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COURTING DISASTER: SYSTEMIC FAILURES AND REACTIVE RESPONSES IN RAILWAY SAFETY REGULATION

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The routine reaction of both industry trade groups and government regulators to deadly infrastructure failures such as railway disasters is to characterize them as anomalous, freak events occasioned either by human error or idiosyncratic equipment failure. Conversely, this Article uses the Institutional Analysis and Development (IAD) framework to show how the systematic federal deregulation of the rail industry, combined with federal court decisions holding that federal deregulation preempts both state government regulation and tort actions to remedy these harms, have almost invited such disasters to occur. Piecemeal, partial, patchwork re-regulation occurs only in response to especially egregious, high-profile tragedies. Such reactive regulation ill-serves the safety needs of a public reliant on increasingly complex and intensively used infrastructure. What is needed instead is preventive regulation, based on the application of an Interdependent Systems Analysis (ISA) approach that integrates the findings of individual accident investigations with aspects of the contextual regulatory and statutory framework within which whole categories of similar accidents occur. Empowering both the National Transportation Safety Board and the Government Accountability Office to use such a whole systems approach, as well as compelling regulatory agencies to explain in greater detail why they either are or are not adopting NTSB and GAO findings and recommendations based on such a whole systems analysis, can measurably improve

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the safety of both rail passengers and those residing near freight rail lines.

INTRODUCTION

A. *Case in Point*

It was a routine Friday afternoon rush hour in southern California's San Fernando Valley. In an effort to avoid clogged freeways many commuters had opted to ride Metrolink, a passenger rail system serving the Valley and greater Los Angeles area. But on this September day in 2008, the ride on Train 111 heading west out of the Chatsworth station would be anything but routine.

The Metrolink commuter train was running on rail lines shared with freight trains, presenting traffic control problems not found in systems

dedicated exclusively to passenger trains. At some point, the westbound commuter train switched onto the same track as an eastbound freight train.[1] The two trains collided at a combined speed of over eighty miles per hour.[2] Twenty-five people were killed (including the Metrolink train engineer),[3] and nearly 140 more were seriously injured,[4] in what was to become one of the deadliest passenger rail disasters in American history—at least, so far.[5]

Initially, this train disaster, like so many before it, was variously ascribed to an intentional human act caused by a lone man or the by-product of a distracted train engineer who did not follow safety protocols—in either event, the disaster was the result of idiosyncratic human operator error.[6]

Later in the investigation of the Metrolink collision, however, other contributory factors began to emerge. The commuter train engineer was working almost an eleven-hour split shift,[7] as train engineers at that time were not subject to the same work-hour restrictions as airline pilots and bus drivers. Further, no positive train control system existed that could have halted the trains[8]—a system that the National Transportation Safety Board (NTSB) had consistently but unsuccessfully advocated, especially in the wake of a similar fatal accident involving a Metrolink commuter and a freight train near Placentia, California in 2002.[9] Additionally, a

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1 *See* NATIONAL TRANSPORTATION SAFETY BOARD, RAILROAD ACCIDENT REPORT: COLLISION OF METROLINK TRAIN 111 WITH UNION PACIFIC FREIGHT TRAIN LOF65-12, CHATSWORTH, CALIFORNIA, SEPTEMBER 12, 2008, 1, 48 (2010), *available at* http://www.ntsb.gov/Publictn/2010/RAR1001.htm [hereinafter NTSB 2008 REPORT].

2 *Id.* at 8.

3 *Id.* at i.

4 *See Feds Look into Texting Before Deadly Train Crash*, CBS NEWS (Sept. 15, 2008), *available at* http://www.cbsnews.com/stories/2008/09/14/ap/national/main2767679.shtml [hereinafter CBS NEWS STORY].

5 *Id.*; *see also* Rich Connell & Robert J. Lopez, *Safety of Rail System Assailed*, L.A. TIMES, Dec. 13, 2008, at B1, *available at* www.latimes.com/news/local/la-me-metrolink12-2008dec13,0,5338329.story.

6 *See* CBS NEWS STORY, *supra* note 4 (noting that federal officials were seeking to obtain the Metrolink engineer's cell phone records to determine if he was text messaging when he ran the red signal); Connell & Lopez, *supra* note 5, at B6 (noting the Metrolink train engineer "had been text messaging with a cell phone and ran a red light seconds before" the crash).

7 NTSB 2008 REPORT, *supra* note 1, at 46.

8 *Id.* at 63–64.

9 NATIONAL TRANSPORTATION SAFETY BOARD, RAILROAD ACCIDENT REPORT: COLLISION OF BURLINGTON NORTHERN SANTA FE FREIGHT TRAIN WITH METROLINK PASSENGER TRAIN PLACENTIA, CALIFORNIA APRIL 23, 2002 38 (2003), *available at* www.ntsb.gov/publictn/2003/RAR0304.htm [hereinafter NTSB 2002 REPORT] (reiterating the recommendation to install a positive train control system with "collision avoidance"); *see also* NTSB 2008 REPORT, *supra* note 1, at 63 (stating that the NTSB had "long advocated the implementation of positive train control systems that would prevent train-to-train collisions such as those that occurred at Placentia and Chatsworth").

string of federal court decisions asserting the preemptive authority of admittedly ineffectual federal regulation had progressively weakened the ability of aggrieved individuals, as well as state and local governments, to use the courts to compel safer railway operations.[10]

B. Blaming the Victim Versus Systemic Failure

Human operator error is typically the first—and most agencies and firms hope—the last organizational refuge after an accident. The logic is that if the human operator failed in his duties—to err, after all, is human—then the system itself must not be broken. Blaming the human operator, and, if not the human operator, then malfunctioning equipment, tends to shield both industries and regulatory agencies from the costly and time-consuming process of governmental and public accident investigations that might reveal deliberate indifference and therefore necessitate systemic reforms—perhaps even some resignations.[11]

The human operator, or the lowly piece of malfunctioning equipment, is an easy mark. Sometimes, a human operator or an equipment malfunction is indeed the sole cause of an accident. This is more easily demonstrated in industries in which accidents rarely occur. But in an era of greater vulnerability to expanding networks of large socio-technical systems, accidents have become more rare, but also more costly. The NTSB acknowledged as much in its January 2010 report on the 2008 Metrolink disaster.[12]

Although the NTSB report noted that the conductor of the freight train had been texting[13] (a practice forbidden by company policy but not federal regulation at the time)[14] and found that the proximate cause of the 2008 accident was the Metrolink engineer's distracted state of mind due to texting on his cell phone,[15] the NTSB also found that Metrolink's failure to install a positive train control system on the stretch of track that its trains shared with freight lines was a significant contributing cause of the accident.[16] The NTSB had urged Metrolink to install such a system

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10 *See, e.g.*, *In re* Derailment Cases, 416 F.3d 787, 794 (2005) (holding that plaintiffs' negligence claims were preempted by the Federal Railroad Administration regulations); Auburn v. U.S. Gov't, 154 F.3d 1025, 1030 (1998) (holding that the Interstate Commerce Commission Termination Act preempted local and state permitting laws regarding railroad operations).

11 CBS NEWS STORY, *supra* note 4 (noting that shortly after the Metrolink crash, Metrolink spokeswoman resigned).

12 NTSB 2008 REPORT, *supra* note 1.

13 *Id.* at 55.

14 *See id.* at 44 ("[A]t the time of the accident no Federal rail regulations prohibited the use of cell phones or similar devices by train crewmembers.").

15 *Id.* at 66.

16 *Id.* at 66.

after the 2002 Placentia collision,[17] but Metrolink had refused to do so.[18] And because the NTSB's recommendations are only advisory, the safety upgrade that could have prevented the 2008 tragedy was never achieved.[19]

These large socio-technical systems typically cover vast geographic areas and often manage elements of critical infrastructure; in essence, they take advantage of certain economies of scale to decrease costs and reduce accident rates.[20] However, the cost of a systemic failure is greater than in smaller systems—systemic failures are "low-probability, high-consequence events."[21] With low-probability, high-consequence events, or where there are decreasing accident rates, it is difficult to know whether a single accident is really a single accident—indicating an isolated failure—or an early symptom of systemic problems.

Further, as accidents grow increasingly costly, probabilities of accidents must decrease significantly to make the risk acceptable.[22] In essence, the larger the risk, the lower the probability of systemic failure must be. Reducing the probability of systemic failure, however, becomes more difficult as systems grow more complex—one must anticipate where the failure might occur and mitigate its risk. However, in complex systems with many component parts, anticipation and mitigation grow more difficult.

In this Article, we posit that any regulatory frameworks established to protect the public from any form of disaster (whether economic, environmental, or health and safety-related) generally fall into one of two categories: *reactive* or *preventive*. These are, of course, two ideal regulatory frameworks, and over time governmental behavior may shift back and forth between them. Yet, we have concluded that a great deal can be learned by studying industrial disasters and government behavior using this archetypical framework.

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17 NTSB 2002 REPORT, *supra* note 9, at 38.

18 *See* NTSB 2008 REPORT, *supra* note 1, at 63 (noting that as of 2008, the federal government had initiated "little effective action" despite the NTSB recommendation to install a positive train control system).

19 *See id.* at 63 (explaining that the Rail Safety Improvement Act of 2008 required Class I railroads to submit an implementation plan for a positive train control system by 2010).

20 *See, e.g.*, YOSSI SHEFFI, THE RESILIENT ENTERPRISE: OVERCOMING VULNERABILITY FOR COMPETITIVE ADVANTAGE 11 (2005) (explaining that "global, interwoven networks" are "responsible for high levels of customer service and low costs").

21 *See, e.g.*, LEE CLARKE, WORST CASES: TERROR AND CATASTROPHE IN THE POPULAR IMAGINATION 42 (2006) (explaining that "if we imagine the future in terms of probabilities, then risks look safe . . . because almost any future big event is unlikely."); SHEFFI, *supra* note 20, at 11–12 (explaining that modern, global supply chains are vulnerable to "high-impact/low-probability events").

22 *Cf.* SCOTT D. SAGAN, THE LIMITS OF SAFETY: ORGANIZATIONS, ACCIDENTS, AND NUCLEAR WEAPONS (1993) (asserting that the high likelihood of a nuclear weapons accident is not rendered less salient simply because no such accident has ever occurred).

As alluded to in this Article's title, our research has led us to the conclusion that, far from being an anomalous random event, the Metrolink disaster was almost invited to occur. In our own study of the Metrolink collision and some other recent high-profile railway disasters, we have discovered (and document below) examples of what turned out to be fatal compromises in systems of legislative action and oversight, regulatory policing and the funding thereof, judicial review, and industry operational practices.[23] Systematic disaggregation and disempowerment of a formerly more integrated system of regulation gradually devolved into fertile ground for the spawning of deadly disasters.

