



Information as Risk Regulation: Lessons from Experience

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Abstract

Since the mid-1980s a wide variety of federal and state laws in the United States have employed structured disclosure of factual information as a means of reducing risks to public health, safety or the environment. These disclosure systems aim to create new economic or political incentives for organizations to improve their products or practices. In effect, they harness the government's enduring authority to command the disclosure of previously private information to create a form of risk regulation. In the past, each of these disclosure systems has been viewed as unique. Each has been separately conceived as a novel response to a pressing problem. No central plan has informed their architecture or increasing popularity. Evidence from four such systems suggests, however, that they represent a cohesive innovation in public policy. They share core characteristics and common roots, display similar strengths and produce similar kinds of conflicts among widely shared values. As some approach maturity, it is also becoming clear that they share common problems. Political compromises can cripple effective design. Primitive metrics can distort incentives. Mismatches between the scope of requirements and the dimensions of risk can create unintended consequences. Adaptation to changes in technology or markets can be problematic. And communication problems can result in public confusion rather than enlightenment. Policy makers face challenges to learn from early experience in using this promising tool of risk regulation effectively in the future.

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At a time when distrust and downsizing of government are dominant themes, a significant policy innovation is gaining prominence. Its central feature is the mandatory disclosure of factual information by businesses or other organizations about their practices or product characteristics for the purpose of reducing risks to public health, safety or the environment. Disclosure as risk regulation is based on the premise that public access to such information will strengthen market incentives or political pressures for organizations to minimize such risks.¹

Reducing Medical Mistakes: In November 1999 the National Academy of Sciences alerted the American public to a set of newly perceived and serious risks. The Academy's Institute of Medicine reported that 44,000 to 98,000 people a year died in the United States as a result of medical mistakes -- more than the 43,458 killed in 1998 in traffic accidents, the 42,297 who died from breast cancer or the 16,516 who died from AIDS. The Institute's panel called for immediate national action to cut mistakes by at least 50 percent within five years. But instead of recommending strict new government rules or financial incentives, it proposed that Congress construct a new system of mandatory disclosure.² The public would be informed about serious errors systematically, incident by incident and hospital by hospital. Congress would require standardized data and reporting formats. Advances in information technology would help people compare hospitals and track improvements. Public pressure would provide new incentives to improve patient safety.³

Promoting Safe Drinking Water: In October 1999, as a result of a Congressional mandate intended to increase their vigilance, local water authorities revealed to the public for the first time the amounts of all detectable contaminants in drinking water. In 1993, cryptosporidium, a microbe found in animal waste, invaded the water supply of Milwaukee, Wisconsin. More than 400,000 people got sick, 4,400 went to the hospital

and more than 50 died. Scores of less serious incidents in the 1990s also shook the public's trust in the safety of local water supplies. In 1996, Congress required that the nation's 55,000 public water systems send their customers annual "consumer confidence reports" disclosing contaminants even in small amounts that did not violate any state or federal law.⁴

Producing Healthier Processed Foods: Responding to mounting evidence of links between diet and chronic diseases, Congress required in 1990 that food processors label packages with levels of fat, salt, sugar and other nutrients. New mandatory disclosure was intended to help shoppers make informed choices and create incentives for companies to market healthier products. Influential reports by the U.S. Surgeon General and the National Research Council in 1988 and 1989 linked over-consumption of fats to heart disease and cancer, recommended daily limits to fat consumption (30 percent of total calories for total fat; 10 percent for saturated fat) and called for better labeling.⁵ But a growing cacophony of health claims by makers of packaged foods made it increasingly difficult for shoppers to tell which products were relatively healthy. By 1989, a *Business Week* cover story concluded that "supermarket food aisles look like a modern medicine show."⁶ In addition to requiring companies to reveal amounts of nutrients in standardized labels and serving sizes, the Nutrition Labeling and Education Act restricted health claims to those backed by "significant scientific agreement" and required use of terms like "lite" and "low-fat" to conform to government definitions. Its framers hoped that the law would not only help consumers avoid over-consumption of fats, salt and sugar but also pressure food processors to increase the availability of authentically healthier foods.⁷

