D. THOMPSON, ORGANIZATIONS IN ACTION: SOCIAL SCIENCE BASES OF ADMINISTRATIVE THEORY 150 (1967).

59. James March, *Exploration and Exploitation in Organizational Learning*, 2 ORG. SCI. 71, 71 (1991).

60. Nelson P. Repenning, *Understanding Fire Fighting in New Product Development*, 18 J. PRODUCT INNOVATION MGMT. 285, 286 (2001).

61. Wendy K. Smith & Michael L. Tushman, *Managing Strategic Contradictions: A Top Management Model for Managing Innovation Streams*, 16 ORG. SCI. 522, 526 (2005).

62. SCOTT A. SNOOK, FRIENDLY FIRE: THE ACCIDENTAL SHOOTDOWN OF U.S. BLACK HAWKS OVER NORTHERN IRAQ 143 (2000) (quoting HERBERT SPENCER, AN AUTOBIOGRAPHY 56 (1904)).

63. *Id.* at 143.

64. THOMPSON, *supra* note 58, at 54–56; LAWRENCE & LORSCH, *supra* note 50, at 9–11.

65. LAWRENCE & LORSCH, *supra* note 50, at 9–11.

order to overcome its inherent complexity.[66] These realities lead to predictable errors and oversights.[67]

In addition to structural demands, an organization must respond to the cognitive[68] limits on how its workers, managers, and other members experience and interpret their surroundings. There are two broad approaches to organizational cognition. First, we can view the organization as an information processing system.[69] Second, and equally important, we can consider how members interpret the stream of information entering a system, which depends on the environment in which the organization finds itself.[70] In either approach, the challenge begins with the fact that the properties of a complex system cannot be entirely understood by any given person. They must rely on schemas, which are templates for "representing elements and the relationships between them" in order to compensate for cognitive shortcomings by storing information and indicating appropriate actions.[71] Management teams also set out routines or standard operating procedures for the organization, and workers develop patterns of interaction in particular settings.[72] Schemas, routines, and fixed categories of behavior have strong effects on an organization's ability to detect and respond to unexpected or novel events.[73] They can also encourage organizations to gradually accept greater amounts of risk.[74]

66. Marshall Scott Poole & Andrew H. Van de Ven, *Using Paradox to Build Management and Organizational Theory*, 14 ACAD. MGMT. REV. 562 (1989).

67. For an example of an organizationally-based accident resulting from the failure of each of the coordination mechanisms Thompson describes, see SNOOK, *supra* note 62, at 154–173.

68. Here, I am distinguishing cognitive processes from more affective and emotional processes, focusing on "reasoning and the preconscious grounds of reason: classifications, representations, scripts, schemas, production systems, and the like." Paul J. DiMaggio & Walter W. Powell, *Introduction*, *in* THE NEW INSTITUTIONALISM IN ORGANIZATIONAL ANALYSIS 1, 35 n.10 (1991); *see also* W. RICHARD SCOTT, INSTITUTIONS AND ORGANIZATIONS 23 (1995).

69. For an overview, see Theresa K. Lant, *Organizational Cognition and Interpretation*, *in* COMPANION TO ORGANIZATIONS 344 (Joel A.C. Baum ed., 2002).

70. *Id.* at 351–52.

71. Kimberly D. Elsbach, Pamela S. Barr & Andrew B. Hargadon, *Identifying Situated Cognition in Organizations*, 16 ORG. SCI. 422, 422 (2005).

72. *See* Stephen R. Barley & Pamela S. Tolbert, *Institutionalization and Structuration: Studying the Links Between Action and Institution*, 18 ORG. STUD. 93, 97–98 (1997). For a discussion of how routines lead organizations to uphold inefficient practices in the context of industrial accidents, see Gregg P. Macey, *Coasean Blind Spots: Charting the Incomplete Institutionalism*, 98 GEO. L.J. 863 (2010).

73. Karl Weick, *Organizing and Failures of Imagination*, 8 INT'L PUB. MGMT. J. 425,

To find out whether an organization will have difficulty responding to a crisis, we focus on the complex, open system and how it comes to know and interpret information from its environment; how it stores knowledge in procedures, norms, rules, and other sources of cognition that transcend the individual; and how patterns of understanding form among its actors as well as across organizations. These structural and cognitive considerations inform how organizations invite and intensify disaster. The BP oil spill provides a dramatic example of how the organizational roots of crisis are reproduced during a response action.

III. THE ILL-FATED MACONDO WELL: AN INDUSTRIAL CRISIS

I need not take much space to return to the devastation that befell the Gulf region, a diverse ecosystem that includes everything from sperm whales to fishing villages,[75] in April 2010. On April 20, there was an explosion on an offshore oil platform known as the *Deepwater Horizon*, forty-eight miles southeast of the Mississippi River.[76] The dynamically stabilized (not anchored to the seabed) platform, built by Hyundai, owned by Transocean,[77] and leased to BP, sat partially submerged about 5,000 feet above the sea floor.[78] This is by no means an uncommon scene in the Gulf of Mexico:

431–33 (2005).

74. Diane Vaughan, *Theorizing Disaster: Analogy, Historical Ethnography, and the* Challenger *Accident*, 5 ETHNOGRAPHY 315, 340 (2004).

75. ROWAN JACOBSEN, SHADOWS ON THE GULF: A JOURNEY THROUGH OUR LAST GREAT WETLAND 92 (2011).

76. For book-length accounts of the disaster, see JOEL ACHENBACH, A HOLE AT THE BOTTOM OF THE SEA: THE RACE TO KILL THE BP OIL GUSHER (2011); BOB CAVNAR, DISASTER ON THE HORIZON: HIGH STAKES, HIGH RISKS, AND THE STORY BEHIND THE DEEPWATER WELL BLOWOUT (2010); WILLIAM R. FREUDENBURG & ROBERT GRAMLING, BLOWOUT IN THE GULF: THE BP OIL SPILL DISASTER AND THE FUTURE OF ENERGY IN AMERICA (2011); PETER LEHNER & BOB DEANS, IN DEEP WATER: THE ANATOMY OF A DISASTER, THE FATE OF THE GULF, AND ENDING OUR OIL ADDICTION (2010).

77. Of the companies with a stake in the exploratory drilling of the Macondo well, Transocean Ltd. is most consistent in its efforts to deflect responsibility for the blowout, focusing in its internal investigation on BP's risk-magnifying decisions and Halliburton's failure to ensure the integrity of the cement used to secure steel pipe against the sides of the wellbore. BP's internal investigation was more circumspect. *See* TRANSOCEAN LTD., MACONDO WELL INCIDENT: TRANSOCEAN INVESTIGATION REPORT VOLUME I (June 2011), *available at* http://www.deepwater.com/_filelib/FileCabinet/pdfs/ 00_TRANSOCEAN_Vol_1.pdf.

78. CUTLER CLEVELAND, DEEPWATER HORIZON OIL SPILL (C. MICHAEL HOGAN & PETER SAUNDRY eds., 2010), *available at* http://www.eoearth.org/article/ Deepwater_Horizon_oil_spill?topic=50364.

there are 1,900 ultra-deepwater leases in the region, 272 of which have been drilled.[79] Each requires drilling at depths greater than 5,000 feet.[80] The *Deepwater Horizon* joined this eerie skyline in February 2010, connecting to a well roughly one mile below the surface using several thousand feet of pipe, after another rig, the *Marianas*, was damaged by a hurricane.[81]

From the platform, workers carried out operations through the pipe, which is called a riser. Their tasks were enormous: Send a drill bit down the riser into a metal box on the sea floor, which then drills into the sediment. Follow the drill bit with drilling mud, a mixture of water, clay, and other substances, circulating it down the riser and back up to the platform to bring rock to the surface and lubricate the drillbit.[82] Gradually insert steel casings into the well as drilling continues, cementing them to surrounding rock at various stages in order to keep them in place.[83] These and other tasks, at such depths, demand some of the most complex work carried out by any industry. In order to accomplish such tasks, BP and other owners and operators need to develop technologies to withstand very low temperatures; near the seafloor, ice crystals form around methane molecules, creating hydrates that can clog pipes and equipment.[84] Technology is also needed to combat exceedingly high pressures in various ways.[85] Much of the work is done using remotely operated vehicles. The semisubmersible rig holds its ground using eight 7,000 horsepower thrusters and GPS technology "so precise that its drills [can] hit a specific spot on the ocean floor, just inches in diameter, but located nearly a mile below."[86]

Of greatest concern is that there will be a blowout, which is a loss of control over drilling fluids leading to the release of oil or gas to surrounding waters.[87] The dangers were well-known by the

79. CURRY L. HAGERTY & JONATHAN L. RAMSEUR, CONG. RESEARCH SERV., R41262, DEEPWATER HORIZON OIL SPILL: SELECTED ISSUES FOR CONGRESS 2 (2010), *available at* http://www.fas.org/sgp/crs/misc/R41262.pdf.

80. *Id.*

81. LEHNER & DEANS, *supra* note 76, at 6; ACHENBACH, *supra* note 76, at 14.

82. FREUDENBURG & GRAMLING, *supra* note 76, at 28–31.

83. *Id.* at 28–30.

84. PETER FOLGER, CONG. RESEARCH SERV., RS 22990, GAS HYDRATES: RESOURCE AND HAZARD 1 (2008).

85. HAGERTY & RAMSEUR, *supra* note 79.

86. FREUDENBURG & GRAMLING, *supra* note 76, at *x*.

87. MARC HUMPHRIES, ROBERT PIROG & GENE WHITNEY, CONG. RESEARCH SERV., R40645, U.S. OFFSHORE OIL AND GAS RESOURCES: PROSPECTS AND PROCESSES 24 (2010).

industry, including BP.[88] For example, prior to the *Deepwater Horizon*'s demise, there were forty-four notable blowouts worldwide. This included eleven blowouts in the Gulf of Mexico, occurring at a rate of roughly one every four years.[89] Blowout preventer failures were also common. A blowout preventer is a giant piece of equipment that is supposed to seal around a wellhead in the event of an uncontrolled fluid event. A study by the Minerals Management Service identified 117 failures during a two-year period on the Outer Continental Shelf.[90] Some of the environmental review documents covering the area of the Macondo well gave strangely prescient estimates for the size of a potential well blowout and the length of time necessary to drill a relief well, and discussed problems presented by methane hydrates and other deepwater drilling realities.[91] But none of the firms with a stake in Mississippi Canyon Block 252, Lease Sale 206, were prepared for what happened on April 20.

At the bottom of the Gulf, far below the *Deepwater Horizon* oil platform, sat the well's blowout preventer (BOP). Should an oil or gas well experience too much pressure, this device, which contains a series of valves weighing several hundred tons, is supposed to be activated.[92] There are several backup systems on BOPs that can respond to a number of contingencies. Each of them failed to engage the BOP on April 20, when methane gas escaped from the well and rapidly ascended through the drill column, ballooning in size as it neared the surface.[93] It crashed through several seals before

88. For example, BP suffered a blowout on a gas platform in Azerbaijan in 2008. Similar to the Macondo well blowout, the accident was blamed on a "bad cement job" by Halliburton, a contractor on both projects. Confidential Cable from Embassy Baku, Azerbaijan: BP Downbeat on 2009 Shah Deniz Phase Two Progress (Jan. 15, 2009), *available at* http://www.cablegatesearch.net/cable.php?id=09BAKU30 ("BP has restarted oil production from CA and is about to start re-injecting gas again in the Central Azeri field. It has closed off a 'few suspect wells' from which they think a bad cement job caused the leaking gas . . . .").