In this Article, we begin with a discussion of the distinctions between reactive and preventive regulation, viewed through the analytic lens of the Institutional Analysis and Development (IAD) framework, as pioneered by Nobel Laureate, Elinor Ostrom, and her colleagues.[24] We then demonstrate how a reactively regulated (as well as increasingly deregulated) rail safety environment sets the stage for some of the more egregious rail disasters of recent years, using the Metrolink tragedy as a prime example, as well as the more recent fatal crash in Washington, D.C.'s Metro system.[25] Finally, we suggest one method to accomplish a broad-scale, whole systems approach to achieving the policy goal of safer railway transport system in the United States.

Discerning where responsibilities lie and how those responsibilities may not have been adequately borne in industrial disasters such as fatal transportation accidents is not the same as indulging in simple post hoc recrimination—and the latter is certainly not our intention. However, unless we thoroughly assess causality at the macro as well as micro levels—and unless we remain wary of the notion that a quickly con-

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[23] Unfortunately, such examples are not limited to railway disasters. Other examples include mine safety as evidenced by the West Virginia Massey mine disaster of April 2010, which killed twenty-nine mine workers, see Ian Urbina, *No Survivors Found at Site of W.Va. Mine Disaster*, N.Y. TIMES, Apr. 10, 2010, at A1, *available at* www.nytimes.com/2010/04/10/us/10westvirginia.html, oil and gas exploration and retrieval (e.g., BP *Deepwater Horizon* oil platform disaster, which killed eleven platform workers and caused massive environmental damage in April 2010), see Campbell Robertson & Leslie Kaufman, *Officials Say Oil Leak May Be 5 Times as Much as Thought*, N.Y. TIMES, Apr. 29, 2010, at A14, *available at* www.nytimes.com/2010/04/29/us/29spill.html, and natural gas transmission (such as the September, 2010 San Bruno, California natural gas pipeline explosion that obliterated thirty-eight suburban homes and killed nine residents, see Rebecca Smith, *Safety Valve Was Skipped*, WALL STREET J. March 2, 2011, http://online.wsj.com/article/SB10001424052748704506004576174322210513228.html.

[24] *See generally* ELINOR OSTROM, UNDERSTANDING INSTITUTIONAL DIVERSITY (2005) (introducing the IAD framework).

[25] Lyndsey Layton, *Experts Suspect Failure of Signal System, Operator Error*, WASH. POST, June 22, 2009, *available at* www.washingtonpost.com/wp-dyn/content/article/2009/06/22/AR2009062203261.html; *Six Dead in D.C. Metro Rail Crash*, L.A. TIMES, June 23, 2009, articles.latimes.com/2009/jun/23/nation/na-train-crash23.

trived, reactive, post hoc fix will prevent such disasters in the future—the true goals of prevention will not be met.

I. REACTIVE VERSUS PREVENTIVE REGULATION AND THE INSTITUTIONAL ANALYSIS AND DEVELOPMENT FRAMEWORK

Of all the models, theories, and analytic frameworks proffered by scholars of the policy process in American governmental institutions, Ostrom's IAD framework best incorporates the law and legal institutions into its analytic process. In fact, Ostrom and her colleagues who developed the IAD framework intended to create such a structure, but also ensured that the structure would remain flexible and generic enough to also accurately describe the behaviors of other institutions such as private firms, civic organizations, and quasi-public institutions.

Regardless of the institutions being studied, the framework posits the existence of three concentrically nested *action arenas*:[26] (1) the *constitutional* arena, (2) the *collective choice* arena, and (3) the *operational* arena.[27] And within each of these arenas, participants occupy certain positions or roles and occasionally meet to interact in *action situations*, the outcome of which may alter the rules governing the behavior of participants in each subsequently nested action arena.[28]

Traditionally, these concentric arenas were depicted as one-dimensional hierarchies.[29] But for the purpose of application to governmental institutions and the rule of law, it is helpful to visualize these nested institutions as a sports stadium—or perhaps the Roman Coliseum—with both hierarchical and lateral dimensions. The outer and highest circle contains the skyboxes on the upper perimeter. There reside the constitutionalists: in this analogy, the federal courts (especially the U.S. Supreme Court) when they rule on the constitutionality of a congressional enactment or the potentially preemptive effect of constitutional provisions and federal legislation over state law. This characterization reflects President Woodrow Wilson's description of the U.S. Supreme Court as "a constitutional convention in continuous session."[30]

The inner ring, the stands in this analogy, is occupied by participants in the arena of collective choice (e.g., the legislators who create the agencies to carry out their policy directives, under the authority of the constitutional rules established above, as well as interest-group lobbyists

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26 OSTROM, *supra* note 24, at 13 (explaining that an "action arena" consists of "participants and an action situation," which interact and "produce outcomes that in turn affect the participants and the action situation").

27 *Id.* at 58.

28 *Id.* at 55–58.

29 *Id.* at 59.

30 STEFFEN W. SCHMIDT ET AL., AMERICAN GOVERNMENT AND POLITICS TODAY 63 (2009).

and the news media). When administrative agencies are in general rulemaking mode, they are also acting within the collective choice arena because they are subjected to legislative oversight, interest-group lobbying, and news media scrutiny.

And down on the playing field is the operational arena, in which the participants (the regulators, the regulated, and members of the public affected by the regulatory process) interact in the day-to-day implementation and enforcement of the policies fashioned upwards at the collective choice arena. And, these interactions occur within the bounds of the governance rules established in action situations occurring within the superordinate constitutional action stratum that crowns the structure.

The courts occupy an interestingly mobile position in this framework. Which arena the courts see as functioning within their judicial review of agency action depends largely on the issues presented. If a simple question of fact exists, such as whether an agency has a sufficient evidentiary basis for taking a particular enforcement action, the reviewing court would be engaged in an action situation in the operational arena. But if questions of law exist, such as whether the agency was acting within its statutory authority or was following its own procedures, a court is participating in the collective choice arena. And if the question of law concerns the very constitutionality of the legislative enactment itself (or the preemption of one policy regime by a superordinate one), the courts may be seen as acting in the constitutional arena.

Beginning with the U.S. Supreme Court's 1803 decision in *Marbury v. Madison*,[31] the courts have arrogated unto themselves the authority to interpret federal and state constitutions in ways that either affirm or invalidate actions taken in the collective choice and operational arenas. In exercising this ultimate power of judicial review, Wilson's "continuous constitutional convention"[32] notion certainly applies because the judges are continuously seeking to discern what the framers actually had in mind when they created the Constitution, a minimalist document upon which the entire weight of the legal authority to govern rests in constitutional democracies.

Within this analytic framework, the question of whether governmental institutions engage in reactive or preventive regulation depends greatly on which of the competing values, that define a political culture, are in ascendancy.[33] And, the political history of the United States reflects some well-delineated eras during which either one set of values or

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31 5 U.S. 137 (1803).

32 *See* SCHMIDT ET AL., *supra* note 30, at 63.

33 *Id.* at 27.

another most influenced the behavior of governmental institutions at all three levels of action, as well as the interactions among those levels.[34]

As the following historical analysis illustrates, there were eras of relatively unbridled faith that unregulated markets would "naturally" order the nation's financial affairs (characterized by either no regulation or reactive and minimalist regulatory schemes) and other eras where the government constructed active regulation to prevent future harms. The changing values structures that influence institutional behavior in the constitutional, collective choice, and operational arenas of government cause the wide variations in regulatory philosophy over time.

A. IAD and the History of Railroad Regulation

According to some scholars in the field,[35] the story of the rise of the American administrative state and the nineteenth century origins of railroad regulation are nearly one and the same. The story begins with the development of the U.S. railroad industry in the Northeast, which radiated westward into the upper Great Plains by the latter half of the nineteenth century.[36]

Initially, many different constituencies welcomed railroad development and expansion with open arms, including farmers eager to find new, distant urban markets for their wares, businesses along the rail lines poised to thrive on the burgeoning river of commerce, and a public desirous of faster, safer transportation.[37] Millions of acres of free or cheap land (including, in one notorious case, the entire Chicago waterfront),[38] exclusive charters, and charitable tax policies were among the inducements that industry-friendly state governments used to stimulate railway system development.[39]

By the 1870s, however, the honeymoon was over. Outraged farmers and their allies no longer saw the railroads as a beneficent river of commerce, but rather as a monstrous industry strangling everything within its grasp through the use of monopolistic rate-setting practices, real-estate market manipulation, and pervasive government corruption.[40] By contrast, some railroad-friendly courts tended to view the occasional deadly explosion of ill-maintained locomotives, passenger fatalities, and

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34 *See id.* at 252–53.

35 *See, e.g.*, STEPHEN BREYER ET AL., ADMINISTRATIVE LAW AND REGULATORY POLICY (Aspen 2006) (1979); LAWRENCE FRIEDMAN, A HISTORY OF AMERICAN LAW (Touchstone 2005) (1973).

36 FRIEDMAN, *supra* note 35, at 329.

37 *Id.* at 333.

38 *Id.* at 311.

39 *Id.*

40 *Id.* at 333.

injuries resulting from train wrecks as the "price of progress."[41] Often, property damage actions and tort claims for wrongful death or personal injury against the railroads fell on the unsympathetic ears of judges.[42] The courts balanced the equities and found that the economic benefits to the state far outweighed the harms inflicted on those who interfered with progress.[43]

This in turn gave rise to the Grange Movement in the 1870s in the upper Midwest, in which farmer and small-business interests gained control of state legislatures and created state railroad commissions to comprehensively regulate the railroads with respect to setting rates, standards of service, and operational safety requirements.[44] Viewed through the lens of the IAD framework, the progressive Grange Movement era amended the constitutional arena of state government to empower the collective choice arena (legislatures) of state government to engage in the comprehensive, preventive regulation of railroad management. This era saw the birth of the modern administrative state and early attempts at the comprehensive, preventive regulation of the railroad industry as well.

In their early legal challenges to the constitutionality of these commissions, the railroads argued that the administrative agencies were usurping the powers of both the legislative and judicial branches of state government.[45] Initially, the U.S. Supreme Court rejected these attacks, holding that if the commissions used procedures paralleling the functions of the other branches, their legal authority to create these commissions would stand.[46]

The effectiveness of the railroad commissions established during this progressive era of the late nineteenth century seems to have depended largely on the political and geographical context.[47] In the more industrialized states that depended most on railroad expansion and proliferation, "agency capture" and the corruption of legislatures were the norm rather than the exception, while the Grange states of the upper Midwest sought to maintain their relatively stringent, preventive regulation.[48]

However, the forces shaping the political culture at the federal level were more nuanced. Scholars still debate whether congressional enact-

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41 *See, e.g.*, Beatty v. Central Iowa Ry. Co., 2 N.W. 332, 334 (Iowa 1882) ("All persons must accept the advantages of this mode of intercommunication with the dangers and inconveniences which necessarily attend it; the price of progress cannot be withheld.").