Cutting Toxic Pollution: A tragic release of deadly gases at a Union Carbide plant in Bhopal, India that killed more than 2,000 people on December 3, 1984 and a number of less serious chemical accidents in the United States in 1985 led Congress to require U.S. manufacturers to reveal to the public each year their toxic releases, factory by factory and chemical by chemical.⁸ A decade after that law was approved in 1986, the federal Environmental Protection Agency (EPA) concluded that such mandatory disclosure had helped encourage manufacturers to reduce releases of listed chemicals by nearly half. Federal officials called it one of the most effective environmental requirements ever.⁹ Indisputably, the new disclosure requirement inspired executives of some large

companies to promise huge voluntary cuts in toxic pollution. A prominent example: the day before manufacturers sent their first numbers to Washington in 1988, Richard J. Mahoney, then Chief Executive Officer of the Monsanto Corporation, announced in a memorandum to his managers that Monsanto would eliminate 90 percent of its toxic air pollution in less than five years.¹⁰

Disclosure Requirements as Responses to Other Risks: Since the mid-1980s, structured disclosure of factual information has been employed in a wide variety of policy contexts to reduce risks. Some further examples:

Hazards from Lead-Based Paint: After reports indicated that lead poisoning had harmed the health of as many as three million young children, Congress required in 1992 that homeowners and landlords disclose lead-based paint hazards when housing was sold or leased, in order to provide incentives for minimizing those health risks.¹¹

SUV Rollovers: In the summer of 2000, mounting evidence indicated that more than 100 people had died in auto accidents in the 1990s due to a combination of sudden tread separation on specific models of Firestone tires and an apparent tendency of Ford Explorers and some other sport utility vehicles to roll over. In response, the government expedited a new disclosure system featuring rollover ratings for each new model.

Food Safety: Growing public concern about food safety has led regulators to construct disclosure systems for *processes* by which food is produced as well as for its *contents*. In 2000, for example, the Department of Agriculture required standardized labeling of organically grown fruits and vegetables. Early in 2001, incidents in which genetically modified grain approved for animal consumption was inadvertently used in products for human consumption increased pressure in the United States for labeling all foods with ingredients derived from genetically modified organisms. (The European Union adopted such a labeling provision in 1997.)¹²

Other disclosure systems aim to improve working conditions, airline safety and the quality of health care. A federal hazard communication standard adopted in 1983, for instance, requires employers to disclose workplace hazards to employees. Efforts by the federal Department of Labor in the 1990s encouraged the apparel industry to disclose “sweatshop” conditions among suppliers.¹³ Another disclosure system requires that airlines disclose serious safety incidents and encourages confidential sharing of

information about near-misses. Proposals for a patient “bill of rights” would require new disclosures by health care plans to improve the quality of care.

Disclosure Requirements Tackle Discrimination and Campaign Financing: Beyond risk regulation, disclosure requirements have been enlisted to further national goals as diverse as reducing discrimination by race or sex and improving the fairness of elections. The Home Mortgage Disclosure Act requires banks, savings and loans and credit unions to disclose the geographical distribution of their loans and investments. Its purpose is to reduce “red-lining” and other forms of discrimination. Bills aimed at improving airline service by legislating a “passenger bill of rights” would grant public access to ticket-pricing practices and reasons for flight delays as a way of pressuring airlines into improving service. (Airlines are already required to reveal on-time records and baggage handling errors, now summarized on some ticket-purchase web sites.) And “de-regulate and disclose” is a shorthand description for one popular approach to campaign finance reform.

COMMON CHARACTERISTICS

These systems apply to the task of reducing health and safety risks some characteristics of structured disclosure long employed by the federal government to reduce financial risks. After the stock market crash of 1929 left millions of people holding worthless securities, newly elected president Franklin D. Roosevelt called on companies that sold securities to the public to disclose detailed information about their officers and financial practices in standardized form. In doing so, he drew on the ideas of Louis D. Brandeis who argued that “[p]ublicity is justly commended as a remedy for social and industrial diseases. Sunlight is said to be the best of disinfectants ...”¹⁴ The resulting Securities and Exchange Acts of 1933 and 1934 made disclosure of corporate information a cornerstone of national efforts to reduce financial risks. Seventy years later, that system of structured transparency is widely viewed as essential to investor confidence.¹⁵

Financial disclosure features five core elements that make it possible for investors to compare companies and track their performance over time.