89. Houck, *supra* note 37, at 11,034.

90. PER HOLAND, SINTEF, RELIABILITY OF SUBSEA BOP SYSTEMS FOR DEEPWATER APPLICATION, PHASE II DW 11-12 (1999).

91. MINERALS MGMT. SERV., U.S. DEP'T OF THE INTERIOR, GULF OF MEXICO DEEPWATER OPERATIONS AND ACTIVITIES: ENVIRONMENTAL ASSESSMENT 9, II-3, II-16 (2000); BP, BP GULF OF MEXICO REGIONAL OIL SPILL RESPONSE PLAN 533 (2009) [hereinafter BP REGIONAL RESPONSE PLAN] *available at* http://info.publicintelligence.net/BPGoMspillresponseplan.pdf.

92. DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at 92–93.

93. *Id.* at 131–32, 137–38, 146, 149-50, 159–67, 273. There were also failures of the

exploding, causing chaos and fires to break out on the rig. Of the 126 people operating on the platform, a tiny floating city, 115 evacuated.[94] A search for the remaining eleven persons was called off three days later. The rig sank to the bottom of the Gulf, and the giant pipe that connected the *Deepwater Horizon* to the wellhead collapsed into the sea.

Three days later, remotely operated vehicles scanned the riser and discovered two leaks.[95] Thus began one of the most difficult emergency response efforts since the dawn of the fossil fuel economy. It involved at its height over 6,000 vessels, millions of feet of boom, 37,000 personnel, seventeen staging areas in four states, and a "Unified Command" encompassing over a dozen federal agencies.[96] Several attempts to stop the leak failed, followed by a promising procedure in June in which a cap was placed over the BOP after giant shears severed it from the riser.[97] The operation allowed BP to recover some oil from a containment system attached to the BOP. A number of valves were then closed on the cap, pending tests for pressure, hydrate formation, and other indicators.[98] On July 15, eighty-six days after the release began, crude oil stopped flowing into the Gulf.[99]

We will be grappling with the extent of the devastation for some time. To begin with, the size of the spill is the subject of much controversy. The Coast Guard initially estimated a leak of 1,000 barrels of oil per day.[100] A National Oceanic and Atmospheric Administration (NOAA) scientist later encouraged Unified Command to raise this estimate to 5,000 barrels per day on April 28.[101] That figure remained until late May, when estimates between 20,000 and 100,000 barrels per day were given during congressional testimony.[102] Part of the reason for the disparity in estimates lies in

cement at the base of the well and the drilling mud in the well to contain hydrocarbon pressure. *Id.* at 115–21.

94. *Id.* at 3, 17, 131.

95. *Id.* at 131–32.

96. CLEVELAND, *supra* note 78.

97. DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at 145–46, 148–50, 157–60, 161–67.

98. *Id.* at 161–67.

99. *Id.* at 165.

100. *Id.* at 133.

101. *Id.*

102. *Id.* at 146–47.

the methods used to estimate the size of the spill.[103] Nevertheless, to release more oil than the Macondo well sent into the Gulf would require the work of a national army, such as when Iraqi forces opened and set fire to 700 wells as they retreated from Kuwait in 1991.[104]

The disaster defied many confident claims that BP made to regulators prior to the spill, thus unveiling the symbolic nature of environmental review. BP's Regional Oil Spill Response Plan for the Gulf, approved by the U. S. Minerals Management Service (MMS) in July 2009, reveals the faulty logic involved in contingency plans. The bureaucracies that promulgate these documents are only effective during periods of continuous and stable operation. Because crises occur too infrequently to allow an organization to gauge risk, there is a tendency to lock in existing routines, which are an organization's primary tool for simplifying decisions, and interpret past success as evidence of their adequacy.[105] Organizations do so using "fantasy documents," which are plans for events that are not perceived as credible threats and that rarely test the plans' unrealistic models for how organizations behave under stress.[106]

BP and the MMS engaged in such planning. They assumed the likelihood of a catastrophic blowout was not significant, waiving BOP plans. Procedures and equipment for response to a worst-case blowout were deemed readily available. BP's response plan spoke of "significant mechanical recovery capacity."[107] While the projected worst-case blowout would pump 250,000 barrels per day into the Gulf, BP's plan arrived at a capacity to recover 491,000 barrels of oil per day.[108] By June 2010, its skimming capacity reached 900 barrels per day.[109] Another benign assumption involved the chance that oil could reach the Louisiana coast. BP's plan assumed a twenty-one

103. *Id.* at 147.

104. FREUDENBURG & GRAMLING, *supra* note 76, at 13.

105. Lee Clarke & James F. Short, Jr., *Social Organization and Risk: Some Current Controversies*, 19 ANN. REV. SOC. 375, 392–93 (1993).

106. Lee Clarke & Charles Perrow, *Prosaic Organizational Failure*, 39 AM. BEHAVIORAL SCIENTIST 1040 (1996). These documents have common characteristics: they deal with new or scaled-up systems such as deepwater drilling, use successfully implemented blueprints for simpler contingencies, cover a wide range of events with every possible contingency assumed known, and speak to multiple, skeptical audiences by employing benign assumptions. LEE CLARKE, MISSION IMPROBABLE: USING FANTASY DOCUMENTS TO TAME DISASTER (1999).

107. BP REGIONAL RESPONSE PLAN, *supra* note 91, at 504-48.

108. *Id.* at 509.

109. FREUDENBURG & GRAMLING, *supra* note 76, at 14.

percent chance that this would happen within a month of a blowout.[110] Crude oil reached the state nine days after the blowout.

Such estimates were presented despite the fact that the fate and transport of oil released a mile under the surface is beyond the reach of dispersion modeling. Yet planning proceeded, relying on past successes (such as the use of containment domes for shallow water leaks after Hurricane Katrina); hypothetically scaling up procedures for shallow water or surface spills and ignoring subsurface realities of deepwater drilling; assuming away multiple stressors that accompany a worst-case scenario (shoreline threats, adverse effects on marine life, uncertain authority over decisions, personnel changes) and neglecting to determine how a responsible party would act under such stress; preapproving dispersants based on the assumption that a response action would be limited in time and space; treating the BOP as a failsafe even though it included one, not two blind shear rams; and encouraging the kinds of rigidities of perception that we find in organizational settings. Aided by the self-deceiving quality of fantasy plans, the broader mindset in the petroleum industry, even after the Gulf oil spill was underway, was that "[t]his was simply an event that could not happen."[111]

Media saturation and Web 2.0 took the Macondo well blowout, and the fire, collapse, and riser leaks that followed, and seared them into our collective consciousness. Traffic to a live feed of one of the leaks, taken by camera-mounted remotely operated vehicles and available on the Internet one month after the blowout, crashed the House Select Committee for Energy Independence and Global Warming's website.[112] The "spillcam," as it was called, adorned cable news broadcasts, often next to dreary updates that moved along the crawl at the bottom of the screen. At one point, the spillcam caught an eel as it drifted in for a closer look before darting away to safety.[113]

In the ensuing weeks, the spillcam, and interpretations of the images it captured, mediated the efforts of BP (the responsible party) and a vast architecture of laws and regulations that lumbered into

110. *Id.* at 54.

111. Houck, *supra* note 37, *at* 11033.

112. CLEVELAND, *supra* note 78.

113. *Eel Checks Out Deepwater Oil Leak*, THE GUARDIAN (June 10, 2010), http://www.guardian.co.uk/environment/video/2010/jun/10/eel-deepwater-horizon-oil-leak.

action. We learned plenty during the 103 days before the well was effectively "killed," as the Coast Guard and other agencies worked closely with BP to invent responses "on the fly."[114] The most disquieting lesson, in an age where natural, man-made, and na-tech[115] crises occur with great frequency and where terrorism has muscled its way alongside the hurricanes and accidents of old as an object of legislative reform, is how slowly the law learns from its experience with the organizational factors that magnify and prolong disasters. Organizational breakdown was clear, pervasive, and predictable before and during the oil well blowout.[116] Some of the lessons from the BP oil spill have a ring of familiarity to students of disasters, such as the loss of the shuttles *Challenger* and *Columbia* and the events of 9/11. Yet lawmakers undertheorize the importance of organizations in environmental regulation, particularly during times of crisis.

The aftermath of the spill signifies a rush to remedy what are perceived as the standard contributors to crisis. To avoid conflicts of interest between the Outer Continental Shelf leasing program and staff charged with policing oil and gas operations, the lead oversight agency (the Minerals Management Service) was split into three distinct bureaus and consolidated under the Bureau of Ocean Energy Management, Regulation and Enforcement.[117] Certain categorical exclusions from environmental review were eliminated.[118] Through

114. Nat'l Comm'n on the BP Deepwater Horizon Oil Spill & Offshore Drilling, *Stopping the Spill: the Five-Month Effort to Kill the Macondo Well* 1 (Staff Working Paper No. 6, 2011) [hereinafter Working Paper No. 6], *available at* http://www.oilspillcommission.gov/sites/default/files/documents/Updated%20Containment%20Working%20Paper.pdf.

115. Stacy Young, Lina Balluz & Josephine Malilay, *Natural and Technologic Hazardous Material Releases During and After Natural Disasters: A Review*, 322 SCI. TOTAL ENV'T 3 (2004).

116. In addition to the overconfidence encouraged by the creation of facility response plans, pre-blowout dynamics included atrophy of vigilance, normalization of risk, and parallel processing. FREUDENBURG & GRAMLING, *supra* note 76.

117. U.S. SEC'Y OF THE INTERIOR, ORDER NO. 3299, ESTABLISHMENT OF THE BUREAU OF OCEAN ENERGY MANAGEMENT, THE BUREAU OF SAFETY AND ENVIRONMENTAL ENFORCEMENT, AND THE OFFICE OF NATURAL RESOURCES REVENUE (2010), *available at* http://www.doi.gov/deepwaterhorizon/loader.cfm?csModule=security/getfile&PageID=32475; Memorandum from Michael R. Bromwich, Director, Bureau of Ocean Energy Mgmt., Enforcement and Regulation, to all BOEMRE district employees 1–4 (2010); Press Release, U.S. Dep't of the Interior, Salazar Divides MMS's Three Conflicting Missions (May 19, 2010).