42 FRIEDMAN, *supra* note 35, at 224–25.

43 *Id.*

44 *Id.* at 335–36.

45 *See* Munn v. Illinois, 94 U.S. 113 (1876).

46 *See id.* (allowing states to regulate certain businesses within their borders, including railroads).

47 FRIEDMAN, *supra* note 35, at 336–37.

48 *Id.*

ment of the Interstate Commerce Act of 1887 exemplified the progressive, preventive regulatory spirit of the Grange Movement infiltrating national policy, or instead, represented an industry triumph over hostile state regulatory enclaves.[49]

Nineteenth century railroad regulation has its origins in the outrage of a citizenry that could not find adequate relief at common law and, consequently, demanded state regulation as the only viable means of protecting itself from a physically and commercially threatening entity.[50] Rail safety regulation was, in part, a reaction to dangerous equipment and dangerous operating practices, and rate-setting regulation was a reaction to perceived monopolistic business practices.[51] Particularly in the realm of public health and safety, it was only later in their institutional lives that the state commissions began to order technological improvements to railway systems,[52] rather than simply responding to the latest spate of disasters.

The evolution of late nineteenth century railroad commissions and their later partial preemption by both Congress and federal court rulings can be seen as a contest between reactive and preventive regulation. As the state commissions became more assertive in their efforts to prevent future harm, the railroads and their friends in both Congress and the federal courts became more determined (and successful) in their efforts to consign federal and state regulatory agencies to a more passive and reactive role. While some state commissions were indeed corrupted and ineffectual,[53] others (generally from the more politically progressive states) sought to expand their purview through more stringent preventive regulation.[54]

When Congress partially occupied the field of railroad regulation with its passage of the Interstate Commerce Act in 1887,[55] some hoped that the newly created Interstate Commerce Commission (ICC) would perform in the same preventive mode that certain, more assertive state commissions had.[56] But, such hopes were short-lived.[57] The Act generally alluded to the ICC as having the same functions and powers as the

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49 *Id.* at 336–39.

50 *Id.* at 333.

51 *Id.*

52 *Id.* at 334–36.

53 *See, e.g.*, *id.* at 335 ("An extreme case was New York, which created a commission in 1855; the commissioners, paid off by the railroads, recommended that their office be abolished, and this was done in 1857.").

54 *Id.* at 334–36.

55 *Id.* (citing Act of Feb. 4, 1887, 24 Stat. 379).

56 *Id.* at 337.

57 *Id.* at 337–38.

state commissions but did not spell them out, leaving the Commission on somewhat vague constitutional footing.[58]

From the perspective of the IAD Framework, the progressive actions of state governments in creating and empowering their railroad commissions (some by state constitutional amendments, others by legislative action) were now nested and encased within the collective choice arena of national politics and the power of the federal judiciary. Do what they might at the state level, to the extent that Congress—affected by a more charitable attitude toward the railroad industry—intended to preempt state legislation with the rulings of its ICC, the states could do little about it.

The views of the Supreme Court at this point in our history—when the unregulated, free-market zeal of the Gilded Age steadily eroded and supplanted the progressive fervor of the Grange Movement—also played an important role. The Supreme Court helped to ensure that industry-friendly reactive and minimalist regulation at the federal level would largely preempt residual state efforts at preventive protection of its citizenry.[59]

In its aggressive interpretation of the Interstate Commerce Act's preemptive reach, the high court found much state railroad regulation to be unduly burdensome to interstate commerce and preempted by both the Commerce Clause and the Interstate Commerce Act, as in *Wabash Railway v. Illinois*.[60] In the same year, the Court declared, in *Santa Clara County v. Southern Pacific Railroad*,[61] that all corporations—including railroads—were "persons" possessing due process and equal protection rights, while (as it would turn out) bearing very few of the legal responsibilities of natural persons. So, the present-day, railroad-friendly federal court decisions we feature in this case study—which preempted state regulation and set the stage for recent railway disasters—have deep historical roots indeed.

To the detriment of effective federal railway regulation, the Supreme Court entered into one of its fiercer periods of anti-regulatory zeal during this time, bestowing the crown of legal legitimacy on the Gilded Age's uninhibited market excesses.[62] When the ICC did try to exercise ratemaking authority on its own initiative, a hostile high court told the ICC in no uncertain terms that Congress never intended to grant the ICC

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58 *Id.* at 338.

59 *Id.* at 337; *see also* Wabash Ry. v. Illinois, 118 U.S. 557 (1886) (holding that only the federal government had the power to directly affect railroads, and state commissions could only have an indirect effect on interstate railroads).

60 118 U.S. 557 (1886).

61 118 U.S. 394 (1886).

62 *See, e.g.*, *Wabash*, 118 U.S. 557 (1886).

such authority.[63] That same year the Court also denied the Commission authority to prohibit discriminatory ratemaking.[64]

During this period, when the Supreme Court could not find or interpret language in the Interstate Commerce Act to legitimize its disempowerment of the state railroad commissions, it simply relied on the language of the Commerce and Supremacy Clauses of the U.S. Constitution as sources of authority. In these instances, the Supreme Court was conjuring up a constitutional arena and taking actions within the arena that may have been far removed from what the framers of the Constitution had in mind in the late eighteenth century. But by the late nineteenth century, an ambivalent Congress and an overtly anti-regulatory Supreme Court had transformed the institutional landscape of American government, at least with respect to preventive rail safety and standards of service. The dominant values in the superordinate federal constitutional and collective choice arenas had trumped the ability of state governmental institutions to exercise their regulatory powers in ways that reflected each state's own values.

II. DÉJÀ VU ALL OVER AGAIN: DEREGULATION AND CONTEMPORARY RAILWAY DISASTER

The deregulation of many sectors of American commerce and industry in the late twentieth century began during the Carter Administration, with moves toward the federal deregulation of telephone and airline service and pricing.[65] Deregulation sank deeper roots with Ronald Reagan's election to the presidency. He characterized the government by saying that it "is not the solution to our problem; government is the problem."[66]

But, the most dramatic political successes of this movement toward federal government disempowerment occurred in the first session of the 104th Congress in 1995. In general elections of the previous November, Republicans gained majorities in both houses of Congress by offering to voters a "Contract with America,"[67] key tenets of which included accel-

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63 Interstate Commerce Comm'n v. Cincinnati, New Orleans, Tex. Pac. Ry. Co., 167 U.S. 479 (1897).

64 Interstate Commerce Comm'n v. Ala. Midland R.R., 168 U.S. 144 (1897).

65 Jeff Madrick, *The Case for Big Government*, N.Y. TIMES, Jan. 16, 2009, http://www.nytimes.com/2009/01/18/books/chapters/chapter-case-for-big-government.html?_r=&ref=review.

66 President Ronald Reagan, Inaugural Address (Jan. 20, 1981), *available at* http://www.presidency.ucsb.edu/ws/index.php?pid=43130.

67 *See, e.g.*, Adam Clymer, *The 1994 Elections: Congress the Overview; G.O.P. Celebrates Its Seep to Power; Clinton Vows to Find Common Ground*, N.Y. TIMES, Nov. 10, 1994 at 2.

erated federal deregulation of financial institutions, environmental protection programs, social programs, and infrastructure management.[68]

The 1994 elections and the resultant changes in the federal collective choice action arena (encompassing all three branches of government) set the stage for the economic disaster that befell the American people thirteen years later. These same actors in the same collective choice action arena also created circumstances in the operational action arena of railway deregulation that made possible the tragic, systemic failures studied here. This was not an altogether partisan exercise of political power. The mood of the country toward governmental authority in general had changed. The deregulatory train was leaving the station, and many Democrats as well as nearly all Republicans concluded that it was politically prudent to be on board.

Just as Congress had asserted preemptive federal regulatory authority over the railroads through passage of the Interstate Commerce Act in 1887, so too did the 104th Congress assert preemptive federal *deregulatory* authority over the industry in 1995, through passage of the Interstate Commerce Commission Termination Act (ICCTA).[69] In substantially repealing the 1887 Act, the ICCTA dissolved the Interstate Commerce Commission and replaced it with the Surface Transportation Board (STB), whose statutory mission is to direct and oversee the deregulation of the rail industry.[70]

Congress was unclear as to how expansive it intended this deregulatory authority to be, and this has vexed state and local governments, aggrieved individuals, the courts, and the industry itself (though it is the industry that has pushed for the most expansive possible interpretation of federal preemption).[71] For instance, one clause in the ICCTA states that the STB must ensure, in its deregulatory efforts, that railroads "operate transportation facilities and equipment without detriment to the public health and safety."[72] Some courts have interpreted this clause to mean that STB authority preempts local and state government authority from regulating public health and safety aspects of solid waste transfer and rail-yard land use whenever the Board rules that such regulation is "un-

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68 *See, e.g.*, *id.*; John Cushman Jr., *Republicans Plan Sweeping Barriers to New U.S. Rules*, N.Y. TIMES, Dec. 25, 1994.

69 ICC Termination Act of 1995, Pub. L. No. 104-88, 109 Stat. 803 (codified as amended in sections of 49 U.S.C. (2006)).

70 *Id.*

71 Carter H. Strickland, Jr., *Revitalizing the Presumption Against Preemption to Prevent Regulatory Gaps: Railroad Deregulation and Waste Transfer Stations*, 34 ECOLOGY L.Q. 1147, 1161–65 (2007).

72 49 U.S.C. § 10101(8) (2006).

duly burdensome."[73] And in such cases, of course, the Board is granted deference to determine what constitutes an undue burden.[74]

Other federal courts have interpreted ICCTA's preemption provisions less broadly.[75] But, the cumulative effects of all these decisions—when combined with the STB's aggressive use of its preemption authority and the rail industry's equally aggressive assertion of the authority in federal court—has created a situation of great turmoil and uncertainty regarding who has the authority to regulate the various aspects of railroad operations.