- **Mandatory disclosure**
- **Standardized information**
- **Identification of companies**
- **Reporting at regular intervals**
- **A primary purpose of reducing risks**

Today's systems of social disclosure, unique in their architecture and targets, employ this same combination of characteristics to reduce risks to health and safety. Manufacturers required to disclose toxic chemicals are called on to use standardized formats, report discharges in total pounds for each calendar year and specify amounts for each chemical and each facility. Public water authorities required to notify customers about contaminants have to include information about specified microbes and chemicals and report annually. Food processors must use the now-familiar panel of "nutrition facts," standardize serving sizes and include percent daily values based on a 2,000 calorie diet. Under the Institute of Medicine's recommendations, hospitals and doctors would report medical mistakes that resulted in death or serious injury in standardized formats.¹⁶

This consistency of core elements suggests that disclosure requirements that address diverse risks represent variations on a single policy theme. To state it simply, all of these programs employ *the use of government authority to require the collection and disclosure of standardized information from identified businesses or other organizations at regular intervals for the purpose of reducing social risks.*

This combination of characteristics also distinguishes the collection and disclosure of private sector information as an instrument of risk regulation from traditional collection of information as an underpinning for government standards. Most major regulatory statutes call on businesses to report to the government about selected practices. The Clean Air Act requires businesses to sample emissions and submit compliance certifications, for example. The Federal Water Pollution Control Act requires self-monitoring of discharges and filing of monitoring reports. Under the terms of the federal Freedom of Information Act and the regulatory laws themselves, such information is available to the public unless it is protected as a trade secret or for some other specific reason. But in their purposes and terms, reporting requirements are designed to inform actions by *government* rather than actions by *members of public*.

They inform the framing and enforcement of government standards but are not intended to serve as independent regulatory instruments. As a result, making such reported information widely available is rarely a priority. Public access, provided by law, can be problematic in practice. Frequently data must be requested piece by piece, meaning that knowledge of its existence and location is needed. An unintended secrecy-by-bureaucracy has sometimes prevailed when records have been scattered among agency files.¹⁷

The central characteristics of today's systems of social disclosure also distinguish them from more traditional public warnings. Common law principles have long required sellers to tell buyers about hidden defects in products.¹⁸ In the 1960s and 1970s, the federal government required warning labels on cigarette packages, alcoholic beverages, food products that contained the sweetener saccharin and a variety of consumer products that posed risks to health or safety.¹⁹ Most were simple cautionary statements though some, such as those for prescription drugs, were more elaborate. Beginning in the mid-1980s, however, Congress created disclosure systems to inform rather than persuade. The idea was that ordinary citizens could compare the performance of companies or products and make their own judgments. By the 1990s such standardized disclosure of factual information from identified organizations had become a mainstream approach to improving public health and safety.²⁰

HOW DISCLOSURE WORKS

The central question of whether and how disclosure provides incentives to organizations to reduce risks is the subject of a second paper for the Innovations Program. It may be helpful, however, to establish here a framework for that discussion. Cass Sunstein of the University of Chicago has suggested that informational regulations influence corporate decisions through economic channels by fortifying market mechanisms and/or through political channels by providing checks on private behavior.²¹

Results from these four cases suggest three additional observations. First, disclosure produces such economic or political incentives through a variety of specific pathways. Structured information may alter markets by influencing choices by employees (including managers and directors), suppliers, corporate or individual customers, third

parties (people exposed to risk who have no contractual relationship with the company) or competitors. It may alter collective action by influencing voters, legislators, regulators, enforcement officials, courts or private groups that organize boycotts or take other direct action.²² Disclosure may also improve or diminish the ability of target organizations to influence such market responses or political actions.²³

Second, in practice there are probably few cases of requirements that create incentives that are purely economic or purely political. Debate about disclosure of medical mistakes focused on anticipated impacts on choices by patients and their employers (who influence patient choices). But hospitals were at least as concerned about increased liability. Initially, corporate executives made commitments to reduce newly disclosed toxic pollution because they feared negative responses from communities near their plants or anticipated legislative or regulatory action. But some executives were also concerned that the news might impair their ability to attract skilled workers and empirical studies suggest that investors also responded. Public and private drinking water authorities focused on customer responses to new information about contaminants but probably had more to gain or lose from responses by legislators and investors. Likewise, the framers of legislation for nutritional labeling expected it to influence companies mainly by changing shoppers' choices. But companies also feared lawsuits and further action by state legislators.