118. Memorandum from Michael R. Bromwich, Director, Bureau of Ocean Energy Mgmt., Enforcement and Regulation, to Walter Cruickshank, Deputy Director, Bureau of Ocean Energy Mgmt., Enforcement and Regulation 1 (Aug. 16, 2010).

rulemaking and notices to lessees, the Department of Interior sought to impose new redundancies of control, information disclosure requirements regarding blowout preventer functionality, operator and drilling safety regulations, and third-party equipment verification.[119] There were calls to enhance training and recruit a proper cadre of inspectors.[120] Bills before Congress would extend many of these fixes.[121] In addition to these reforms, the presidential

119. Oil and Gas and Sulphur Operations in the Outer Continental Shelf—Safety and Environmental Management Systems: Final Rule, 75 Fed. Reg. 63,609, 63,610 (Oct. 15, 2010) (to be codified at 30 C.F.R. pt. 250) (final rule requiring operators to "integrate a comprehensive [Safety and Environmental Management System] program into the management of their [Outer Continental Shelf] operations"); Oil and Gas and Sulphur Operations in the Outer Continental Shelf - Increased Safety Measures for Energy Development on the Outer Continental Shelf: Final Rule, 75 Fed. Reg. 63,345 (Oct. 14, 2010) (to be codified at 30 C.F.R. pt. 250) (strengthening regulations for subsea and surface blowout preventers, well casing and cementing, secondary intervention, unplanned disconnects, recordkeeping, and well completion); BUREAU OF OCEAN ENERGY MGMT., REGULATION AND ENFORCEMENT, U.S. DEP'T OF THE INTERIOR, NTL NO. 2010-N10, NATIONAL NOTICE TO LESSEES AND OPERATORS OF FEDERAL OIL AND GAS LEASES, OUTER CONTINENTAL SHELF 1–2 (2010) (requiring submission of information demonstrating that an operator using BOPs "has access to and can deploy surface and subsea containment resources that would be adequate to promptly respond to a blowout or other loss of well control"); BUREAU OF OCEAN ENERGY MGMT., REGULATION & ENFORCEMENT, FACT SHEET: THE DRILLING SAFETY RULE 1–2, *available at* http://www.doi.gov/news/pressreleases/loader.cfm?csModule=security/getfile&PageID=45792 (describing BOEM's interim Drilling Safety Rule imposing requirements on well bore integrity and well control equipment and procedures); MINERALS MGMT. SERV., U.S. DEP'T OF THE INTERIOR, NTL NO. 2010-N05, NATIONAL NOTICE TO LESSEES AND OPERATORS OF FEDERAL OIL AND GAS LEASES, OUTER CONTINENTAL SHELF (OCS): INCREASED SAFETY MEASURES FOR ENERGY DEVELOPMENT ON THE OCS 1, 2–6 (2010) (implementing reporting requirements for "BOP stacks and loss of well control events," as well as third party certification, new testing requirements, and well design requirements); MINERALS MGMT. SERV., U.S. DEP'T OF THE INTERIOR, NTL NO. 2010-N06, NATIONAL NOTICE TO LESSEES AND OPERATORS OF FEDERAL OIL AND GAS LEASES, OUTER CONTINENTAL SHELF (OCS): INFORMATION REQUIREMENTS FOR EXPLORATION PLANS, DEVELOPMENT AND PRODUCTION PLANS, AND DEVELOPMENT OPERATIONS COORDINATION DOCUMENTS ON THE OCS 2–3 (2010) (requiring submission of information to MMS on potential well blowout and worst-case discharge scenarios).

120. Press Release, Bureau of Ocean Energy Mgmt., Regulation and Enforcement, BOEMRE Strengthens Offshore Inspections Program (June 13, 2011).

121. *See, e.g.*, H.R. 1890, 112th Cong. (2011) (requiring applicants for exploration plans or development plans in the Outer Continental Shelf to submit an oil spill containment and clean-up plan); H.R. 1870, 112th Cong. (2011) (creating new entities within the Department of Interior); H.R. 1664, 112th Cong. (2011) (amending requirements for oil spill response plans and water quality monitoring); H.R. 1393, 112th Cong. (2011) (requiring mandatory monthly inspections of offshore drilling facilities on the Outer Continental Shelf); H.R. 1229, 112th Cong. (2011) (as passed by the House, May 11, 2011) (requiring operators to demonstrate compliance with safety systems, including blowout prevention and oil spill response and containment before the Dept. of Interior issuance of drilling permits); H.R. 3534, 111th Cong. (2010) (as passed by the House, July 30, 2010) (requiring use of safe well

commission added that coordination should be improved among high-level officials and that more extensive procedures for Spills of National Significance should be adopted.[122] Their report echoes earlier calls for a "culture of safety" among operators, through use of a "safety case" instead of a prescriptive approach.[123] Better coordination, increasingly intricate procedures, and more data with oversight by independent, better-trained staff is the order of the day.

IV. NCP v. DWH: The Response Architecture's Ignorance of Organizations

Such changes mark the tail end of twenty years of regulatory accretion. The federal response to disaster during this time has been to create organizations that focus on civil contingencies, new or reorganized bureaucracies demanding greater coordination, enhanced procedures, and more data sharing. This began in earnest with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP),[124] published in response to the *Torrey Canyon* oil spill in 1968, amended to cover hazardous substance spill response, and revised after *Exxon Valdez* to reflect provisions of the Oil Pollution Act of 1990.[125] The NCP creates a number of bodies to carry out response functions at the national, regional, and area levels.[126] A National Response Team cobbles together sixteen

control technologies and practices for drilling); S. 3516, 111th Cong. (2010) (as reported by S. Comm. on Energy and Natural Resources, July 28, 2010) (reforming the regulatory oversight of the Interior Department with regard to offshore drilling in the Outer Continental Shelf).

122. DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at 267–68.

123. *Id.* at 223.

124. National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. § 300 (2010). For a summary of the NCP, see *National Oil and Hazardous Substances Pollution Contingency Plan Overview*, U.S. ENVTL. PROTECTION AGENCY, http://www.epa.gov/oem/content/lawsregs/ncpover.htm (last updated Aug. 19, 2011).

125. *See* 40 C.F.R. § 300.1 (The purpose of the NCP is "to provide organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants, and contaminants."). Presidential creation of the NCP is required by § 311(d) of the Federal Water Pollution Control Act ("Clean Water Act"), 33 U.S.C. § 1321(d) *as amended by* the Oil Pollution Act of 1990, Pub. L. 101-380, and by Section 105 of CERCLA, 42 U.S.C. § 9605 (2006), *as amended by* the Superfund Amendments and Reauthorization Act of 1986, Pub. L. 99-499, 100 Stat. 1613 (1986). The President delegated the authority to amend the NCP to the administrator of the EPA. Exec. Order, No. 12777, 56 Fed. Reg. 54,757 (Oct. 22, 1991).

126. 40 C.F.R. §§ 300.210(a)–(c), 300.105(c) (2010). The NRT does not become actively involved in a response action that is manageable by Regional Response Teams (RRT), instead offering policy, guidance, and coordination efforts, for instance in the creation of

agencies and is chaired by the EPA and vice-chaired by the Coast Guard.[127] Regional Response Teams mirror the National Response Team in composition. They function at the regional level and actively engage in response efforts.[128] Area Committees required by the Clean Water Act also include members from industry and are the primary functional units of response planning, implementing more specific and detailed plans for a physical response to oil spills.[129] For the Gulf region, the Area Committee formulated the Area Contingency Plan, or "One Gulf Plan," a coordinated effort to envision and prepare for events as they might occur on the ground.

An On-Scene Coordinator directs and oversees response efforts and coordinates all other efforts at the release site.[130] When a spill poses a substantial threat to public health or welfare, the Commandant of the Coast Guard may classify it as a Spill of National Significance and appoint someone to coordinate even greater federal involvement. The National Incident Commander assumes the role of On-Scene Coordinator and oversees all levels of response.[131] For the *Deepwater Horizon* spill, Admiral Thad Allen filled this role by forming a Unified Area Command, an *ad hoc* body to supervise the broader effort,[132] while three Incident Command posts in Houma,

Regional Contingency Plans (RCPs). Because of the severity and cross-district nature of the BP oil spill, the NRT was activated as an emergency response team as part of the nationalized response. 40 C.F.R. § 300.110(j)(1)(i–ii) (2010).

127. During a response action, the chair is the agency providing an On-Scene Coordinator. The Coast Guard provides On-Scene Coordinators for oil discharges within coastal waters and was therefore the NRT's chair for the *Deepwater Horizon* response. 40 C.F.R § 300.120(a)(1) (2010).

128. 40 C.F.R § 300.205(b) (2010). RRTs are limited to regional resources of represented federal agencies (Coast Guard vessels, for example). 40 C.F.R § 300.115(f) (2010). However, RRTs also include state and local representation. 40 C.F.R §§ 300.115(a), 300.180 (2010). The RRT is composed of a standing team of members of participating federal agencies, state governments, local governments, and incident-specific teams when the RRT is activated for a response. Membership in incident-specific teams is dictated by the nature of the incident. 40 C.F.R. § 300.115(b)–(e) (2010).

129. 40 C.F.R. §§ 300.205(c), 300.210(c) (2010).

130. 40 C.F.R. § 300.120(a) (2010). For coastal releases, the Coast Guard has predesignated On-Scene Coordinators (OSCs). OSCs collect information and communicate it to appropriate persons and agencies as well as the public. 40 C.F.R § 300.135(c)–(n), 300.155(a)–(c) (2010).

131. 40 C.F.R. § 300.323(c) (2010). The OSC continues to operate after installation of an NIC, although their relationship and defined roles are not well-defined in the NCP.

132. The organizations involved in the *Deepwater Horizon* response's Unified Command included BP, Transocean, the Coast Guard, Minerals Management Service, NOAA, EPA, Department of Homeland Security, Department of the Interior, Department of Defense, Fish and Wildlife Service, National Park Service, Department of State, U.S. Geological Survey, and

Louisiana; Houston, Texas; and Mobile, Alabama made tactical and operational decisions.[133]

The NCP is the federal government's "playbook,"[134] a massive assignment of procedures, roles, equipment levels, techniques, and schedules. It mirrors the perceived lessons of disasters like *Exxon Valdez* as it consolidates expertise, expands procedures, and assigns responsibilities. The events of 9/11 ushered in a more gargantuan surge of reorganization, whose premise bears a striking resemblance to the justification for the NCP. First, bring together disparate, diverse units, this time under the Department of Homeland Security.[135] Second, increase coordination among agencies and branches, including among fifty-six FBI field offices, and acquire and share a greater amount of information. Lastly, build out standard operating procedures to meet an expanding set of contingencies in an evolving threat environment, such as by updating protocols to address multiple or suicide hijackings as opposed to traditional hijackings.[136]

Below, I discuss what is neglected in these efforts, which represent the state-of-the-art in environmental crisis management. The Macondo well blowout illustrates crucial, cutting-edge problems in organization theory, particularly interorganizational limits to rationality and how to manage organizational cognition. In the Gulf of Mexico in the summer of 2010, the post-9/11 emergency

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OSHA.

133. Nat'l Comm'n on the BP Deepwater Horizon Oil Spill and Offshore Drilling, *Decision-Making Within the Unified Command* 4 (Staff Working Paper No. 2, 2010) [hereinafter Working Paper No. 2], *available at* http://www.oilspillcommission.gov/sites/default/files/documents/Updated%20Unified%20Command%20Working%20Paper.pdf.

134. H.R. REP. NO. 96-1016, pt. 1, at 30 (1980).

135. Homeland Security Act of 2002, Pub. L. No. 107–296, 116 Stat. 2135 (2002); U.S. DEP'T OF HOMELAND SEC., HOMELAND SECURITY PRESIDENTIAL DIRECTIVE/HSPD-5 (2003) [hereinafter HSPD-5] (making DHS the principal federal agency for "terrorist attacks, major disasters, and other emergencies" and outlining agency obligations).