Nowhere have the negative consequences of these deregulatory efforts and ambiguities in the law been more strongly or tragically felt than in the high-profile rail disasters this country has experienced since federal judges generally (but with some exceptions) started climbing aboard the deregulation express during the 1990s. Judges sympathetic to the railroad deregulation movement not only upheld the preemptive authority of the STB under the ICCTA (as in the waste transfer cases cited above), but they also began to interpret preexisting railway safety legislation as being just as wholly preemptive of local and state government jurisdiction as the ICCTA.[76]

The 1970 Federal Railway Safety Act (FRSA) provides principally for federal railway safety regulation.[77] Though the Act originally called for the implementing Federal Railroad Administration to work in partnership with local and state rail safety regulators,[78] by the 1990s courts were consistently interpreting the Act as preempting any meaningful non-federal regulation of rail safety as well as the jurisdiction of state courts to entertain non-federal causes of action based on failures of adequate federal regulation.[79]

A line of cases following an Eighth Circuit decision with tremendous ripple effects came to be collectively termed the *Derailment Cases*.[80] The Eighth Circuit's decision was an appeal from a district court case brought by residents of Scottsbluff, Nebraska, injured by a

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73 *See, e.g.*, N.Y. Susquehanna & W. Ry. Corp. v. Jackson, 500 F.3d 238, 252–57 (3d Cir. 2007); Green Mountain R.R. v. Vt., 404 F.3d 638 (2nd Cir. 2004); Auburn v. U.S. Gov't, 154 F.3d 1025 (9th Cir. 1998).

74 *See, e.g.*, N.Y. Susquehanna & W. Ry. Corp. v. Jackson, 500 F.3d 238, 252–57 (3d Cir. 2007); Green Mountain R.R. v. Vt., 404 F.3d 638 (2nd Cir. 2004); Auburn v. U.S. Gov't, 154 F.3d 1025 (9th Cir. 1998).

75 Strickland, *supra* note 71, at 1167–68.

76 *See id.* at 1165–70.

77 Federal Railroad Safety Act, Pub. L. No 91-458, 84 Stat. 971 (1970) (codified as amended at 49 U.S.C. §§ 20101–20153 (2006)).

78 *See* Strickland, *supra* note 71, at 1147 n.92.

79 *See, e.g.*, Bowman v. Norfolk S. Ry., 66 F.3d 315 (4th Cir. 1995); Hatfield v. Burlington N. R.R., 64 F.3d 559 (10th Cir. 1995).

80 416 F.3d 787 (8th Cir. 2005).

major freight train derailment in their community.[81] In 2000, an eighty-four car freight train derailed in Scottsbluff, resulting in the rupture of tank cars containing benzene (a highly toxic, known carcinogen) and anhydrous ammonia (which can cause severe inflammation of mammalian respiratory tissues when inhaled). An emergency evacuation of 1,100 people ensued.[82]

The accident investigation revealed that two of the cars became uncoupled as the train passed through Scottsbluff.[83] Dislodged coupling equipment fell onto the track, derailing the cars following behind it.[84] In accordance with federal regulations, contractors employed by the defendant railroad had visually inspected the train two days earlier.[85] The inspection lasted thirty minutes and consisted of inspectors riding alongside the train on all-terrain vehicles, visually examining rail-car carriage equipment as they rode alongside the rail bed.[86]

Plaintiffs sued in tort, alleging claims of negligence per se and negligent compliance with federal rail safety regulations.[87] However, the Eighth Circuit panel ruled unanimously that the FRSA preempted all causes of action, whether under state tort law or alleged noncompliance with federal rail safety regulations.[88] Even if the workers carelessly or negligently performed the federally mandated inspections, the court ruled, the mere fact that they conducted the inspections sufficed to shield the railroads from legal attack by the injured plaintiffs.[89]

Later in 2005, the U.S. District Court for the District of Maryland heard a similar uncoupling/inspections/toxic release case and followed the reasoning of the Eighth Circuit.[90] In this incident, a freight train had come uncoupled in the Howard Street railroad tunnel in Baltimore, Maryland.[91] A tank car ruptured, releasing tripropylene (a flammable petrochemical) onto the railbed of the tunnel.[92] The chemical ignited, quickly spewing a huge volume of toxic gas throughout the tunnel and the air surrounding it.[93] City firefighters spent three days working to quench the poisonous conflagration.[94]

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81 *Id.*
82 *Id.* at 791.
83 *Id.*
84 *Id.*
85 *Id.* at 792.
86 *Id.* at 792.
87 *Id.*
88 *Id.* at 794.
89 *Id.* at 796.
90 Baltimore v. CSX Transp., 404 F. Supp. 2d 869 (D. Md. 2005).
91 *Id.* at 70.
92 *Id.*
93 *Id.*
94 *See, e.g.*, Kara Kridler, *No Light at the End of the Tunnel in CSX Transportation Suits*, DAILY RECORD, July 13, 2004.

The City of Baltimore sued the railroad and its contractors under state tort law to recover the expenses associated with fighting the fire, repairing the tunnel, and emergency response activities associated with shielding the public from harm.[95] Once again, the accident investigation revealed that a faulty coupling device caused the derailment. Earlier, the defendant's railroad inspection contractors had inspected the coupling device and determined that it was safe. The court therefore ruled, following the ruling in the Scottsbluff accident case, that the FRSA's preemptive authority shielded the railroad and its contractors from state tort actions.[96]

The year after that a similar case came before the federal trial court in North Dakota.[97] As in Scottsbluff, another set of tanker cars on a freight train derailed, ruptured, and released anhydrous ammonia into the air. This incident occurred in the town of Minot, North Dakota.[98] The factual distinction in this case was that the tracks themselves, rather than the coupling devices on the train, caused the derailment.[99]

Bound by precedent established by higher federal courts, in the ensuing litigation the federal judge in *Mehl v. Canadian Pacific Railway* arrived at the same conclusion as did the federal district court in *Baltimore v. CSX* a year earlier: as long as the defective rails that caused the derailment at Minot had passed their most recent inspection, the Federal Rail Safety Act shielded railroads from suits by injured persons or local governments seeking to reclaim funds expended on disaster response.[100] But, near the end of his opinion, the judge in *Mehl* expressed his frustration at being forced to hand down a ruling that he felt was manifestly unjust: "[T]he [FRSA] fails to provide any method to make injured parties whole and, in fact, closes every available door and remedy for injured parties. As a result, the judicial system is left with a law that is inherently unfair to innocent bystanders and property owners who may be injured by the negligent actions of railroad companies."[101]

The judge in *Mehl* also noted that others shared his views that the federal judiciary's aggressive use of the FRSA's preemption language to preclude both state regulation and state-based tort liability created a serious gap in railway safety regulation. In his decision, the judge quoted Supreme Court Justice Ginsburg's dissent in a 2000 case in which the high court had essentially written an instruction manual for the lower courts on how to use FRSA's preemption provisions to shield railroads

95 *CSX Transportation*, 404 F. Supp. 2d 869 (D. Md. 2005).
96 *Id.*
97 Mehl v. Canadian Pac. Ry., 417 F. Supp. 2d 1104 (D. N.D. 2006).
98 *Id.* at 1106.
99 *Id.*
100 *Id.*
101 *Id.* at 1120.

from state law and personal injury actions: "As Justice Ginsburg of the United States Supreme Court argued in her dissent in *Norfolk S. Ry. Co. v. Shanklin*, the displacement of state negligence law 'with no substantive federal standard of conduct to fill the void' creates an outcome that 'defies common sense and sound policy.'"[102]

The point Justice Ginsburg made in her dissent is the same point that we make here: by choosing to interpret the FRSA so as to sweep the field clean of any residual state authority to regulate rail safety or any individual power of aggrieved communities and their residents to find relief in tort actions, the federal courts effectively defeated the law's ability to adequately protect the public from harm caused by railway disasters. Governed only by the vague, industry-deferential FRSA regulations—which are implemented by an underfunded, understaffed bureaucracy—the railway industry reasonably concluded that the law posed little threat of meaningful regulation, especially as interpreted by equally deferential federal judges.

III. REACTIVE RESPONSE TO THE METROLINK DISASTER IN THE COLLECTIVE CHOICE ARENA

Just one month after the Metrolink disaster, Congress enacted the Federal Railroad Safety Improvement Act of 2008 (Railroad Act of 2008), including safety measures such as selective installation of Positive Train Control (PTC) systems and railway crew work hour regulation.[103] Previously, the Bush Administration had opposed such precautionary measures,[104] and the president of the Metrolink commuter rail line had actually testified at congressional hearings a few months prior to the Chatsworth disaster that no statute should mandate such technology, in order to leave railways the flexibility to decide what safety measures are necessary.[105]

Given the haste with which Congress crafted and passed this measure, it represents a classic example of reactive *legislation*, which will once again lead to reactive *regulation*. As has happened before, there was an after-the-fact, linear, fault-tree response to this most recent disas-

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102 *Id.* (quoting Norfolk S. Ry. Co. v. Shanklin, 529 U.S. 344, 360 (2000) (Ginsburg, J., dissenting)).

103 *See generally* Rail Safety Improvement Act of 2008, H.R. 2095, 110th Cong. §§ 104, 108 (2008) (enacted) [hereinafter Rail Safety Act].

104 *See, e.g.*, BUSH ADMINISTRATION STRONGLY OPPOSED MANDATORY POSITIVE TRAIN CONTROLS, BOXER-FEINSTEIN BILL ADDRESSES METROLINK'S NEGLIGENCE, (Sept. 18, 2008), http://losangeles.injuryboard.com/miscellaneous/bush-administration-strongly-opposed-mandatory-positive-train-controls-boxerfeinstein-bill-addresses-metrolinks-negligence-.aspx?googleid=247794.

105 *See* Najmedin Meshkati & James Osborn, *Rail Safety and the Human Error Excuse*, L.A. TIMES, Sept. 17, 2008, at A23, *available at* http://articles.latimes.com/2008/sep/17/news/OE-MESHKATI17.

ter, which is only one example among a depressingly familiar string of disasters. The reactive response was by no means a comprehensive overhaul of the extant fragmented and disjointed regulatory framework. The NTSB achieved the positive train control technology that it had long advocated, but the timeline to implementation was set at 2015, and industry has vigorously opposed the measure.[106]

Sections 103 and 108 of the Railroad Act of 2008 finally imposed railway crew work-hour limitations, no doubt due in part to the discovery that the Metrolink engineer had been working an eleven-hour split shift—a practice now prohibited.[107] Section 104 mandates the Positive Train Control system on inter-city and mixed-use rail lines carrying commuter trains—the very system the Metrolink president had earlier opposed.[108]

Section 403 of the Railroad Act of 2008 calls for a study of whether existing freight train inspection procedures are adequate, with respect to both the amount of time spent on inspections and the actual practices used.[109] This is in apparent reaction to the investigation of the Scottsbluff derailment disaster, which revealed that contract inspectors simply rode alongside the train on all-terrain vehicles, at the rate of twenty seconds per freight car, to visually inspect the train.[110] Interestingly, this section of the Act does not mandate more in-depth safety inspections—only that the possible need for more stringent inspections should be studied.