Third, the power of disclosure often derives from its influence on reputation. A firm's stature with employees, investors, customers and voters can affect both markets and collective action. For many organizations, reputation is both more volatile and more important today than it was in the past. In simpler times, of course, people judged the reputation of the corner market or neighborhood hardware store by the character of the owner with whom they did business regularly. Even 30 years ago, most people were reasonably familiar with the companies that provided them with goods and services. In today's economy, though, businesses form, merge, break apart and disappear at an astonishing rate and the Internet spreads previously local news of corporate good deeds and misdeeds to a worldwide audience instantaneously. Customers, who have more choice and less time, have to make quick judgments about unfamiliar companies. Skilled workers and investors face parallel challenges. Consumers organizing boycotts, zoning

officials approving expansion of businesses or voters concerned about corporate tax rates may also make judgments about health and safety risks created by companies based on their image. These days, reputation, always hard to gain, is often increasingly easy to lose.

COMMON ROOTS

Informational approaches to risk regulation are a product of expediency and frustration. No central plan has orchestrated their proliferation in recent years. But diverse mandates draw strength from a common set of values and societal trends.

Shoring Up Democratic Values

Regulation by disclosure is fortified by an association with widely shared values. At a time when public participation in government decisions about reducing risks is problematic, disclosure systems seem to offer the possibility of improving such involvement. At a time when organized and moneyed interests appear to have unusual influence, broader public access to information promises to return some important choices to ordinary citizens. Reliable information has long been taken to be a cornerstone of democratic governance. The Founders believed that an informed public would help to resist the forces of faction and mob rule that they feared. In the words of James Madison: "Knowledge will forever govern ignorance, and a people who means to be their own Governours, must arm themselves with the power which knowledge gives."²⁴

Furthering "Right to Know"

From these core values has grown an expanding notion of the public's "right to know." Demands by labor leaders in the 1960s and 1970s that employees be told about risks in the workplace led to the enactment of state and local "right to know" laws aimed at informing workers. Such laws provided a starting point for a step-by-step development of the idea of a community "right to know," a concept now embodied in a variety of federal and state laws. In general, these laws provide that information about company practices (as well as other data) held by government must be made accessible to the public unless compelling interests (protection of trade secrets, personal privacy, or national security, for example) call for secrecy.

Correcting Market Flaws

For markets to operate efficiently, all parties need reliable information. In practice, though, organizations that create health or safety risks are more likely to have access to data about their character and seriousness than are employees, investors or members of the public. Few consumers, employees or investors would take the time and effort to collect detailed information about such risks, even if it were possible. Gathering data can be costly and often is not profitable since anyone can gain the benefits of new information without diminishing its value. By requiring disclosure, government can take steps toward correcting this imbalance, encouraging informed choices and promoting market efficiency.²⁵

Measuring Performance

Regulation by disclosure also resonates with a current national priority of using performance measurements to assess the progress of public and private organizations. Such measurements are seen as a means of improving accountability. The rising popularity of mandated disclosure requirements reflects in part a perceived need to provide the public as well as experts with such quantitative measures of risks.²⁶

Minimizing Endemic Problems with Risk Regulation

For three decades, widely publicized instances of regulatory failure, increasingly unmanageable agency workloads, decreases in the federal grant funds and the growth of international commerce have highlighted limitations associated with the last generation of risk regulation. Such perceived limitations have sometimes overshadowed evidence of substantial strengths. Even the harshest critics agree that government rules and economic incentives have contributed to reducing some kinds of pollution, many hazards to workers' safety and most health risks associated with drinking water contamination. At the same time, though, the character of the public agenda has been changing. Policy makers now target some risks that are harder to address with uniform standards. New attention to health and safety problems that are locally unique or commercially variable has prompted a search for more flexible, de-centralized approaches to regulation.²⁷

Disclosure systems, seen as one such approach, are thought to further regulatory agendas while minimizing government intrusion into private affairs. They give

organizations broad choices not only about how and how much to change practices but also about *whether* to change them. They can also be harder to challenge in court than government standards and proponents often argue that they are self-enforcing.