136. The National Incident Management System (NIMS) "provide[s] a consistent nationwide approach for Federal, State, and local governments," a single system of management for domestic emergencies. HSPD-5, *supra* note 135, at § 15. NIMS Component IV codifies the Incident Command System, itself a small bureaucracy with command, operations, planning, logistics, and finance sections. U.S. DEP'T OF HOMELAND SEC., NATIONAL INCIDENT MANAGEMENT SYSTEM § IV.A.2 (2008) [hereinafter NIMS]. Together, HSPD-5 and NIMS lay out the response architecture that prosecuted what officials understood as a "war" against the Macondo well. They invoke the structures and procedures of the NCP and require assembly of a Unified Command for multi-jurisdictional response. NIMS § IV.A.2.a(2).

response laws were set in motion. Government organized teams of scientists and engineers who "took a crash course in petroleum engineering and were able over time to provide substantive oversight of BP."[137] BP worked on building "novel devices" that they confidently lowered into the Gulf while the government "had to mobilize personnel on the fly."[138] We see two strands of activity here: design/build of new containment methods and a lurching toward appropriate oversight, for which the National Response Framework provided a limited map. The insights of organization theory help explain the "failure of response systems to improve alongside advances in exploration technology"[139] that haunted the response effort. This Article discusses six dynamics that were reproduced by the response system awakened by the BP oil spill. These dynamics, which contributed to the failure to more swiftly rein in the blowout, go beyond the narratives that dominate standard regulatory accounts of accidents. They point to how multiagency response can intensify the paradox of organizing.

A. Interorganizational Dynamics

1. Anarchy

The NCP and other contingency planning efforts intensify the challenges of balancing differentiation and integration while tending to organizational cognition. This is true by virtue of the inter-organizational anarchies that they create and try to govern. No matter how many standard operating procedures are built out or agencies are consolidated and told to share information, disaster response will occur under conditions of dramatic uncertainty. For example, during the BP oil spill, the use of dispersants to break oil into trillions of tiny droplets to keep much of it from reaching coastal wetlands had to be approved for subsea use near the wellhead.[140] This had to proceed with little or no data on environmental persistence, sublethal effects (such as endocrine

137. Working Paper No. 6, *supra* note 114, at 1.

138. *Id.*

139. Memorandum, *supra* note 15, at 13.

140. Press Release, Restore the Gulf, Coast Guard and EPA Approve Use of Dispersant Subsea in Further Effort to Prevent Oil from Reaching U.S. Shoreline (May 15, 2010), *available at* http://www.restorethegulf.gov/release/2010/05/15/coast-guard-and-eps-approve-use-dispersant-subsea-further-effort-prevent-oil-reac/.

disruption), or toxicity.[141] Dispersants were preauthorized as part of the NCP but without guidance as to the appropriate amount or duration of use.[142] Decisions about what became high-volume, subsea dispersant application were made in narrow time frames without the chance to gather sufficient data.[143] Responders also wanted to place boom along coastal ecosystems and tried to direct its placement where it would be most efficient.[144] But because coastal areas change with great frequency, determining specific booming maps ahead of a crisis is impossible.[145] These and other sources of ambiguity rendered goals unclear at a number of points during the war on the Macondo well.

Well control and containment, which were supervised by MMS officials, and later the Unified Command,[146] provide examples of the unclear goals that informed the response. At first, the concern was well integrity.[147] BP workers delayed intervention with remotely operated vehicles for twenty hours because they were worried that closing the BOP stack and shutting in the well might cause an underground blowout, where vast amounts of hydrocarbons would escape into surrounding rock.[148] Other times, decisions were guided by goals such as positioning ships at a safe distance from the fire or by concerns for human health due to concentrations of volatile organic compounds near response vessels or the shoreline.[149]

141. DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at 144–45, 270–71; Nat'l Comm'n on the BP Deepwater Horizon Oil Spill & Offshore Drilling, *The Use of Surface and Subsea Dispersants During the BP Deepwater Horizon Oil Spill* 1–2 (Staff Working Paper No. 4, 2011) [hereinafter Working Paper No. 4], *available at* http://www.oilspillcommission.gov/sites/default/files/documents/Updated%20Dispersants%20Working%20Paper.pdf.

142. Working Paper No. 4, *supra* note 141, at 4; *see* DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at 271.

143. DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at 144–45, 270–71.

144. Nat'l Comm'n on the BP Deepwater Horizon Oil Spill & Offshore Drilling, *Decision-Making Within the Unified Command* 18 (Staff Working Paper No. 2, 2011) [hereinafter Working Paper No. 2], *available at* http://www.oilspillcommission.gov/sites/default/files/documents/Updated%20Unified%20Command%20Working%20Paper.pdf.

145. *Id.* at 21; DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at 154.

146. Working Paper No. 6, *supra* note 114, at 1.

147. *Id.* at 3.

148. *Id.* at 3–4.

149. *Id.* at 4.

Objectives shifted over time. After the "top kill" method failed to stop the flow of oil, BP concluded that it did not work because mud pumped into the well had moved through collapsed rupture disks and sideways into the rock, rather than remaining in the well and pushing hydrocarbons back into the reservoir.[150] This caused capping methods, including the capping stack that ultimately stopped the flow of oil into the Gulf, to be shelved because of well integrity concerns.[151] Later, when the capping stack was again considered a viable option, monitoring protocols had to be developed, combining visual, seismic, sonar, wellhead pressure, and other data.[152] This raised several questions: Would well integrity tests signal the need to reopen the spill to avoid an underground blowout? What threshold would signal the need to take such an action? And how would it be decided?[153]

In addition to goal ambiguity, and despite the militaristic hierarchy set in place by the NCP and other documents, response participants and their assigned roles varied considerably over time. The federal oversight structure matured through late June.[154] Early on, MMS focused its attention on safety risks and ensuring conformity with MMS regulations, not on suggesting options or determining their likelihood of success.[155] The Coast Guard did not take charge of the scene or even lead the fire fighting effort, as neither were part of its primary mission.[156] Eventually, a rudimentary chain of command formed, with BP detailing new procedures, MMS and Coast Guard staff in Houston identifying and mitigating hazards, procedures being forwarded to the Unified Command in Louisiana with an MMS Gulf of Mexico director reviewing those procedures, and the Federal On-Scene Coordinator giving final approval.[157] It was not until two months into the crisis that a formalized government review process was in place, with the U.S. Geological Survey and teams from several national laboratories providing information and analysis.[158] Additional teams of scientists

150. *Id.* at 20–21.

151. *Id.* at 22.

152. *Id.* at 28–29.

153. *Id.*

154. *Id.* at 14–15, 24–25.

155. *Id.* at 6.

156. DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at 130.

157. Working Paper No. 6, *supra* note 114, at 6.

158. *Id.* at 14–15.

not envisioned by the response plans, such as the Well Integrity Team and the Flow Rate Technical Group, were formed rapidly.[159]

Throughout this time period, there was little clarity as to the extent and nature of government oversight with respect to certain classes of issues.[160] Role ambiguity abounded as positions and responsibilities were grafted onto existing frameworks.[161] Organizational charts for the Unified Area Command and Incident Command posts, for example, show employees of BP scattered across the command structure in roles such as waste management and environmental assessment.[162] Admiral Allen, who decided to focus on monitoring high-level strategy and political issues himself, defined the role of the National Incident Commander on the job.[163] From existing procedures it was unclear how he and the On-Scene Coordinator should divide responsibility.[164] The National and Regional Response Teams were activated and later marginalized, becoming report-to instead of decision-making bodies.[165] Agency administrators took on evolving responsibilities and issued joint directives.[166] Industry leaders from firms other than BP assumed an active role in mid-to-late June, providing advice on conference calls of thirty or more.[167] State-level actors did not know how to interact with the NCP, which is more interventionist than the federal relief provided under the Stafford Act (which provides funding and coordination when an emergency is declared at the state level).[168]

The essential technologies of emergency response, which included the instruments and techniques of well control and available

159. *Id.* at 13–14, 27–28.

160. *Id.* at 13–15, 24–27.

161. *Id.*

162. DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at 134.

163. Working Paper No. 2, *supra* note 144, at 5.

164. *Id.* at 3–6.

165. *Id.* at 8–9.

166. *See generally* DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at ch. 5 (outlining the response to the Gulf Oil Disaster); Working Paper No. 6, *supra* note 114 (outlining the effort to contain the Macondo blowout).

167. *See, e.g.*, Thad Allen, Nat'l Incident Commander for the Deepwater BP Oil Spill, Press Briefing Regarding the Deepwater BP Oil Spill (June 21, 2010), http://www.restorethegulf.gov/release/2010/06/21/transcript-press-briefing-national-incident-commander-june-21-2010 (describing conference calls and the involvement of BP in the ongoing containment efforts); DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at 161–62; Working Paper No. 6, *supra* note 114, at 14–15.

168. Working Paper No. 2, *supra* note 144, at 18–19.

routines and institutionalized modes of conduct, were further ill-defined.[169] Some of the proposed solutions to the well blowout, which included cofferdam, top kill, junk shot, capping stack, static kill, and collection, were adapted to deepwater use for the first time.[170] Other more rule-based technologies, such as standard operating procedures previously developed and based on well-defined problems culled from previous crises, were inappropriate for this particular spill response, yet the decisions that they facilitated allowed other risks to accumulate. For example, the Coast Guard has procedures for supporting the fire marshal brought in by a company with a rig fire. However, in the chaos surrounding the events before the rig's collapse, no fire marshal was called.[171] With no one in charge, vessels responding to the fire poured seawater onto its decks rather than on the columns supporting the rig.[172] As a result, the tons of seawater applied to the deck upset the rig's stability and potentially hastened its collapse.[173] If the rig had stayed afloat, much of the oil would have burned at the surface.

Later, faith in existing procedures led the Unified Command to neglect some of the key operational hazards associated with BP's containment efforts.[174] Specifically, as the cofferdam was readied to surround the larger of two riser leaks, no effort was made to determine how to mitigate hydrate formation within equipment as it was being installed.[175] There were procedures for dealing with hydrates once a containment structure was in place, but not before.[176] Hydrates accumulated in the cofferdam while it was being

169. *See generally* DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at ix; Nat'l Comm'n on the BP Deepwater Horizon Oil Spill & Offshore Drilling, *Response/Clean-up Technology Research & Development and the BP Deepwater Horizon Oil Spill* (Staff Working Paper No. 7, 2011) [hereinafter Working Paper No. 7], *available at* http://tinyurl.com/6mkt8cf.

170. DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at 145–53; Working Paper No. 6, *supra* note 114, at 7–16. For depictions of some of the proposed solutions to the blowout, see Working Paper No. 6, *supra* note 114, at 9 (cofferdam), 16 (top kill and junk shot), 27 (capping stack), 35 (static kill), and 22 (collection).

171. U.S. COAST GUARD, REPORT OF INVESTIGATION INTO THE CIRCUMSTANCES SURROUNDING THE EXPLOSION, FIRE, SINKING AND LOSS OF ELEVEN CREW MEMBERS ABOARD THE MOBILE OFFSHORE DRILLING UNIT, DEEPWATER HORIZON IN THE GULF OF MEXICO 78–79 (2011), *available at* https://www.hsdl.org/?view&did=6700.

172. *Id.* at 78–81.

173. *Id.* at 81–82.

174. Working Paper No. 6, *supra* note 114, at 4–7.

175. DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at 145.

176. *Id.*

lowered into the Gulf.[177] Because hydrates are lighter than water, they rendered the structure buoyant, sending a giant flammable dome toward a surface strewn with response vessels.[178]

As disaster scholars have repeatedly warned about the "incubation period" that precedes crises, the effects of poorly defined technologies and an accumulation of errors were similarly manifest in the early response efforts in the Gulf. For example, BP and other parties tried to control the blowout preventer stack until May 5, by which date they were only able to partially close the blind shear ram.[179] These were largely misdirected efforts because Transocean had earlier reconfigured the equipment so that what the parties thought was the blind shear ram was actually a test ram.[180]

More importantly, the lack of an accurate flow-rate estimate hindered use of existing and refined technologies.[181] Efforts such as placing a cofferdam over a riser leak were known to have little chance of success if the flow rate were greater than 15,000 barrels per day.[182] For the top kill, given planned pumping rates, the procedure was not likely to work if it were counteracting a 13,000- to 15,000-barrel-per-day blowout.[183] In addition, hydrates are more likely to form on equipment as the flow volume increases.[184] A ship brought in to collect oil from containment structures could process only 15,000 barrels per day.[185] Models of hydrate formation and collection abilities proceeded without accurate flow estimates.[186] For much of May 2010, the only official flow-rate estimate was 5,000 barrels per day.[187] The flow rate was closer to 60,000 barrels per day.