With regard to the STB's aggressive preemption crusade in the courts on the matter of waste-transfer-station regulation, the Act imposes on the Board a heavier burden of proof before it can preempt local land use regulation of such sites.[111] The Act also makes clear that the presumption should be in favor of deferring to state and local government police powers in waste transfer station land use regulation.[112]

The Act does provide for agencies to conduct more comprehensive rail safety system studies in the future.[113] Whether such studies will actually lead to the more integrated, whole-systems approach to regulatory reform that the authors advocate here will depend largely on how these studies are designed and conducted, as well as the extent to which con-

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106 *See* ASSOCIATION OF AMERICAN RAILROADS, THE NEED FOR REASONABLE IMPLEMENTATION OF THE POSITIVE TRAIN CONTROL MANDATE (2009), http://www.aar.org/~/media/AAR/PositionPapers/PTC%20Oct%202009.ashx; *see also* Rail Safety Act, *supra* note 107.

107 NTSB 2008 REPORT, *supra* note 1.

108 *See* Meshkati & Osborn, *supra* note 105.

109 *See* Rail Safety Act, *supra* note 103.

110 *See In re* Derailment Case, 416 F.3d 787, 792 (8th Cir. 2005).

111 *See* Rail Safety Act, *supra* note 103, at § 604.

112 *Id.*

113 *Id.* at §§ 403–05, 408, 411, 415.

gressional oversight committees decide to feature them in public hearings and possibly use them as a basis for whole-systems reforms.

A. Disasters Subsequent to Passage of the 2008 Rail Safety Act

In the period during which this Article was being drafted, and after the passage of the 2008 Act, two more major train derailments occurred within three days of each other. The first was on June 19, 2009 in Rockford, Illinois, about sixty miles from Chicago. Eighteen ethanol filled tank cars exploded, killing one person and injuring six more.[114] The train derailment forced 600 families to evacuate the area.[115] A post-derailment investigation by the Environment Protection Agency (EPA) found that there was a substantial fish kill in an unnamed creek running near the accident site.[116] The EPA's investigation could not confirm that the fish kill was a result of pollution from an ethanol plume caused by the accident, though the timing of the fish kill provided strong circumstantial evidence.[117]

While the NTSB indicated that an investigative report would take more than a year to compile, preliminary evidence suggested that the train "hydroplaned" on standing water on the tracks after recent heavy rains.[118] The train crash injured fewer people and caused less environmental damage than it could have in part because the ethanol/gasoline product in the eighteen tank cars burned up in the post-derailment inferno.[119] Unclear from the reporting on the incident is whether the "high water" found on the railroad tracks was a common occurrence, whether corresponding speed limits were in effect in the area (and whether the derailed train followed them), and whether safety directives existed to limit the potential for this type of accident.

Just three days later, on June 22, 2009, two Washington D.C. Metro trains collided between the Takoma Park and Fort Totten stations during a Monday evening rush hour commute. The first train was stopped on the tracks waiting for the second train to clear the platform when the

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114 *See* Marynia Kolak, *One Killed, Several Injured in Ethanol Train Blast*, EXAMINER (June 21, 2009, 9:18 AM), http://www.examiner.com/environmental-news-in-chicago/one-killed-several-injured-ethanol-train-blast.

115 *Id.*

116 *See Illinois EPA Says Railroad Should Test, Clean Up Spill*, RRSTAR (June 27, 2009, 12:08 AM), http://www.rrstar.com/news/publicsafety/x998788847/Illinois-EPA-says-railroad-should-test-clean-up-spill.

117 *Id.*

118 *See* Kolak, *supra* note 114; *see also* Christina M. Wright, *Tank Cars Blow up in Illinois Train Derailment, 1 Killed*, HUFFINGTON POST (June 20, 2009, 8:36 PM), http://www.huffingtonpost.com/2009/06/20/tank-cars-blow-up-in-illi_n_218372.html.

119 *See, e.g.*, Christina M. Wright, *Train Derails, Sparking Explosion that Kills 1 and Injures 3*, THE STAR-LEDGER, June 21, 2009 (noting that the wreckage burned through the night and was not extinguished until Saturday morning).

second train collided with the first at full speed, killing nine people and injuring scores of others in the worst crash in Washington D.C. Metro history.[120] Preliminary reports from investigators noted that the cause of the crash likely resulted from a mechanical failure: first, circuits in the undertrack system had been intermittently failing to detect train cars on the platform and, second, the train operated in "automatic" mode, in which the signals control the distance between trains.[121] The detection system evidently failed, and the train failed to stop.[122]

Despite the fact that the manufacturer of the signaling equipment had warned of interoperability safety risks inherent in the installation of equipment manufactured by third parties, only five days before the accident, Metro maintenance and safety crews installed third-party signaling systems that likely failed before the collision.[123] In a September 7, 2004 letter sent to numerous rail system operators using their signaling systems, Alstom, the company that made the original equipment, stated that it believed that "the use of third-party components . . . constitutes a serious and increasing risk to overall signaling system safety."[124] Investigators of the Metro disaster found that the third-party equipment indeed malfunctioned, and maintenance and safety crews had not detected it.[125]

Further, the cars on the train that was hit were built in 1976 and were not retrofitted with "anticlimber" technology[126] that would keep the train cars from "telescoping," or crushing, and collapsing all safe space within the cars.[127] After a 2004 collision in which one car telescoped and a train operator died, the NTSB had recommended that Metro retire all of the cars with this safety hazard. Metro declined to do so on the grounds that it would not receive the increased funding necessary to do so ahead of the cars' 2014 retirement date.[128] NTSB had called this ac-

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120 *See At Least 9 Dead After D.C. Metro Trains Crash*, FOX NEWS (June 23, 2010), http://www.foxnews.com/story/0,2933,528203,00.html.

121 *See* Lena H. Sun & Lyndsey Layton, *Metro Failed to Detect Hazard Device Replaced Just Days Before Crash, but Circuit Malfunctioned*, WASH. POST, July 2, 2009, http://www.washingtonpost.com/wp-dyn/content/article/2009/07/01/AR2009070102369.html.

122 *Id.*

123 *See* Lena H. Sun, Ann Scott Tyson & Joe Stephens, *Metro's Mixing of Signal Part Brands Could Have Caused Crash, Maker Tells NTSB*, WASH. POST, February 25, 2010, http://www.washingtonpost.com/wp-dyn/content/article/2010/02/24/AR2010022403006.html.

124 *Id.*

125 *Id.*

126 NTSB, COLLISION BETWEEN TWO WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY TRAINS AT THE WOODLEY PARK-ZOO/ADAMS MORGAN STATION IN WASHINGTON, D.C. NOVEMBER 3, 2004, RAILROAD ACCIDENT REPORT (March 23, 2006), http://www.ntsb.gov/publictn/2006/RAR0601.pdf.

127 *See generally* Mike DeBonis, *Old Questions About Crashworthiness of Metro Cars*, WASHINGTON CITY PAPER (June 22, 2009, 9:01 PM), http://www.washingtoncitypaper.com/blogs/citydesk/2009/06/22/old-questions-about-crashworthiness-of-metro-cars/ (describing how anticlimber technology operates).

128 *Id.*

tion "unacceptable,"[129] but because NTSB recommendations are not binding, it did not have the power to do more.

Both technical issues had been documented and reported, with the train cars scheduled to retire over the next several years. One veteran rail-safety mechanic at Metro stated that he knew of the mismatch in signaling equipment and "had asked superiors for new procedures for testing and handling the equipment, but was told there were none" and that neither Metro nor the manufacturer provided training on it.[130] Metro officials testified that they issued new testing requirements in 2006 but that distribution of the requirements was "probably uneven."[131] The lack of training and procedures led to frustration on the part of safety crews and challenges in obtaining installation crews to adjust equipment.[132]

Immediately following this latest disastrous accident, Washington D.C. Metro authorities quickly asserted that "the system is safe."[133] This statement, relayed to the public by a general manager of the D.C. rail system the day after the train crash seemed to conflict with the technical and mechanical difficulties suggested by the first reports from the NTSB and system safety workers.[134]

The D.C. Metro rail accident is particularly troubling given the fact that maintenance and safety crews knew of the mechanical issues that led to the collision: that third-party, built-in safety signals would create information relay problems about trains stopped in stations to oncoming trains,[135] and that aging rail cars were not equipped with passive anticlimber safety systems.[136]

The 2008 Act took a number of steps to increase rail safety but failed to address core prevention issues that might have prevented the Metro disaster, particularly the importance of acknowledging and addressing NTSB recommendations and maintenance crew safety warnings. In the Washington D.C. Metro accident, the NTSB and maintenance crews previously identified a number of factors that made the rail unsafe, but financial pressures on D.C. Metro inhibited its managers from making the necessary upgrades,[137] absent a federal mandate to do so.

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129 *Id.*

130 Sun, Tyson & Stephens, *supra* note 123 (quoting NTSB investigation interview transcripts).

131 *Id.*

132 *See id.*; *see also* Sun & Layton, *supra* note 121.

133 *Six Dead in D.C. Metro Rail Crash*, L.A. TIMES, June 23, 2009, http://articles.latimes.com/2009/jun/23/nation/na-train-crash23.

134 Sun, Tyson & Stephens, *supra* note 123 (quoting NTSB investigation interview transcripts).

135 *Id.*

136 *Id.*

137 *Id.*

In the following sections of this Article, we recommend an alternative approach to rail safety regulation—one that is preventive rather than reactive in nature, and the analytic scope of which encompasses the whole system of rail transport as well as the private and public institutions that govern it. Interestingly, the NTSB—which has long advocated for systemic technological reforms such as positive train control—already employs several elements of the approach we develop below. Such reforms likely would have prevented the Metrolink disaster.

We examine why the NTSB's whole-system reforms advocacy takes the form of non-binding recommendations that transport regulatory agencies such as the Federal Railroad Administration routinely ignore. And, employing the IAD framework once again, we recommend ways in which the NTSB could apply to a greater extent our preferred approach, as well as ideas for reforming regulatory agencies in ways that would compel them to heed NTSB advice.

IV. IAD AND THE WHOLE SYSTEMS APPROACH

The traditional approach to rail disaster accident investigations is *fault tree analysis*. This method for the study of discrete events begins with the facts of the accident and works backward in time in search of the contributory factors that caused the event—an approach focused exclusively at the operational level. We advocate for an accompanying collective choice-level, whole-systems analysis to complement this operational focus in all instances. Such an analysis might reveal whether factors existed in the superordinate legislative/regulatory context that might have contributed just as much to an accident as failures at the operational level. This Article discusses how to achieve that goal *in principle* below, and then concludes with recommendations on how to achieve the goal *in practice*.