Harnessing the Power of Computers and the Internet

Advances in computer power and the growth of the Internet also have increased pressures for systematic disclosure of private sector information. Beginning in the mid-1990s, federal and state agencies, as well as industry and advocacy groups, made increasing amounts of information about safety and health risks available via the Internet without waiting for requests. That trend has been strengthened by the Electronic Freedom of Information Act Amendments of 1996. Congress required federal agencies to establish "electronic reading rooms" containing all documents that "the agency determines have become or are likely to become the subject of subsequent requests."²⁸

Computer power and the Internet promote effective disclosure of complex information to a broad audience in 3 ways. First, they can provide easier, faster and more complete access to information that might influence economic choices or spur collective action. Second, they can create increased capability to integrate information from many sources to produce a more comprehensive picture of relative risks. And, because the Internet is interactive, it creates the potential for diverse users to customize information to serve their particular needs. Even now, anyone with access to the Internet can quickly survey toxic risks in their neighborhood, violations of labor laws by specific companies or safety records of specific airlines in as little or as much detail as they choose.

STRENGTHS AND WEAKNESSES OF DISCLOSURE AS REGULATION

At a time when the weaknesses of traditional regulation are receiving a great deal of public attention, these six trends make the government's use of disclosure to reduce risks a domain of potential strength. One can imagine a rosy future. In a few years, homebuyers might routinely rely on simple digital maps to pinpoint neighborhood sources of risk. Internet sites might post real-time information about levels of lead, arsenic and microbes in drinking water, color-coding health concerns for children, the elderly or people suffering from AIDS. Job hunters could be armed with comparisons of hazards at factories or offices, including risks posed by indoor air pollution, which

scientists consider a more serious health threat to most Americans than outdoor pollution. Shoppers might quickly compare the safety and reliability of toys or lawn mowers as well as their prices. People shopping on-line might choose to consider only items that met their personal health, safety or environmental criteria, which they could specify in computer settings. In groceries, familiar barcodes could link information about benefits of new disease-fighting foods with each customer's medical profile, displaying results on handheld devices. Optimistically, today's piecemeal disclosure requirements aimed at reducing risks might grow into a remarkable web of reliable information.

Early experience with disclosure systems to reduce medical mistakes, contaminants in drinking water, diet-related health risks and toxic pollution suggests that such optimism is premature, however. It points to the potential strengths of structured disclosure but also raises questions about the degree to which the political process can produce systems that make substantial contributions to reducing risks. Public access to information can clash with fundamental interests in protecting trade secrets, personal privacy or national security. Its broad appeal to liberals and conservatives can crumble when specific provisions threaten competitive advantage or increase the likelihood of lawsuits. And its architecture can be manipulated to serve narrow, short-term interests of specific groups rather than broad, enduring public interests. As a result, disclosure requirements have frequently emerged from the political process with features that distort incentives and impair their potential for improving health and safety. It remains to be seen whether better understanding of impacts and more attention to the design of specific systems will make it possible to benefit from potential strengths while minimizing weaknesses of this newly prominent tool of risk regulation.

Stalemate Over Disclosure of Medical Mistakes: When the Institute of Medicine called for cutting medical errors by at least 50 percent in five years in November 1999, support was immediate and bipartisan. President Bill Clinton endorsed the panel's recommendations, called for the establishment of a new federal office of patient safety and ordered government health agencies to meet the panel's ambitious goals. Three Senators announced that they would hold hearings. State officials called for an end to the culture of silence about mistakes. The private group that accredits the nation's hospitals, accused in the past of pro forma monitoring, announced that it would begin making

surprise inspections. Perhaps most important, executives of General Motors, General Electric and six other giant corporations announced that they would use such disclosure to steer their employees to the safest hospitals. As one executive put it at the time: "From an employer's perspective, this is a no-brainer. It saves money and employees get better." Within weeks of the initial report, an unprecedented national campaign to improve patient safety through disclosure appeared to be underway.²⁹