There is a decision-making model for environments characterized by unclear goals, ill-defined technology, and shifting participation. This model challenges the view of organizations as rational entities

177. *Id.*

178. *Id.* at 146.

179. *Id.* at 137–38.

180. Working Paper No. 6, *supra* note 114, at 8.

181. DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at 146–47; Working Paper No. 6, *supra* note 114, at 11–12.

182. Working Paper No. 6, *supra* note 114, at 11–12.

183. *Id.* at 16; DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at 150.

184. DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at 146.

185. Working Paper No. 6, *supra* note 114, at 11–12.

186. *Id.* at 11.

187. *Id.*

and extends the work of the Carnegie school on bounded cognition.[188] In it, "[p]roblems, solutions, participants, and choice opportunities . . . are frequently uncoupled and recombined in organizational settings for reasons of timing and chance rather than based on administrative forethought."[189] This occurs under conditions of what Cohen, March, and Olsen dub "organized anarchy."[190] A primary preoccupation of organizations is to replace ambiguous goals with "more specific, proximal, and often procedural goal statements" in order to reduce uncertainty.[191] How these goals are then addressed is contingent: the specific decision-making context and choice opportunities that it presents, the participants who are assembled, and other characteristics of an organization's structure bring together solutions and problems. New institutionalism is largely devoted to studying what happens in these settings, as organizationally-defined solutions seek problems in order to reduce uncertainty and ensure an organization's legitimacy.[192]

While some scholarship questions how contingent such decisions will ultimately be,[193] recent work suggests that the model has even greater relevance in interorganizational settings. For example, Clarke's study of the regulatory response to a polychlorinated biphenyl (PCB)-contaminated office building in Binghamton, New York[194] and Beamish's analysis of the Guadalupe Dunes oil spill[195] point to how, in an interagency context, bounded fields of attention, indistinct problems, unclear procedures, fluid agency participation, and conflicting priorities inform how contamination is addressed and how solutions are paired with problems in specific choice situations.

188. *See* Herbert A. Simon, *Theories of Decision-Making in Economics and Behavioral Science*, 49 AM. ECON. REV. 253 (1959).

189. Thomas D. Beamish, *Waiting for Crisis: Regulatory Inaction and Ineptitude and the Guadalupe Dunes Oil Spill*, 49 SOC. PROBS. 150, 154 (2002).

190. Michael D. Cohen, Jarmes G. March & Johan P. Olsen, *A Garbage Can Model of Organizational Choice*, 17 ADMIN. SCI. Q. 1 (1972).

191. THOMAS BEAMISH, SILENT SPILL: THE ORGANIZATION OF AN INDUSTRIAL CRISIS 91 (2002) (quoting W. RICHARD SCOTT, ORGANIZATIONS: RATIONAL, NATURAL, AND OPEN SYSTEMS 274 (1981)).

192. Meyer & Rowan, *supra* note 54.

193. Jonathan Bendor, Terry M. Moe & Kenneth W. Shotts, *Recycling the Garbage Can: An Assessment of the Research Program*, 95 AM. POL. SCI. REV. 169 (2001).

194. *See generally* LEE CLARKE, ACCEPTABLE RISK? MAKING DECISIONS IN A TOXIC ENVIRONMENT (1989).

195. BEAMISH, *supra* note 191.

To improve contingency planning, we must better understand how those linkages occur.

2. *Drift*

A second debate that is recast by multiagency response is the extent to which an organization is prone to crisis. Turner's grounded theory of the origins of disasters zeroed in on the faulty premises, misplaced optimism, and ignored danger signals that contribute to an accident during an incubation period.[196] Gephart, Shrivastava, and others added political and external factors to explain their root causes, while Perrow was the first to provide a framework to study how certain factors interact.[197] Perrow argues that organizations are "error-inducing" systems to the extent they exhibit interactive complexity (which allows independent failures to combine in unforeseen ways) and tight as opposed to loose coupling (which allows mistakes or failures to quickly escalate before they are understood).[198] The basic message of "normal accident" theory is that accidents are inherent in the structure and technology of an organization. Complexity and coupling render what are at first minor technical problems either invisible or incompatible with existing categories of inquiry by facility managers. Beginning with the Three Mile Island nuclear accident, Perrow distinguishes systems accidents from those caused by operator or equipment failure.[199]

Like Beamish and Clarke, Perrow relies on a garbage can model of decision making for normal accident theory.[200] The theory helps us build on the basic problem of organizing, that of creating organizations that function as a single entity (integration) while maintaining enough internal diversity (differentiation) to allow them

196. Turner, *supra* note 10.

197. David Wicks, *Institutionalized Mindsets of Invulnerability: Differentiated Institutional Fields and the Antecedents of Organizational Crisis*, 22 ORG. STUD. 659, 660 (2001).

198. PERROW, *supra* note 29, at 4–5; Scott D. Sagan, *Learning from Normal Accidents*, 17 ORG. & ENV'T. 15, 16–18 (2004).

199. Charles Perrow, *The President's Commission and the Normal Accident*, *in* ACCIDENT AT THREE MILE ISLAND: THE HUMAN DIMENSIONS 174–76 (David L. Sills, C. Wolf & V. Shelanski eds., 1982).

200. Charles Perrow, *The Limits of Safety: The Enhancement of a Theory of Accidents*, 2 J. CONTINGENCIES & CRISIS MGMT. 212, 216–17 (1994). The garbage can model considers the interplay of relatively independent streams of problems, personnel, solutions, and choice opportunities. It seeks to understand the influence of organizational structure and design over how these streams are linked together. Cohen, March, & Olsen, *supra* note 190, at 3–4.

to respond to the complexity of their environments.[201] Normal accident theory does so by focusing on the mechanisms used to maintain sufficient diversity: (a) establishing hierarchy to consider problems at different levels, (b) allowing those with power to use the hierarchy to encourage actions they approve of, or (c) creating distinct subcultures through use of social pressures.[202] Through these mechanisms, diversity is enhanced (usually through loose coupling) or diminished (usually through tight coupling). Thus, Weick suggests that the theory, which began as a technologically deterministic account of two common properties of systems, concerns social processes as well as technological structures.[203]

While Sagan approvingly tested the theory against the Strategic Air Command's operations during the Cold War,[204] the theory is sometimes criticized for its inadequate falsifiability, as is true of its more optimistic counterpart, the theory of high-reliability organizations.[205] Initially formulated by LaPorte, high-reliability theory looks to air traffic control, nuclear powered aircraft carrier decks, and submarines and asks how they achieve strong safety records in the face of interactive complexity and tight coupling. The answer is largely one of group socialization, redundancy, and continuous training and simulation.[206]

The BP oil spill poses a question to both theories on an inter-organizational scale: To what extent can contingency planning be designed so that it is reliable while avoiding system-level failures? The NCP grafts a potentially tightly coupled and interactively complex system of decision-making onto environmental hazards, where an ill-placed procedure or flow rate estimate can migrate through the system and lead to potentially catastrophic outcomes (e.g., earlier rig collapse, failed containment efforts, underground blowout). Snook's reconstruction of a friendly fire incident in Iraq

201. Karl E. Weick, *Normal Accident Theory as Frame, Link, and Provocation*, 17 ORG. & ENV'T. 27, 28 (2004).

202. *Id.* at 29.

203. *Id.* at 29–30.

204. SCOTT D. SAGAN, THE LIMITS OF SAFETY: ORGANIZATIONS, ACCIDENTS, AND NUCLEAR WEAPONS (1993).

205. Eugene A. Rosa, *Celebrating a Citation Classic—and More*, 18 ORG. & ENV'T. 229 (2005).

206. Todd R. LaPorte & Paula M. Consolini, *Working in Practice but Not in Theory: Theoretical Challenges of "High-Reliability Organizations,"* 1 J. PUB. ADMIN. RES. & THEORY 19 (1991); Karlene H. Roberts, *Some Characteristics of One Type of High Reliability Organization*, 1 ORG. SCI. 160 (1990).

suggests that when we add this multilevel (as well as a temporal) dimension to the analysis of accidents, normal accident and high-reliability theory can be treated as complementary.[207] Here is the event that Snook, himself a prior victim of friendly fire, analyzed:

> Two army helicopters (UH-60s), based in Turkey, had been assigned to land at a village just inside the Iraqi border . . . . The helicopters were visible only intermittently on the air force AWACS radars because their signals would fade in and out as they landed or flew behind mountains. Radios in the army helicopters were incompatible with those in the air force fighters. Furthermore, the helicopters did not use a different electronic identification code when they flew in Iraq from the one they used in Turkey, even though all other friendly aircraft did. This discrepancy had continued for almost three years of the peace-keeping operation. On the morning of the shootdown, two air force F-15 fighter planes, accustomed to air-to-air combat at high altitudes, were assigned to sweep the secure zone for enemy aircraft. They believed that they were the first aircraft in the secure zone that morning, and when they spotted the two helicopters on their own radar screens, they tried unsuccessfully to identify whether they were friend or foe.[208]

Confusing the Black Hawks for Mil Mi-24 Hind-Ds, the pilots, after attempting visual identification and help from an AWACS crew, obliterated the two helicopters with air-to-air missiles.[209] Snook explains that breakdowns at multiple levels within the no-fly zone led to "practical drift," the "slow, steady uncoupling of local practice from written procedure."[210] Karl Weick, whose theoretical work on loose coupling inspired important elements of Snook's theory, describes the process of practical drift as follows:

> When a global system is first designed, it is treated as a tightly coupled system with safeguards built in to prevent worst-case scenarios. When these designs are implemented, they often prove unworkable locally. Units adopt their own local variations, which

207. SNOOK, *supra* note 62. For the importance of these elements, see Samir Shrivastava, Karan Sonpar & Federica Pazzaglia, *Normal Accident Theory Versus High Reliability Theory: A Resolution and Call for an Open Systems View of Accidents*, 62 HUM. REL. 1357, 1368–73 (2009).

208. Karl E. Weick, *Two Reviews on Organizational Accidents*, 46 ADMIN. SCI. Q. 147, 147–48 (2001). For the complete account, see SNOOK, *supra* note 62, at 26–64.

209. SNOOK, *supra* note 62, at 59–64; Weick, *supra* note 208, at 148.

210. SNOOK, *supra* note 62, at 220.

> get perpetuated when new briefers inform new crews how we do things around here. With each new generation of briefing, the entire system becomes more loosely coupled, and the logic of the local task becomes more compelling . . . . What is crucial in this ongoing loosening of coordination is that each unit that is following its own unique path assumes that all other groups are behaving in accord with the *original* set of established rules. If a system that has drifted into locally acceptable procedures suddenly becomes tightly coupled, the local adaptations no longer mesh, and this produces an incomprehensible catastrophic moment.[211]

In this way, a high-reliability system, such as a no-fly zone with fifty thousand incident-free hours, can invite a "normal accident."