A. Fault Tree Analysis

In a fault tree analysis (also known as a "root cause" analysis), an investigating engineer starts with the undesired event and then works backward, examining all possible contributing factors to that event's occurrence.[138] Once the investigator completes the analysis, it can be converted into a set of recommendations on how to avoid such accidents in the future.

The fault tree essentially reverse-engineers the situation, beginning from an undesired outcome and working backward to the events that contributed, or could have contributed, to the undesired outcome. The

138 *See generally* W. E. VESELY ET AL., U.S. NUCLEAR REGULATORY COMM'N., FAULT TREE HANDBOOK (1981).

fault tree usually consists of a visual diagram of possible outcomes coupled with probabilities of occurrence that provide a method of analyzing possible ways in which a system can fail.[139]

While fault trees provide extraordinary explanatory power for failures in technological systems in individual events, they have several limitations. These limitations include: single event focus, an overreliance on quantitative data to the exclusion of qualitative data, and difficulty accounting for human error.

1. Single Event Focus

The fault trees' focus on a single outcome or event under a particular set of conditions limits their utility, making it difficult to link seemingly disparate accidents. While particularly useful in helping to control particular outcomes in limited systems, fault trees reveal less when accidents are a product of the confluence of a number of events or the product of a cascading failure, or both. Thus, they work well where a single cause produces the complex-systems accident. But, they tend to break down where multiple contributing causes exist, as in the case of a "Swiss cheese" accident type, in which a number of unrelated active and passive malfunctions coalesce into an opportunity for an unpredictable accident (e.g., as discussed by Reason[140] and Vicente[141]).

2. Exclusive Reliance on Quantitative Data

In the highly complex systems with low accident rates in which human operators play a major role in system reliability, available data tends to be qualitative and historical.[142] The fault tree does not lend itself to qualitative and historical data inputs, which undermines its utility in systemic level inquiry.

3. Difficulty in Accounting for Human Error

While fault trees are particularly good tools for analyzing technical failures by following the "branches" of the tree toward potential causes of an accident at the "trunk," they have less explanatory power in accounting for human decision-making and error. Social scientific work on operational accidents and human factors suggests that human errors, such as poor judgment or execution, occur at a confluence of technological

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139 *See id.*

140 *See, e.g.*, JAMES REASON, HUMAN ERROR (1990).

141 *See, e.g.*, KIM VICENTE, THE HUMAN FACTOR (2004).

142 *See, e.g.*, CHARLES PERROW, NORMAL ACCIDENTS (Basic Books, Inc. 1984); VICENTE, *supra* note 141; Gene I. Rochlin, Todd R. La Porte & Karlene H. Roberts, *The Self-Designing High-Reliability Organization: Aircraft Carrier Flight Operations at Sea*, NAVAL WAR COLL. REV., Autumn 1987, *available at* http://govleaders.org/reliability.htm.

design and social/organizational systemic and institutional deficiencies.[143]

Fault trees are not particularly well suited to analyze these factors, as human operator error can be both a "black box"—a set of circumstances or evidence that is unknowable or hidden—and unpredictable. This can tempt accident investigators who use the fault tree analysis to identify human error as the major causal factor in an accident and end the analysis there. As a result, this usually leads to narrowly tailored safety rules focused on stopping particular types of human activity. These rules often focus on the last accident rather than the next.

In IAD parlance, fault trees and traditional safety engineering tools—including root cause analyses, which are typically conducted after an incident—can be effective in studying *action situations* (i.e., accidents) in operational arenas, where interactions occur primarily between humans and technologies. But fault trees cannot examine the collective choice-level, whole-systems context that may have increased the likelihood of the accident under investigation.

B. Interdependent Systems Analysis

An interdependent systems analysis (ISA) complements the fault tree analysis by focusing its inquiry at the collective choice action arena, analyzing structural concerns: rules, procedures, organizational structures, and safety cultures. It looks inward to view the operational arena as part of the larger system, wholly nested within the collective choice action arena, thus better able to capture potential structural causes of seemingly disparate accidents.

To do this, one must view railroad traffic as a system operating continually and under peak operational demand over a given period of time. Rather than viewing particular accidents in isolation, an interdependent systems-analysis groups accidents together as components of a larger system. The ISA focuses on the types of legal and organizational structures in place at the time of the particular accident and compares it with other accidents that occurred under similar structural conditions. Most "official" accident investigation reports rarely undertake this kind of analysis, but it has been done—resulting, for example, in Diane Vaughan's classic analysis of the Challenger[144] launch decision (and its tragic prescience with regard to the Columbia decision), and Paul Shrivastava's book on Bhopal published in 1987,[145] among others.

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143 *See, e.g.*, PERROW, *supra* note 142; REASON, *supra* note 140; VICENTE, *supra* note 141.

144 *See* DIANE VAUGHAN, THE CHALLENGER LAUNCH DECISION: RISKY TECHNOLOGY, CULTURE AND DEVIANCE AT NASA (Univ. Chicago Press 1996).

145 *See* PAUL SHRIVASTAVA, BHOPAL: ANATOMY OF A CRISIS (Paul Chapman Publishing Ltd. 1987).

The IAD framework of nested arenas examines the relationship between fault tree analysis at the operational level and the collective choice arena of lawmaking and rule-writing above that provided the regulatory context within which a given accident occurred. Thus, disparate operational accidents are seen as taking place under a given set of rules, and the comparative analysis of individual accidents occurring within the same regulatory context may begin to reveal how the legal and regulatory context might be at fault. The Interdependent Systems Analysis (ISA) has its greatest explanatory potency at the collective choice level.

Both the fault tree and ISA analysis focus on "interactivity"—the points at which moving parts (human, machine, rule/procedure, institutional, etc.) come together—because points of interaction have the greatest likelihood of failure. Engineers might refer to this interactivity as inducing "friction" while economists may refer to it as inducing "transaction costs." Essentially, both drag on the system and provide opportunities for unanticipated accidents to occur.

However, unlike the traditional fault tree or root cause approach, which starts with an undesired outcome and works backwards to uncover potential causes, ISA takes a wide view of a system that has undergone either constitutional or collective choice changes. The ISA analysis may then, as in the case of railroad safety, view a number of rail accidents over a given time period, classify them by constitutional and collective choice differences, and help to illustrate how a particular set of rules and rule interpretations create the conditions for accidents.[146] Thus, the ISA approach asks: how many accidents occur in a particular system or set of systems? What are the similarities in those accidents? Then it categorizes the accidents by time and looks to changes in rules, procedures, and organizational or regulatory structure to set the contours of each category. The system can then look to broader causes within each time period: when was new, major legislation crafted that affected the particular industry? When did the courts hand down important decisions?

To some extent, the definitions of "major" and "important" are a product of the effects in the operational arena. That is, the degree to which constitutional-level changes affect operational-level performance is an empirical question. This is largely because the collective choice action arena lies between them. At that level of inquiry, the investigator might ask: did any non-safety specific rules influence safety procedures? How did regulators resolve conflicts between federal, state, and local laws? What role do judges have in enforcement? How technical is the knowledge necessary to regulate?

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146 *See, e.g.*, SHRIVASTAVA, *supra* note 145 (using the ISA analysis); VAUGHAN, *supra* note 144.

The ISA approach utilizes timelines, overlaying accident timelines with timelines for legislation. By mapping key events at all three institutional levels in a "layer cake" timeline (i.e., accidents at the operational level; lawmaking and rulemaking at the collective choice level; and court decisions at operational, collective choice, and constitutional levels), links between events at all levels might begin to manifest in a way that fault tree analysis could not have identified.

Clusters of accidents, at certain times, may suggest that some legislation, funding decision, or enforcement regime led to a decrease in safety precaution. If the ISA analyst examined a timeline for legislation first, she could examine whether particular legislation markedly affected industrial safety. The latter could be used to determine the relative importance of constitutional-level changes on operational performance. That is, given constitutional-level changes, what was the empirical impact on the number and seriousness of accidents over a given period of time?

If rule or rule-interpretation changes do not markedly affect operational level performance, then a further empirical question arises: whether corresponding changes emerged from the regulatory policies. At that point, the investigator might ask: did workers or investigators note that rules changed? Did they note that too many rules existed or that they did not know about a procedure change (like the maintenance workers in the post-Metro accident investigation)? Did they note lax enforcement? Did they say that rules were impenetrable and dense? Did management signal employees not to follow rules in favor of operational efficiency? To whom, in the organization, did safety officials report? What authority did safety officials have to order stand-downs or other safety procedures? How many safety or operations officials were there relative to the number of employees? What outside regulatory bodies exist? What is the punishment for violation? How well-funded were regulatory bodies?

When conducting research on formal legal rules, any accident that occurred during the enforcement period for a particular rule must be considered equally with any other accident that occurred during the enforcement period. Thus, if there were a series of safety rules in force in one particular year, any accident occurring during that time period would be symptomatic of that particular enforcement regime. Of particular interest in the systems analysis of a formal rule regime is the time period immediately following a new rule regime, and what happens during that time period. This gives a picture of whether and how new rule regimes have changed operational performance.

This first step isolates rule enforcement regimes to highlight which regime was in force during which event; this isolation helps to explain

system reliability in systems that fail infrequently because it groups accidents together by institutional conditions that may span across several years and geographic regions. The expectation is that a person would find an increasing number of accidents immediately after new rule regimes come into force, while operators become familiar with them, and then, if the rules concern safety, a decrease in a particular type of accident or an increase if they are industry-centric rules. The ISA approach does not initially focus on what errors the operator made or why the operator made them, but focuses on the number and types of accidents that occurred under a particular rule system or legal interpretation. This helps to test whether public regulatory polices reduce public risk.[147]

This approach rests against a backdrop under which legal rules and bureaucratic systems are put in place in top-down hierarchical fashion. Thus, the more complete question for the accident investigator investigating potential human operator contributions to accidents includes, "Did the human operator err in following formal systemic rules and procedures?" This question brings the rules and organizational systems into the discussion.

The simple answer may be that the operator did not follow procedure, but in a top-down rule system, operators' experiences may suggest that rules themselves are unclear, there are too many of them, they are otherwise difficult to follow, or the rules in place do not correspond to operators' experience and knowledge of the system—"If I do what they tell me to do, I make the system less reliable than if I do it the way we have always done it."[148] This latter point may suggest that externally-imposed rules are not intuitive to operators with many years of experience, for whom safety is a practice gained through experiential knowledge of the system. Further, it may reflect a lack of training in the "newest" rules and authorities, or even a "culture of deviance" that can arise where operators push back against rules by ignoring them, as Vaughan found at NASA preceding the Challenger disaster.[149]

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147 This approach has been taken in the past with regard to coal mine safety regulations. Lewis-Beck and Alford analyzed data collected on coal mine safety over a period of thirty-five years under three major pieces of federal legislation in order to understand whether workplace safety regulations increase safety and to suggest possible reasons why particular laws may have had effects on safety while others did not. The policy evaluation approach focuses on the collective choice arena. *See generally* Michael S. Lewis-Beck & John R. Alford, *Can Government Regulate Safety? The Coal Mine Example*, 74 AM. POL. SCI. REV. 745 n.3 (1980).