A year later, however, momentum for national action had splintered into ongoing battles among dueling interest groups. The American Medical Association, representing many of the nation's doctors, announced that it would oppose disclosure of the names of doctors who made serious mistakes. Such revelations might expose doctors and hospitals to lawsuits and wouldn't necessarily improve safety. Legislation introduced by several Republican Senators also called for keeping reporting confidential and protecting information about errors from discovery in lawsuits. Democrats countered by proposing that hospitals report medical errors as a condition of receiving Medicare reimbursement. Large employers, including the original eight that had announced they would integrate new information into their choices of health care providers, formed a coalition called the Leapfrog Group to lobby for disclosure. Interestingly, while most organizations representing health care providers opposed disclosure, those representing nurses supported the idea. They argued that their members had too often been blamed for errors that resulted from systematic problems. Faced with growing dissension and other pressing priorities, the 106th Congress adjourned without taking any action.

A Modest Beginning To Informing the Public about Contaminants in Drinking Water: In October 1999 most public water systems mailed to their customers the first "consumer confidence reports" as required by the 1996 amendments to the Safe Drinking Water Act. These notices provided new data on contaminants that did not violate current standards but might be of concern for children, the elderly or other members of the public. By requiring the mailing contaminant reports with water bills and placing many of them on the Internet, the government provided examples of innovative strategies to assure broad access.

But political compromises made in framing the law meant that most reports did not provide the public with means of comparing drinking-water systems, link amounts of

most contaminants to health risks or provide current information. Representative of state and local governments and water authorities had appealed to Congress for flexibility. They wanted to make their own choices about how information should be presented. In the past, they pointed out; federal authorities had been slow in correcting errors in databases and had imposed unreasonable requirements for monitoring contaminants. Also, talking about specific health risks might lead to public scares.

Heeding these arguments, Congress gave individual states much leeway in designing reports to the public. No national database was created. Reports did not have to link levels of most contaminants to information about risks. And no new monitoring was required. Reports could be based on whatever information was on hand, even if it was several years old.

As a result, reports were of limited use. By the time they reached the public, most estimates of contaminants were months and sometimes years old. That meant that people with weakened immune systems could not track current levels of contamination and make informed choices based on that information. Confronted with growing concern about the quality of the nation's drinking water, Congress had taken only a small step toward creating a national source of reliable data.

Limited Nutritional Labeling Outdistanced by Changes in Markets and

Technology: Nutritional labeling of processed foods was shepherded to approval by a surprising coalition of interests. Health officials and consumer groups had long argued for such a measure. In the late 1980s, however, they were joined by the food industry. As companies made increasingly bold health claims for their products in the 1980s, they faced an array of actions by state legislatures and courts. By the end of the decade, at least 65 labeling bills had been introduced in 22 states. Nine attorneys general and the Federal Trade Commission were investigating claims such as Campbell's that soup was "health insurance." As one *New York Times* reporter put it at the time: "What the companies are worried about is tough state laws. They prefer a weak federal law."³⁰

The new disclosure strategy that emerged had many strengths. For the first time, virtually all processed foods carried nutritional labels. Amounts and serving sizes were standardized and linked to recommended daily consumption. But political compromises created a disclosure system with a scope narrower than the dimensions of risk. For

example, restaurants, fast food operations and small businesses (less than \$500,000 in annual gross sales) avoided disclosure about nutrients at a time when people were spending nearly half of their weekly food dollar on meals eaten away from home. Consumer groups had also argued for a statement that “cholesterol-raising fat” was low, medium or high. But Congress settled for listing amounts of nutrients as percentages of recommended daily consumption.³¹ And, as products with government-mandated labels appeared on store shelves in 1994, little funding was available for the kind of public education that everyone agreed was needed. Most people did not know much about the significance of proteins or carbohydrates and had variable understanding about health risks associated with products high in fat, salt or sugar.