The lessons for contingency planning are manifold. The conditions of practical drift within the emergency response system set out by the NCP, which may include actions by senior leaders, intergroup isolation, and intragroup norms, need to be ferreted out. More importantly, Snook shows that additional layers of rules and coordination will not prevent the systems dynamics at play and, if anything, will only introduce new ways for drift to occur. Rather, we need to identify the design features of a "multilevel, multi-task, organizational system that will increase the likelihood of accomplishing the 'total task'" when it presents itself.[212] Such systems design work will need to be cognizant of the three general conditions of practical drift: (1) complex organizations that do not have the opportunity to learn from trial and error and have a corresponding tendency to overdesign, (2) lengthy periods of loose coupling "sufficient to generate substantial gaps between globally synchronized rules and local subgroup practice," and (3) moments where isolated subgroups become tightly coupled, such as during a response action.[213]

3. Fire fighting

So far, I've suggested two ways in which a response effort can recreate conditions of risk that are similar to those preceding a crisis. Interorganizational anarchy abounds, adding contingency to how solutions, problems, and choice settings will be aligned. And practical drift suggests that even highly scripted contingency

211. Weick, *supra* note 208, at 149–50.

212. SNOOK, *supra* note 62, at 235.

213. *Id.* at 229.

operations will introduce new risks, such as when previously isolated teams are reassembled (more tightly coupled) during a response action. These approaches to crisis mirror the literature's focus on how organizations fail to address novel events, beginning with Turner's account of the incubation period. For example, normal accident and high-reliability theory disagree principally over how novel events will be managed—will they remain hidden by complex technology, defy existing categories of routine action, and accumulate unnoticed, or can their effects be muted or designed around with sufficient training and preoccupation with error?

Missing from these debates is an understanding of how non-novel events lead to or worsen a crisis.[214] The response in the Gulf set contingency planning in motion under conditions of both novelty, where interruptions occur for which an organization lacks the appropriate response in its repertoire, and quantity, where interruptions threaten the system's information processing capacity and lead to cycles of increased stress and rigidity.[215] To design a response framework is to appreciate how the two forms of interruption interact with the stocks, flows, and feedback loops of the system and lead to declining performance. Contingency planning often reacts to the novelty of prior crises. It tries to widen conceptual categories of response and fields of attention through additional standard operating procedures and, along with this enlarged repertoire, increases organizational responsibilities.[216] At the same time, mundane events, nonthreatening in isolation, can produce system-level effects in their own way.

Here are three examples of the accumulation of non-novel events during the Gulf oil spill response. The first concerns the use of dispersants, which were applied heavily at the spill source, on the surface nearby, and in other locations.[217] The novelty of their use included the fact that while the NCP gives the On-Scene Coordinator the authority to authorize use of dispersants, it did not schedule their approval for long-term, subsea application.[218] Requests

214. Jenny W. Rudolph & Nelson P. Repenning, *Disaster Dynamics: Understanding the Role of Quantity in Organizational Collapse*, 47 ADMIN. SCI. Q. 1 (2002).

215. *Id.* at 24–25. For a discussion of threat-rigidity dynamics in organizations, see Barry M. Staw, Lance E. Sandelands & Jane E. Dutton, *Threat-Rigidity Effects in Organizational Behavior: A Multilevel Analysis*, 26 ADMIN. SCI. Q. 501 (1981).

216. Rudolph & Repenning, *supra* note 214, at 25.

217. Working Paper No. 4, *supra* note 141, at 6–13.

218. *Id.* at 4–7.

from the responsible party and Unified Command for their use had to be considered based on operational conditions (such as windows of effectiveness for skimming operations), health and safety (such as when volatile organic compound surface levels exceeded air monitoring limits for a seven-day period), and other factors.[219] A May 26 directive (followed by a revised directive on June 22) curtailed their use but allowed for exemptions to impose limits for surface and aerial application.[220] The On-Scene Coordinator received seventy-four requests for exemption.[221] This added a number of mundane tasks for the unified response to tend to on a daily basis: monitoring aircraft tank levels, recording tank levels on surface vessels, sorting and cataloguing records, calculating the dispersant-to-oil ratio to check whether it fell within a certain range, and other efforts, all of which became routine.[222] In this way, the development of new operational policy in the midst of an emergency response included both novel and numerous interruptions that posed different system-level risks to the response.

A second example is an event that occurred toward the end of May 2010, when the Administration tripled the federal manpower and resources available to the response effort.[223] This taxed what was at the time a thin-spread force in unforeseen ways. National Incident Command staff dramatically increased their purchasing of skimmers and boom deployment, some in areas unlikely to be affected.[224] The spill occurred during a "transfer season" where Coast Guard workers were being reassigned to new ports.[225] Coast Guard reservists could be recalled, but only for a maximum of two, sixty-day intervals in a

219. *See id.* at 6–10.

220. *See id.* at 10; ENVTL. PROT. AGENCY, DISPERSANT MONITORING AND ASSESSMENT DIRECTIVE – ADDENDUM 3 (2010), *available at* https://www.hsdl.org/?view&did=21676; Letter from Rep. Edward J. Markey, Chairman, Subcomm. on Energy and Env't, to Admiral Thad W. Allen, Nat'l Incident Commander 4, 7, tbl. 1 (July 30, 2010), *available at* http://markey.house.gov/docs/07-30-10ejmtocgdispersants.pdf.

221. Letter from Rep. Edward J. Markey to Admiral Thad W. Allen, *supra* note 220, at 2.

222. *See* ENVTL. PROT. AGENCY, BP-HZN-CEC020605, DISPERSANT AND MONITORING ASSESSMENT DIRECTIVE FOR SUBSURFACE DISPERSANT APPLICATION (2010), *available at* http://globalwarming.house.gov/tools/3q08materials/files/Dispersant-Directive.pdf.

223. DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at 150–51; Working Paper No. 2, *supra* note 144, at 7.

224. Working Paper No. 2, *supra* note 144, at 7.

225. *Id.* at 6.

two year period.[226] Other agencies were approached by the National Incident Command to see whether they could send additional responders. The Coast Guard eventually tripled personnel, keeping track of their progress through a daily report, "Status on Tripling."[227] Responders concluded that these efforts limited the Coast Guard's ability to conduct other missions within the recovery operation.[228]

Specific efforts to approve berm-related projects provide a third example of a system taxed by non-novel as well as novel events. The Army Corps of Engineers offers a general permit—the NOD-2—covering operations that respond to oil and gas well blowouts.[229] This permit truncates environmental review but with a number of important caveats. For example, the project must involve the minimum work necessary to respond to the emergency, and it must be temporary.[230] In mid-May, the Louisiana State Coastal Protection and Restoration Authority applied for an NOD-20 permit to build offshore sand barrier berms.[231] This was another solution not contemplated in the contingency plans prior to the spill, novel for its scale and for its many unintended effects, about which there was little information to gauge the project's environmental impacts. But it was also subject to an environmental review process, involving federal and state agencies under more than half a dozen statutes. The Corps coordinated review of a revised application through hastily organized emails, telephone calls, and written communications between agencies prior to a "berm summit" in early June.[232] The Commission found that such a process strained the capacity of emergency response agencies to properly comment on and approve what was ultimately a cost-ineffective project that collected only 1,000 barrels of oil.[233]

226. *Id.* at 7.

227. *Id.*; DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at 151.

228. Working Paper No. 2, *supra* note 144, at 7.

229. Nat'l Comm'n on the BP Deepwater Horizon Oil Spill & Offshore Drilling, *The Story of the Louisiana Berms Project* 3 (Staff Working Paper No. 8, 2011), *available at* http://www.oilspillcommission.gov/sites/default/files/documents/Updated%20Berms%20Working%20Paper.pdf.

230. *Id.* at 4.

231. *Id.* at 3.

232. *See generally id.* at 23–30.

233. *See id.* at 42; DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at 271.

These mixtures of novel and non-novel interruptions suggest the need to better understand how, together, they tax an emergency response system. While a novel event might call for enlarging a system's repertoire of responses, recombining procedures, and increasing its resilience to cope with surprises, the number of such interruptions can over time degrade or punish a system's ability to enact such solutions. Preparing for how a system will respond to interruptions will require models of how such interruptions arrive, accumulate, and dissipate, how they impair the execution of necessary cognitive processes, and the role of feedback loops in triggering the system's declining performance.

We should pay particular attention to how a system can descend into "fire fighting," a condition of crisis management involving the interaction of system stocks and flows.[234] For example, Repenning considers how a product development process might be crippled by fire fighting.[235] Specifically, the number of tasks required to complete a project might increase slightly. This will marginally decrease the portion of concept development tasks that are finished in a given period. There will in turn be more design-phase problems and diminished final product quality. If this "shock" to the design system is limited, and the workload returns to normal, it might be contained. Or it could spread, with the system engaged in little concept development with final product quality substantially degraded.[236]

Managers will respond to the initial descent into fire fighting by shifting resources. For example, a product manager might devote greater resources to a product with late-development problems. This allocation will lead to a local optimum, where the project is improved while the broader product development system is degraded. Managers are prone to give too much weight to the short-term benefits of their decisions, while the systems effects of those decisions are delayed. Moreover, managers make attribution errors, such as when they blame the attitudes of people within the process as opposed to its broader structure. Therefore, they will make further decisions that will increase the vicious cycle by adding surveillance, reporting requirements, and other procedures to the work of

234. *See* Nelson P. Repenning, *Understanding Fire Fighting in New Product Development*, 18 J. PRODUCT INNOVATION MGMT. 285 (2001).

235. *See id.* at 287–95.

236. *Id.* at 291.

product engineers.[237] To address problems of quantity in the response to environmental crises will require more dynamic resource planning techniques and a better understanding of how to combine double-loop learning (called for in the response to a novel event) with greater adherence to existing routines (that can prevent a system from descending into a cycle of declining performance).[238]

B. Organizational Cognition

1. Schemas

The twin tasks of differentiation and integration that dominate organizing provide the setting in which the above system effects occur. The scope of these effects, such as interorganizational anarchy, practical drift, and fire fighting, is increased when they happen among, as opposed to within, organizations, such as in the midst of a response to an oil spill. They should give us pause before casually accepting calls for expanding plans and procedures featuring dozens of agencies and support teams. In addition to risks introduced by the structure of a response, we also have to consider how groups and individuals make sense of information and actions taken within the response system. Contingency planning hints at the cognitive management challenges inherent in organizing that should lead us to reconsider the mechanics of dramatically increased data-gathering efforts following disasters. While system effects speak to the unintended consequences of organizational solutions to previous disasters, cognition concerns how organizations process information and make sense of those solutions.

The unified response team was inundated with data that it had to process and understand. This raises three related concerns, each involving the paradox of organizing, discussed in the following three sections. The first is an information-processing problem. Organizing encourages the use of schemas, which are fixed categories and simplifying representations that impose order on the steady stream of information entering a system.[239] For example, prior to 9/11, the intelligence community was concerned with a number of terrorist scenarios, including hijackings of single as opposed to multiple

237. *Id.* at 296–97.

238. *See* Rudolph & Repenning, *supra* note 214, at 25–27.