148 A research team at Los Alamos National Laboratory found the latter to be a major contributor to rule violation during the period from 1999–2004. *See generally* TODD R. LA PORTE, STEWARDSHIP AND THE DESIGN OF 'Future Friendly' Technologies Avoiding Operational Strain in Nuclear Materials Management at Scale, *in* FINAL REPORT: UCB - LANL INSTITUTIONAL STEWARDSHIP STUDIES (2000).

149 "Cultures of deviance" should not be taken for granted. At Los Alamos National Laboratory in the period from 1999–2003, the entire Laboratory was blamed for having a "culture of deviance" in an attempt to ascribe human operator error to the entire system. M.

Where rules prescribe behavior—and violation results in punishment—less experienced employees, on the one hand, may become too compliance-oriented because they may not understand that there are appropriate times for violation. On the other hand, more experienced employees may disregard rules that do not make intuitive sense, a conflict that plays out in numerous organizations that manage hazard. While emergency heroism is celebrated even where it entails rule violation, intuitive rule violation that does not result in heroism may be punished, leaving the operator in a difficult philosophical quandary between strict compliance with rules and intuitive rule violation at precisely the moment we want them to act. Emergency managers confront inherent conflicts between rule compliance and flexibility of response in emergency operations, indicating that such conflicts either lead to paralysis during the event or acceptance of potential post-event punishment by authorities.

V. THE NTSB AND RECOMMENDATIONS FOR SYSTEMIC REFORM

The NTSB is the primary federal body in charge of investigating transportation accidents in the United States.[150] Originally established to investigate aircraft accidents, its reach has expanded over time to include all domestic transportation, particularly common carriers.[151] Its main focus is the prevention of future accidents by finding the causes of previous accidents.[152]

Initially, the NTSB was a division of the Department of Transportation, receiving its funding and organizational structure from that department.[153] As the NTSB increasingly began to investigate the Federal Aviation Administration itself, Congress, in 1974, passed the Independent Safety Board Act to establish boundaries between the regulated entity and its regulator.[154] Congress gave the NTSB considerable discretion to conduct its own accident investigations and issue nonbinding findings and reports on those accidents.[155]

By institutional design, the NTSB is intended to be non-partisan, apolitical, and non-regulatory. The generally high marks it receives for

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Jude Egan, The Stewardship Claim at Los Alamos National Laboratory: Managing Hazardous Legal and Regulatory Environments (Fall 2008) (unpublished Ph.D. dissertation, University of California, Berkeley) (on file with author); *see also* VAUGHAN, *supra* note 144.

150 *History and Mission*, NATIONAL TRANSPORTATION SAFETY BOARD, http://www.ntsb.gov/abt_ntsb/history.htm (last visited Feb. 25, 2011).

151 *Id.*

152 *Id.*

153 *Id.*

154 *See* Trowbridge Littleton, *The National Transportation Safety Board: How Should They Conduct Witness Investigations—The Need for a Privilege*, 27 TRANSP. L.J. 255, 258 (2000).

155 *See id.* at 261.

its dispassionate and relatively objective technical analysis of transport accidents stems in part from its lack of regulatory authority. It is seen as less vulnerable to interest group pressure and the "agency capture" phenomenon than the regulatory agencies that write the rules and oversee implementation and enforcement actions.

But, this dissociation from the regulatory environment comes at a price. Undoubtedly, successful industry lobbying against regulatory implementation of some key NTSB recommendations has cost dozens of rail commuters their lives over the course of the last fifteen years, as we came to experience the full effects of industry deregulation and non-regulation generated by the abolition of the Interstate Commerce Commission. Yet fatal flaws in the collective choice arena—flaws that independent systems analysis could have exposed—set the stage for equally fatal flaws in the daily functioning of rail safety systems in the operational arena. The institutional design problem to be solved is how to empower and encourage the NTSB to integrate the ISA approach more fully into its analytic operations, without sacrificing its reputation for dispassionate professionalism and nonpartisan advice.

A. Recommendation 1: Extend NTSB Investigatory Authority to Include the Implementation of Its Recommendations

Given the NTSB's proximity to accidents, the recommendations that appear in its investigation reports and its "Most Wanted Safety Regulations" lists provide considerable insight into the safety practices in the rail industry.[156] For example, NTSB issued R-06-5: "Develop transit railcar design standards to provide adequate means for safe and rapid emergency responder entry and passenger evacuation" and R-06-6: "Develop minimum crashworthiness standards to prevent the telescoping of transit railcars in collisions and establish a timetable for removing equipment that cannot be modified to meet the new standards" on April 19, 2006,[157] after a collision on the Washington D.C. Metro injured several passengers. If the D.C. Metro had adopted these regulations it would have directly increased passenger safety before the 2009 collision that killed nine people.

The U.S. Rail Safety Improvement Act of 2008 addressed another outstanding issue on the NTSB's "most wanted" list: "positive train control" technology.[158] This reactive regulation legislative process followed Birkland's logic that disasters provide policy focusing opportunities that

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156 *Most Wanted Transportation Safety Improvements*, NAT'L TRANSP. SAFETY BD., http://www.ntsb.gov/recs/mostwanted/rail_issues.htm (last visited Mar. 10, 2011).

157 *Id.*

158 *See* Rail Safety Act, *supra* note 103.

otherwise may not have come into existence.[159] As noted above, positive train control technology had been on NTSB's "most wanted" list since 1990 but had suffered from intense anti-regulation lobbying from the rail industry because of the cost of implementation. Even though the Act mandates positive train control technology implementation by 2015, a number of criticisms and complaints about the implementation of this Act have already arisen. These include the high estimated price tag and the potential for over-regulation and quick obsolescence.[160] Depending on the level of possible industry resistance and pushback, the question of future compliance with this regulation remains open. Nevertheless, the NTSB removed positive train control from its most wanted list after the passage of the 2008 Act.[161]

Our recommendation in this regard is that the NTSB adopt a more nuanced listing system. The current approach is binary: an item is either on the most wanted list, or it is not. We recommend a secondary list, perhaps labeled "Recommendations in Process." The Positive Train Control mandate would appear on this list. A legislative mandate is only the first step. Without continuous implementation monitoring, the public has no way of knowing whether the advice rendered by the NTSB and written into law will be implemented. Overseeing the implementation process in the operational arena is just as important as keeping track of systemic changes at the level of collective choice.

The Government Accountability Office (GAO) normally conducts implementation studies of the sort we recommend here, and we do not suggest that the NTSB either replicate or replace the GAO's important oversight function. However, the NTSB and the GAO could work together to track the implementation of certain critical rail infrastructure upgrades, such as positive train control on passenger rail/freight line mixed-use tracks.

The NTSB provides a valuable source of information about rail and transportation safety. As a front line investigator, the NTSB has access to information available from operators and maintenance workers that can indicate better methods of regulation and ways in which the opera-

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159 THOMAS A. BIRKLAND, AFTER DISASTER: AGENDA SETTING, PUBLIC POLICY AND FOCUSING EVENTS (1997).

160 *See, e.g.*, DEPARTMENT OF TRANSPORTATION, BENEFITS AND COSTS OF POSITIVE TRAIN CONTROL 21–25 (2004), http://www.fra.dot.gov/downloads/safety/ptc_ben_cost_report.pdf.

161 In retrospect, this action may have been both optimistic and premature. The Association of American Railroads (the freight rail industry trade group) sued the Federal Rail Administration (FRA) to enjoin implementation of aspects of its newly crafted positive train control rule. In an out-of-court settlement announced March 4, 2011, the FRA agreed to exempt 10,000 miles of track previously subject to the new rule. Josh Mitchell, *Railroads Gain Leeway on Safety Rule*, WALL STREET J., March 5-6, 2011, at B-3.

tors and maintenance workers understand the regulations at the operational level.

B. Recommendation 2: Increase the Level of Preventive (Rather than Reactive) ISA Analysis in NTSB Investigations

While no evidence exists indicating that the NTSB now conducts the kind of regulatory analysis under the ISA/IAD framework we outline in this Article, the NTSB does make connections between separate accident investigations when it discovers a pattern of similar technological or human errors occurring in multiple instances. These patterns of failure contribute to the NTSB's "most wanted" list and other systemic safety recommendations for the future prevention of the same class of accidents. While this approach gives a great deal of weight to particular areas the NTSB has identified, it has remediable limitations.

For example, the NTSB seems to realize that putting too many issues on the "Most Wanted" list will reduce the likelihood that they can be taken seriously at a policy level. As a result very few items make the list. The NTSB appears to engage in a "triage" exercise—featuring only those recommended changes it deems most likely to save the most lives while expending the least amount of its own political capital.

A February 2010 NTSB PowerPoint document entitled "Federal Most Wanted List of Transportation Safety Improvements" indicates that at that time, there were 143 open railroad recommendations.[162] One of those is the removal of a 1965 prohibition against federal regulation of rail companies that receive federal transit assistance, such as local rail transit agencies.[163]

This forty-five year old provision has weakened regulatory oversight of the rail transit industry.[164] As result of this prohibition, the State Safety Oversight program leaves states in charge of their own rail transit rules, with no minimum federal thresholds.[165] State staffing and enforcement is minimal on a number of rail lines, meaning that even high-risk safety issues have gone unidentified and corrected.[166]

The NTSB is requesting something that Secretary of Transportation Ray LaHood proposed in advocating for congressional enactment of the

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162 *See* NATIONAL TRANSPORTATION SAFETY BOARD, FEDERAL MOST WANTED LIST OF TRANSPORTATION SAFETY IMPROVEMENTS, Feb. 18, 2010, http://www.ntsb.gov/recs/mostwanted/MWL-Presentations/100318/Most_Wanted_List_Presentation_03182010-1.pdf.

163 *Id.*

164 *Id.*

165 *Id.*

166 *See* Letter from Ray LaHood, Secretary, Department of Transportation, to Nancy Pelosi, Speaker of the House, House of Representatives (Dec. 7, 2009), *available at* http://www.fta.dot.gov/11039_11117.htm (proposing the Public Transportation Safety Program Act of 2009).