239. *See* Elsbach, Barr & Hargadon, *supra* note 71, at 422; *see also* Paul DiMaggio, *Culture and Cognition*, 23 ANN. REV. OF SOC. 263 (1997).

aircraft, hijackings to gain the release of individuals held by the U.S. government, or the destruction of aircraft that were set with explosives overseas.[240] There was little or no effort to develop terrorist scenarios involving hijackings of multiple aircraft that were domestic in origin, with no motive to communicate, and where the planes themselves would be used as explosives.[241]

After the Gulf oil spill, Admiral Thad Allen similarly recalled that procedures in place that seemed effective for twenty years "became dysfunctional" given the magnitude of the spill.[242] Post-disaster investigations reveal that important categories of action, such as addressing methane hydrate formation after, rather than before, equipment installation, establishing federal oversight over rig fires without the presence of a fire marshal, keeping oil out of marshlands instead of instituting Coast Guard procedures for its removal, using subsea in addition to surface dispersants, and responding to continuous leaks as opposed to discrete spills either inadequately informed contingency planning or were ignored.[243]

A reasonable reaction to such findings would be to develop new categories to determine what are considered "in-family" as opposed to "out-of-family" events.[244] In-family events are those that were at some point experienced and analyzed. Unique standard operating procedures might be built up around in-family events for future use, but the broader problem is schema-based processing itself, which teases in-family problems from the stream of data that organizations face. Schema-based processing, with its fixed categories and routines that store prior learning, is not ideal for responding to low-probability, high-consequence events.[245] Specifically, during a crisis

240. *See* Kelman, *supra* note 22, at 133.

241. *See* Weick, *supra* note 73, at 425.

242. Video: Meeting 3: September 27–28, 2010, Washington D.C. (Nat'l Commision on BP Deepwater Horizon Oil Spill & Offshore Drilling, 2010), http://www.oilspillcommission.gov/meeting-video/320 (testimony of Admiral Thad W. Allen).

243. *See* DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at 145–46; U.S. COAST GUARD, *supra* note 171, at 78–79, 87; Working Paper No. 2, *supra* note 144, at 18; Working Paper No. 6, *supra* note 114, at 10–11; Video: Meeting 3: September 27–28, 2010, Washington D.C., (Nat'l Commision on BP Deepwater Horizon Oil Spill & Offshore Drilling, 2010), http://www.oilspillcommission.gov/meeting-video/320 (testimony of William Nungesser, Plaquemines Parish President). *See generally* Working Paper No. 4, *supra* note 141.

244. *See* Weick, *supra* note 73, at 426.

245. *See* Kelman, *supra* note 22, at 133; Charles F. Parker & Eric K. Stern, *Bolt from the Blue or Avoidable Failure? Revisiting September 11 and the Origins of Strategic Surprise*, 1

operation, there is a need for cognition that is not limited by automatic thinking (encouraged by standardization) or memory and sequential linkages of existing categories (encouraged by rule-based planning).[246] Automatic and rule-based cognition limit an organization's ability to address novelty.[247] They erase necessary detail and inhibit efforts to unify bits of seemingly disparate information. Disasters require "controlled" cognition that will limit the chance that novel events or threats during a response will be perceived as "in-family" and handled with existing schemas or linkages of procedures.[248]

While post-disaster accounts focus on the need for stronger coordination, added hierarchies within or across organizations can discourage controlled cognition. This is because hierarchies increase the demand for sequential or rule-based interaction among an organization's subunits.[249] The goal should be to locate where in a response system activity can be coordinated by mutual constraint and adjustment, as opposed to by plan or standardization across groups that hold mutually exclusive knowledge of a situation. To respond to a crisis using controlled cognition, the system should add redundancies of representation to the redundant technologies that are more often put into place.[250] It should encourage overlapping knowledge across groups that are governed by loose coupling. Weak coordination will increase the extent to which groups return to earlier activities, preserving detail and encouraging a more nuanced understanding of novel contexts.[251] Subunits should be made better aware of how their outputs can become inputs for other groups. Strengthening awareness of how each group must adjust its actions to fit the actions of others should be given priority.[252] This will increase the number of elements of a response system that can detect

FOREIGN POL'Y ANALYSIS 301, 304, 310 (2005); Weick, *supra* note 73, at 425–26.

246. THOMPSON, *supra* note 58, at 54–56; *see* Weick, *supra* note 73, at 427–31.

247. *See* Weick, *supra* note 73, at 431–33.

248. *See id.* at 426.

249. *See id.* at 431.

250. *See, e.g.*, Elsbach, Barr & Hargadon, *supra* note 71, at 429–30; A. Alexandra Michel, *A Distributed Cognition Perspective on Newcomers' Change Processes: The Management of Cognitive Uncertainty in Two Investment Banks*, 52 ADMIN. SCI. Q. 507, 511–13 (2007); Karl E. Weick & Karlene H. Roberts, *Collective Mind in Organizations: Heedful Interrelating on Flight Decks*, 38 ADMIN. SCI. Q. 357, 358–61 (1993).

251. *See* KARL E. WEICK & KATHLEEN M. SUTCLIFFE, MANAGING THE UNEXPECTED: RESILIENT PERFORMANCE IN AN AGE OF UNCERTAINTY 32–35, 53–58 (2d ed. 2007).

252. *See* Weick, *supra* note 73, at 430–31.

discrepancies from prior events, preserving vital information about novel threats as they emerge. Ultimately, each of these steps will reduce schema-based decision-making.

2. Self-limiting data

A second reaction to the stream of data and experience that characterizes crisis management is to call for greater amounts or different kinds of information. While organizing influences how that information is processed, it also affects how it is shared. Differentiation begins with the premise that cognitive load should be reduced by distributing information across groups. But structural differentiation also leads to information becoming lost or misplaced.

During the oil spill, streams of data were directed up and down a rudimentary chain of command, and later, a more formal hierarchy. Data were distributed among agency heads and members of the National Response Team, between and within national laboratory, science advisory, and technical teams, and with the responsible party and the public, among other channels.[253] For example, a team of scientists from three national laboratories provided diagnostic information to a Science Advisory Team created by Secretary Chu. The advisory team responded with its own data analysis tasks for the tri-labs team. BP was eventually asked to create worst-case scenarios for the outcomes of future decisions. The advisory team reviewed source control plans, and industry representatives provided additional information.[254] Much of this work proceeded via conference call.[255] These data sharing efforts were grafted onto and in addition to existing Unified Command structures.[256] The number of constraints inhibiting adequate data sharing on dispersant availability and toxicity, skimmer location and manufacturing, closure of certain waters, sampling and water and air quality monitoring, well containment and collection innovations, shoreline conditions, and other issues was substantial.

The composition of response teams and *ad hoc* groups, such as the tri-labs team and Flow Rate Technical Group, can reduce the quality of information exchanged. Diverse groups are organized to

253. *See* DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at 131, 134–43, 148–49.

254. *See id.* at 148–49; Working Paper No. 6, *supra* note 114, at 24.

255. DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at 161.

256. *Id.* at 149.

mimic the complexity of an organization's environment (an approach known as "requisite variety").[257] But if information is ambiguous, multiple viewpoints will increase the number of equally plausible meanings available.[258] This will increase the likelihood that weak but important signals in the data will lie dormant. If they are in fact addressed, equally plausible meanings tend to be resolved through group decision-making processes that limit analysis and heighten advocacy.[259] Diverse groups of specialists also fall victim to common knowledge and audience tuning effects.[260] In particular, discussion of unique information is limited, as specialists working in teams focus on perceptions held in common. These dynamics also make it difficult to detect important anomalies.

In addition, as the number of parties addressing a problem increases, the likelihood that each will obtain precisely the same information decreases.[261] Specifically, increasing the number of parties increases the number of interpretations of information, making it more difficult to reach consensus. Groups also spend an inordinate amount of time decomposing information based on functional divisions (a "partition focus").[262] Those divisions may be no longer relevant, or might further lead to loss of information. The spill response was criticized for missing data gathering opportunities because of its focus on coordination tasks.[263] These group dynamics suggest the need for closer attention to the self-limiting qualities of information, as well as how available information is negotiated. Particularly where a decision-making process is not yet worked out, as in the early weeks of the oil spill, novel information must pass tests of social as well as technical sufficiency across functional specialists, such as the theoretical scientists and engineers on the advisory team

257. KARL E. WEICK, MAKING SENSE OF THE ORGANIZATION 332–35 (2001).

258. Garold Strasser, *The Uncertain Role of Unshared Information in Collective Choice*, *in* SHARED COGNITION IN ORGANIZATIONS: THE MANAGEMENT OF KNOWLEDGE 49–69 (Leigh L. Thompson, John M. Levine & David M. Messick eds., 1999); *see also* Kathleen M. Sutcliff, *Information Handling Challenges in Complex Systems*, 8 INT'L PUB. MGMT. J. 417 (2005).

259. Strasser, *supra* note 258, at 49–69.

260. *Id.*

261. *Id.*

262. Chip Heath & Nancy Staudenmayer, *Coordination Neglect: How Lay Theories of Organizing Complicate Coordination in Organizations*, *in* 22 RESEARCH IN ORGANIZATIONAL BEHAVIOR 153, 158 (Barry M. Staw & Robert Sutton eds., 2000).

263. *See, e.g.*, DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at 78; Working Paper No. 2, *supra* note 133, at 8.

and at BP.[264] This process arguably slowed containment efforts. Such "negotiated information orders" arose around attempts to prove the validity of oil collection methods to the tri-labs team, develop monitoring protocols for well control operations, and agree to such tactically vital pieces of information as flow rate from the riser leak.[265]

3. *Enactment*

The workings of *ad hoc* groups during the spill response suggest a third concern for organizational cognition: any response to a crisis will occur largely through enactment rather than planning.[266] Enactment happens when a stream of data and events becomes unintelligible, such as when a context is unfamiliar, a situation exists for which an organization has no operating procedures,[267] or an event has too many equivocal meanings.[268] In those moments, order must be imposed on the world. The spill response was punctuated with moments for which there was no map suggesting how to proceed: flow rates were revised, dispersants were used in novel ways revealing new operational concerns, and well-closure tests failed or yielded ambiguous results. In those kinds of moments, organizations engage in sensemaking, an ongoing, retrospective development of plausible rationales for actions already taken.[269] Through sensemaking, organizations impose order on the world in the form of workable but temporary perceptual frameworks.

An imposed or "enacted" order occurs through action and interpretation, not evaluation and choice. Crisis situations are constructed as much as they are already in existence. Actors such as the On-Scene Coordinator or members of a technical group construct a crisis as they search for reasons that will allow them to resume interrupted activities. Dispersant uses are retroactively authorized when new justifications emerge, such as their reduction of surface-level volatile organic compounds.[270] Other uses must be

264. *See* Carol A. Heimer, *Allocating Information Costs in a Negotiated Information Order*, 30 ADMIN. SCI. Q. 395, 397 (1985).

265. *See id.* at 395.

266. *See* Weick, *supra* note 1; Karl E. Weick, Kathleen M. Sutcliffe & David Obstfeld, *Organizing and the Process of Sensemaking*, 16 ORG. SCI. 409 (2005).

267. Weick, *supra* note 73, at 305.

268. *Id.* at 410.

269. *Id.* at 409.

270. DEEPWATER HORIZON OIL SPILL COMM'N REPORT, *supra* note 26, at 144–45.

approved under conditions for which there are little or no data: a failed top-kill procedure leads to a thought of collecting hydrocarbons instead,[271] increased flow rate estimates present a new reality,[272] and the Well Integrity Team, including scientists from the national labs and the U.S. Geological Survey, arrives at a monitoring protocol to detect leaks into rock formations after a capping operation.[273]

The presidential commission describes how order was imposed on the situation through testing and modeling efforts after a capping stack was fitted to the wellbore. Pressure test data revealed either an underground blowout, a different flow rate, or a new geological reality.