Public Transportation Safety Program Act of 2009. If adopted, this measure would empower the Department of Transportation to set minimum federal safety standards for unregulated transit rail.[167] The measure would also provide funding for states to hire and train regulators to enforce federal standards. Further, the measure would require state oversight agencies to be financially independent of the agencies they oversee.[168]

If this measure were enacted, the NTSB could assume the role of generating a prescriptive, preventive interdependent systems analysis of how the measure should be enacted. The NTSB could also retrospectively examine how well the Act corrects the regulatory, technical systems and operator failures that gave rise to the need for federal regulation of commuter rail transit in the first place.

The NTSB already has a proactive mission in accident prevention and mitigation, but legislation has only empowered NTSB to conduct independent investigations of accidents that have already occurred—a reactive rather than a preventive role. Mandating an ISA approach would give the NTSB the ability to conduct systemic policy analysis and evaluation—a proactive role in monitoring and enforcing regulatory authorities. This information may then be used at the policy level to drive policy modifications and enforcement practices.

The goal is better rail safety, not increasing or decreasing regulation. In a general sense, regulators and safety oversight boards could use the ISA approach to broaden the scope and reach of the analysis and grant themselves a more proactive role. Done correctly, particularly in the case of regulators in complex technological industries, industry could conduct its own ISA studies, and the two could work together to produce optimal levels of external regulation and internal self-regulation.

C. Recommendation 3: Enhance the Status of NTSB Recommendations

When the NTSB prepares a systemic safety recommendation, current law calls for the Secretary of Transportation to respond within ninety days with a decision as to whether or not the Department of Transportation intends to implement the recommendation, along with an explanation of why or why not.[169] The Secretary must also submit an

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167 *Id.*

168 *Id.*

169 J. Cade Hamner, *Regulating Safety-Can the National Transportation Safety Board and the Federal Aviation Administration Improve the Safety of EMS Flights?*, 74 J. AIR L. & COM. 597, 602 (2009).

annual report to both Congress and the NTSB regarding the status of recommendations on the NTSB's "Most Wanted" list.[170]

Because NTSB recommendations are not binding, a Birkland-type analysis suggests that the passage of the 2008 Act mandating positive train technologies only occurred because the Metrolink train disaster focused the policy agenda on train collisions. But the NTSB had been recommending this technology for nearly twenty years prior to the Metrolink disaster.[171] The same tragic pattern occurred with the D.C. Metro train collision. The NTSB had already recommended the adoption of passenger rail car improvements three years before the fatal D.C. Metro collision,[172] but incremental implementation of its recommendations proceeded too slowly to avoid the loss of lives and major injuries occasioned by the June 2009 D.C. Metro disaster.

Prior to the 2008 Metrolink commuter rail/freight train collision that killed twenty-five passengers and seriously injured over 130 more,[173] another Metrolink collision caused by similar circumstances six years earlier resulted in the NTSB's unheeded plea that Metrolink install a Positive Train Control system. Prior to the D.C. Metro's fatal train collision of 2009, the NTSB implored Metro managers to replace the thirty year-old cars in its aging fleet with ones that could not be upended and crushed in a collision, but Metro determined that the accelerated fleet replacement was not cost effective.[174]

Rail safety regulators and operators would better protect the safety of the commuting public, as well as neighbors of heavily used rail lines, if they had to do more than simply acknowledge and then reject NTSB recommendations. Rail systems would take NTSB recommendations far more seriously if the rail systems subject to those recommendations and the regulatory agencies overseeing them had to perform and publish a cost-effectiveness analysis explaining in detail why they did or did not adopt an NTSB recommendation. Compulsory documentation of how the industry and its regulatory overseers valuated public safety and human life relative to the fiscal burdens of regulation could measurably enrich the discourse over what price we are willing to pay for the commuter systems we entrust with our lives.

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170 *Id.*

171 NTSB 2008 REPORT, *supra* note 1, at 63–64.

172 *See* DeBonis, *supra* note 127 (describing the technology that the NTSB previously suggested).

173 NTSB 2008 Report, *supra* note 1.

174 *See* DeBonis, *supra* note 127 (describing the technology that the NTSB previously suggested).

CONCLUSION

The interdependent systems approach complements traditional fault tree accident analyses, which focuses on technological breakdowns or human operator error by allowing for a broader and more systemic perspective on contributing causes of accidents. The interdependent systems approach links connections between accidents within particular regulatory and organizational regimes in a more thoughtful and networked approach than the traditional discrete, case-study approach now used by accident investigating agencies such as the NTSB.

While this approach is unlikely to find the operational level causes of a particular accident, it can help to identify similar causes of irregularly occurring accidents in a particular industrial system. Thus, while we focus on the federal railroad system, comparing accidents occurring over several decades, spanning several rule changes with freight and passenger trains, the approach could be applied to other regulated industries. The approach is particularly useful in high-hazard industries with low probabilities of failure because it views accidents that occur over blocks of time as bound by regulations and legal rule interpretations.

We have also shown that federal level, collective choice deregulation of the railroad industry led to ambiguous and diffuse regulatory authority—a contributing factor in the Metrolink disaster and other recent rail crashes. Ambiguous and diffused authority, combined with the 1995 passage of the "deregulatory" Interstate Commerce Commission Termination Act (ICCTA), eroded safety rules and practices within the industry, thereby increasing the probability of accidents such as the Metrolink tragedy.

Charles Perrow, the founder of the Normal Accident Theory approach to high-risk organizations, and Lee Clarke, a prominent accident theorist, recently argued that one way to reduce accidents is to change the law.[175] Perrow and Clarke, in a prescient June 2007 Huffington Post editorial entitled "The Next Railroad Catastrophe," may have gotten "the next catastrophe" wrong—they thought it would involve hazardous materials in a highly-populated area (one of the authors notes the slow moving benzene-laden trains that pass by a full capacity Tiger Stadium on the Louisiana State University campus on football Saturdays)—but they were right in noting that the preemption of state regulation and a lack of adequate federal regulation made the rail system unsafe.[176]

They argue that legislation is needed to address routes, tank car standards, to authorize independent track, switch and rail car inspections,

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175 *See generally* Charles Perrow & Lee Clarke, *The Next Railroad Catastrophe*, HUFFINGTON POST (June 20, 2007, 2:50 PM), http://www.huffingtonpost.com/charles-perrow-and-lee-clarke/the-next-railroad-catastr_b_53027.html.

176 *Id.*

to increase penalties for violations, and to make railroads accountable for damages.[177] The Metrolink disaster, of course, involved a missed red light signal and a passenger and a freight train ending up on the same section of track on a fatal collision course. However, one should shudder to think of what that disaster could have looked like if it had involved two freight trains carrying hazardous materials.

In addition to understanding the causes of, or vulnerabilities to, an accident in a particular system, the ISA approach may also provide greater insight into methods of regulation. For example, if, as we have shown, increasing deregulation leads to decreasing safety in the railway system, we may be able to link deregulation of the railroads to deregulation in other traditional, heavily-regulated industries. Perrow[178] and Egan[179] have recently noted that private power atop critical infrastructure services is a major public vulnerability, as the demands of safety are offset by the demands of ever-increasing quarterly profit efficiency.

Increased profits come from selling more goods more cheaply, and one of the easiest ways to reduce the cost of production is to externalize the costs of safety to the public by failing to take adequate levels of precaution.[180] In deregulated industries with low probabilities of accidents, where costs of precaution and accidents can be large, a major challenge for regulators is to identify whether safety practices meet the acceptable risk threshold. Positive train control technology has steep implementation costs, with estimates ranging from the public sector price tag of over $2 billion, to the Association of American Railroads' (the freight rail industry's lobbying organization) estimate of over $10 billion. Predictably, industry has attempted to demonstrate that positive train control technology would not provide enough social utility to justify the price.[181]

In practice, the utilization of the ISA approach could increase the effectiveness of oversight and safety boards such as the NTSB. The NTSB, as the primary investigator of transportation accidents across the country, attempts to find the root causes of particular accidents and, in so doing, to develop industry safety recommendations based on its findings.

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177 *Id.*

178 CHARLES PERROW, THE NEXT CATASTROPHE: REDUCING OUR VULNERABILITIES TO NATURAL, INDUSTRIAL, AND TERRORIST DISASTERS (2007).

179 *See* Matthew Jude Egan, *Anticipating Future Vulnerability: Increasingly Critical Infrastructure-like Systems*, 15 J. OF CONTINGENCIES AND CRISIS MGMT. 4 (2007).

180 *See* Lewis-Beck & Alford, *supra* note 147.

181 *See* John Dodge, *Positive Train Control Boosted by L.A. Collision*, DESIGN NEWS, Sept. 15, 2008, http://www.designnews.com/article/48173-Positive_Train_Control_Boosted_by_L_A_Train_Collision.php. Lewis-Beck and Alford cite several examples of "safety versus profit" in the coal mining industry as well. *See* Lewis-Beck & Alford, *supra* note 147.

The NTSB has created a variety of recommendations based on its findings, including those from seemingly disparate accidents.

The NTSB, however, suffers from the bifurcation of its own mission. It has complete discretion to investigate the causes of particular accidents. Over time, when similar kinds of accidents have repeatedly occurred, it may begin to formulate recommendations for proactive, systemic, collective choice, but only insofar as accident causes "make sense" to the regulators. Thus, to create safety policy recommendations to reduce future accidents, the NTSB must essentially reason from the particular to the general. This means that the agency's inherent focus is always on the last accident, rather than future systemic improvements in transport safety. Any attempts at systemic improvement become open to criticism from the industry. Accordingly, the NTSB's analysis tends to highlight the technological failures and human error as opposed to ineffectual regulatory regimes that practically invite accidents to happen.

The use of the ISA approach can provide insight into the ways in which legal and regulatory systems inadvertently court disaster, and ultimately, how systematic reform can reduce vulnerability in the future. Industries that have experienced recent catastrophic accidents—such as the petrochemical industry, commercial aviation, passenger rail, mining, and oil and gas extraction, and natural gas transmission—can use the ISA approach retroactively in case studies. And, the results of such retrospective analysis can then lend fresh vigor to calls for the prospective reform of safety practices in these critical infrastructure systems on which society's well-being depends.

Rather than passively waiting for negative events to focus the policy agenda, and thereby trigger reactive reforms that do not address the deeper systemic causes of accidents, an interdependent systems analysis can create an avenue for meaningful regulatory change and a safer environment for the rail-traveling public. Democracies are frequently criticized for doing a better job of cleaning up after the last disaster rather than preventing the next one. Perhaps the time has come for us to disprove this truism and to demonstrate that analysis involving foresight and precautionary regulation are indeed within our institutional capacity and our understanding of how government can best serve the common good.