> Although the Well Integrity Team had calculated that it would take a total leak of approximately 100,000 barrels for hydrocarbons to reach the sea floor, the government determined that it would permit a leak of only 20,000 barrels before requiring the capping stack to be reopened. Using this figure and an estimate for the expected pressure at shut-in derived from BP's modeling of the reservoir, the Well Integrity Team created guidelines for the test. If the pressure at shut-in was less than 6,000 psi, major well damage was likely: BP would have to terminate the test within six hours and reopen the well. If the shut-in pressure was greater than 7,500 psi, the risk of a leak was low, and the test could proceed for the full 48 hours. Finally, if the shut-in pressure was between 6,000 and 7,500 psi, the risk of a leak was uncertain—either there was a medium-sized leak into the formation or the reservoir was highly depleted. Under this scenario, the test could proceed for 24 hours. . . .
>
> . . . Initial wellhead pressure readings were just over 6,600 psi, squarely in the uncertain middle range, and rising slowly. . . .
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> . . . .
>
> . . . The stakes were high. Keeping the stack shut could cause an underground blowout and, in the worst case, loss of a significant portion of the 110 million barrel reservoir into the Gulf. . . .
>
> . . . One participant recalled general agreement that, while the data supported reopening the capping stack, under the guidelines

271. Working Paper No. 6, *supra* note 114, at 20–22.
272. *Id.* at 16.
273. *Id.* at 28.

> established prior to shut-in, the stack could stay closed during the night.
>
> . . . .
>
> Overnight, [Well Integrity Team member] Hsieh attempted to develop a model that explained the results of the well integrity test. The biggest question was why the pressure had climbed above 6,600 psi but not to the minimum expected shut-in pressure of 7,500 psi. The answer was that the expectation had been based on an incomplete understanding of the reservoir's geometry and on pressure readings from a gauge at the bottom of the BOP, which was inaccurate and functioning only sporadically. Using accurate pressure readings from the capping stack, along with a flow-rate estimate of 55,000 bbls/day and BP's estimate that the reservoir originally contained 110 million barrels of oil, Hsieh was able to generate a model of the depleted reservoir that predicted the observed shut-in pressures without having to assume a significant leak into the formation.
>
> . . . .
>
> . . . As more time passed, Hsieh was able to improve his model using seismic data. The model continued to predict the behavior of the well, and a leak into the formation became a less and less likely scenario.[274]

Enactment demonstrates that cognition can be created through action. Specifically, cognition lies in the patterns of interaction that occur in specific contexts.[275] Those connections among behaviors, as opposed to individuals, are a critical unit of analysis for crisis response. We need to better understand the combinations of schemas and social contexts (i.e., patterns of interaction) that encourage the rich awareness of detail, reluctance to simplify, and sensitivity to operations that will avoid catastrophic outcomes as workable frameworks are created and imposed on new, ambiguous information. And we need to study patterns of work to locate reasons that are used to argue for a resumption of interrupted activities (such as industry conventions, prior expectations, and premises about how organizations work) and determine their role in facilitating or disrupting disaster response.[276]

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274. *Id.* at 30–33.

275. Elsbach, Barr & Hargadon, *supra* note 71, at 422.

276. *See* Stephen R. Barley & Gideon Kunda, *Bringing Work Back In*, 12 ORG. SCI. 76,

V. CONCLUSION

The paradox of organizing offers a useful frame for articulating the challenges of responding to an environmental crisis. The struggle to differentiate tasks and subunits and then piece them together during moments of great uncertainty, and the ways in which it can challenge and strain contingency planning, should receive greater attention. This Article takes a preliminary step by addressing how the organizational causes of crisis, rooted in the paradox of organizing and related information management challenges, are recreated and intensified during an interorganizational response. The dynamics at work included risk amplification and system degradation due to the structure of the response, including anarchy, drift, and fire fighting. They also involved the tasks of making sense of information within the response effort, which erases detail, limits whether data can be used to detect anomalies, and encourages responders to develop their own plausible rationales for equivocal data so that they can resume their tasks. Learning how the emergency response system, including the National Contingency Plan, might overcome these challenges deserves a place alongside the reporting requirements, safety compliance systems, data collection measures, redundant technologies, and other solutions that populate our assessments of environmental crises.

Future commissions, those who develop emergency management systems, and legal scholars should consider how this paradox could be better managed. Research on incident command systems suggests that under certain circumstances, it is possible to blend traditional elements of bureaucracy (e.g., specialized roles, formal authority) with temporary organizations in a manner that achieves high reliability.[277] Much is required, however, for such a system to prove effective. First, the system must be able to rapidly alter its formal structure. The process of altering a command system includes structure elaborating (filling various roles and positions while making sure that major activities are not assigned to specialized roles), role switching (transferring personnel according to role as a crisis evolves), authority migrating (distributing critical expertise

84–85 (2001).

277. Gregory A. Bigley & Karlene H. Roberts, *The Incident Command System: High-Reliability Organizing for Complex and Volatile Task Environments*, 44 ACAD. MGMT. J. 1281 (2001).

throughout the system, allowing decision-making authority to migrate quickly among existing positions and giving deference to lower level, more technically qualified members of the team), and system resetting (enabling a complete reconfiguration of the system in response to unexpected events).[278] Second, the system must allow for an appropriate amount of constrained improvisation, bounded by existing rules and routines.[279] Finally, managers must encourage overlapping, accurate understandings of the systems of activity to which response team members belong (also called "operational representation").[280] Maintaining the integrity of operational representation throughout a command system as it is developed, communicated, and shifted is crucial to the system's ability to respond to novelty while muting the effects of practical drift. The extent to which an incident command system can use structuring and cognitive management approaches to counteract the dynamics addressed in this Article should be the focus of future investigations and reform efforts.

The challenges posed by the paradox of organizing can also inform the growing concern over agency fragmentation, in environmental law and elsewhere in the administrative state.[281] The paradox of organizing is helpful in several ways. It suggests how we might define the concept of coordination, which Jody Freeman and Jim Rossi identify as the root cause of governance failures stemming from inter-agency delegation and overlap: "Such delegations may produce redundancy, inefficiency, and gaps, but more than anything else, they create profound coordination challenges."[282] Freeman and Rossi make an important contribution, setting out the origins and types of multiagency delegations, explaining why consolidation will

278. *Id.* at 1286–88.

279. *Id.* at 1288–90.

280. *Id.* at 1290–92; *see also* Smith & Tushman, *supra* note 61, at 525–29.

281. *See, e.g.*, William Boyd, *Climate Change, Fragmentation, and the Challenges of Global Environmental Law: Elements of a Post-Copenhagen Assemblage*, 32 U. PA. J. INT'L L. 457 (2010); William W. Buzbee, *Recognizing the Regulatory Commons: A Theory of Regulatory Gaps*, 89 IOWA L. REV. 1 (2003); Jody Freeman & Dan Farber, *Modular Environmental Regulation*, 54 DUKE L.J. 795 (2005); J.B. Ruhl & James Salzman, *Mozart and the Red Queen: The Problem of Regulatory Accretion in the Administrative State*, 91 GEO. L.J. 757 (2003).

282. Jody Freeman & Jim Rossi, *Agency Collaboration in Shared Regulatory Space*, 125 HARV. L. REV. (forthcoming 2012); *see also* Robert B. Ahdieh, *The Visible Hand: Coordination Functions of the Regulatory State*, 95 MINN. L. REV. 578 (2010) (elevating coordination to the level of preventing defection in our understanding of modern regulatory intervention).

only be available under limited circumstances, and comparing the costs and benefits of coordination tools such as consultation, interagency agreement, joint policy-making, and centralized review.[283]

But coordination is inherently difficult to define. In the disaster management literature, confusion over the concept leads to disagreement over how a successful response operation should be defined.[284] As was pointed out in the late 1970s, such confusion exists because there are in fact too many definitions of interorganizational coordination.[285] Each embraces a different school of theory, be it game theory, resource exchange, contingency theory, or transaction cost economics, among others.[286] Clarification of the concept of coordination is also needed to specify its costs and benefits, whether it happens in the midst of a crisis or during more routine actions, and to guide discussion of how coordination can be improved after an exogenous shock to an interorganizational system.

Viewing environmental crisis response as a coordination problem suggests that the simplest definition may be the most helpful. Thompson's research on organizing provided the foundation for some of the key dynamics that were set in motion during the BP oil spill response, such as Weick's work on the influence of hierarchy on cognition or Snook's concept of practical drift. At its core is the notion of coordination as the management of dependencies among actions.[287] Thompson recognized that the process of differentiation, which sets the paradox of organizing in motion, leads to different levels of interdependence among organizations or subunits.[288] Each form of interdependence (his focus was limited to three kinds:

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283. Freeman & Rossi, *supra* note 282.

284. Thomas E. Drabek & David A. McEntire, *Emergent Phenomena and Multiorganizational Coordination in Disasters: Lessons from the Research Literature*, 20 INT'L J. MASS EMERGENCIES AND DISASTERS 197, 204–05 (2002) (suggesting such definitions as (a) taking account of the activities of others, (b) deliberate adjustment, (c) relaying information so that individual efforts are linked with those of others, (d) agreeing on function priority and performance efforts, (e) integrating tasks reinforced by norms, and (f) eliminating gaps in service and unnecessary duplications of service).

285. AARON WILDAVSKY, SPEAKING TRUTH TO POWER: THE ART AND CRAFT OF POLICY ANALYSIS (1979).

286. *See, e.g.*, ERNEST R. ALEXANDER, HOW ORGANIZATIONS ACT TOGETHER: INTERORGANIZATIONAL COORDINATION IN THEORY AND PRACTICE 7-14 (1995); Thomas W. Malone & Kevin Crowston, *The Interdisciplinary Study of Coordination*, *in* COORDINATION THEORY AND COLLABORATION TECHNOLOGY 40–43 (Gary M. Olson, Thomas W. Malone & John B. Smith eds., 2001); Ahdieh, *supra* note 282, at 603–07.

287. Malone & Crowston, *supra* note 286, at 10.

288. THOMPSON, *supra* note 58, at 54–56.

pooled, sequential, and reciprocal) calls for different coordination mechanisms, the use or ill use of which can lead to failures to detect anomaly, mistakes that gain momentum as they migrate across organizations, inappropriate mixtures of adjustment to novelty and adherence to existing routines, and other problems that were discussed in this Article.

Thompson's innovation was to recognize that the form of interdependence significantly affects the form of coordination applied within or across organizations. The concept of interdependence has been used to define the costs of coordination since at least the work of early systems theorists and organization design scholars often use the terms interchangeably.[289] Further research on the challenges of regulatory overlap and fragmentation should expand upon this work. It should set out the common dependencies, both actual and interpretive, that arise in different regulatory contexts,[290] using Thompson's typology of pooled, sequential, and reciprocal interdependence and related coordination mechanisms as a point of departure. Research on environmental and other crises should determine the processes available to manage these and other forms of interdependence[291] and whether their use during a crisis will lead to risk accumulation, system degradation, or resilience. The next commission should take note of what this research has yet to discover.

289. Ranjay Gulati & Harbir Singh, *The Architecture of Cooperation: Managing Coordination Costs and Appropriation Concerns in Strategic Alliances*, 43 ADMIN. SCI. Q. 781, 784–85 (1998).

290. See Malone & Crowston, *supra* note 286, at 12, for some common examples of dependencies, including shared resources, simultaneity constraints, and task-subtask considerations.

291. See ALEXANDER, *supra* note 286, at 31–36, for further examples within each element of Thompson's typology.