The law also was too narrowly framed to help consumers assess health risks and benefits when the market for dietary supplements, often added to foods, grew rapidly in the 1990s.³² Companies made extravagant claims that Echinacea-laced soups boosted immunity, snacks containing St. John's Wort improved mood and other herbs promoted memory enhancement or improved heart function. Often, these claims were backed by little or no science and were not accompanied by information about risks. Disclosure requirements also did not help shoppers evaluate new disease-fighting foods that companies began to bring to market in the late 1990s or prepare people for the edible vaccines or bioengineered food-medicines that companies were testing. Even incorporating new knowledge about conventional nutrients was slow. Broad scientific agreement about health risks associated with particularly unhealthy “trans fats” would not be reflected in food labels until at least 2002.³³

Flawed Disclosure of Toxic Pollution: Ten years after Congress required manufacturers to disclose their toxic releases, the federal officials who administered the program drew a remarkable conclusion. The Environmental Protection Agency declared that a simple disclosure system was considered "one of the most effective environmental programs ever legislated by Congress and administered by EPA." From 1988 to 1997, according to the government, facilities reduced total releases by 42.8 percent, from 3.40 billion pounds to 1.94 billion pounds, for chemicals reported in all years.³⁴

Whatever its specific contribution to that decrease, the requirement had demonstrated the potential power of disclosure in several ways. Unexpectedly high

national totals added momentum to efforts to adopt laws with stricter provisions for toxics, among them the Clean Air Act Amendments of 1990. Unexpectedly high local totals sparked unprecedented efforts by some managers to explain their toxic releases to surrounding communities. And as rankings of "top polluters" proliferated, some executives made remarkable efforts to get their companies off those lists.

At the same time, however, the effectiveness of this landmark disclosure program was systematically oversold. Congress had passed a law that left out most of the problem of toxic pollution and told the public nothing about risks. An initial promising proposal was reshaped by industry lobbying to produce a compromise that required disclosure of some toxins but ignored the largest sources of toxic pollution -- mobile sources (cars, trucks and buses) and small businesses.³⁵ Many major industrial sources were left out as well.³⁶ Furthermore, the law did not require factories to provide information about human exposure or chemical toxicity. Discharges were listed only in total pounds, as if all chemicals were equally hazardous, making it impossible for manufacturers or members of the public to judge risks. Such reporting also made the real scofflaws hard to identify. Big companies that worked hard to reduce pollution looked worse than smaller companies that made no such efforts. And if companies substituted chemicals that were not listed for ones that were, no one knew whether risks were reduced or increased. In addition, reporting was based on a variety of different estimating techniques. And the formidable challenge of assembling and integrating the annual data meant that information was more than a year out of date when it reached the public. The result was selective disclosure that created a distorted view of toxic pollution.

The claim that toxic releases of listed chemicals plummeted by nearly half in 10 years also masked more complex trends. Releases, a term invented by Congress to describe the portion of toxic waste discharged directly into the environment, did decline by a striking 42.8 percent from 1988 to 1997 – the figure so often quoted by politicians. But they decreased at a much slower rate in recent years than when the requirement was first adopted and in some categories increased substantially.³⁷ Total releases decreased 1.5 percent from 1995 to 1997. Releases from chemical manufacturing declined 5.8 percent whereas those from steel mills and other elements of the primary metals industry increased 22.9 percent. After plunging from 164.6 million pounds to 36.6 million pounds

from 1988 to 1995, on-site surface water discharges nearly doubled from 1995 to 1997 to 61.7 million pounds.³⁸ On-site land disposal increased nearly 10 percent from 304.1 million pounds in 1995 to 338.8 million pounds in 1997 and off-site disposal in landfills or surface impoundments increased by 22.2 million pounds to 232.6 million pounds in those years.³⁹ Total toxic waste related to production increased 8.3 percent from 1991 to 1997 while non-production (one-time or accidental) waste increased 59 percent, both in the context of a rapidly growing economy.⁴⁰

CHALLENGES

Distortions in the design of disclosure systems to reduce risks from medical mistakes, toxic releases, contaminants in drinking water and imbalanced diets did not eliminate the many positive aspects of their design. But in some respects each represented a missed opportunity. Politics weakened disclosure as an instrument of risk regulation and produced claims that systematically oversold its promise. Questions about the degree to which it is politically possible to maximize beneficial aspects of design while minimizing distortions remain important and unresolved. In that regard, designers of future disclosure strategies face a series of challenges.

Improving Primitive Metrics

The most formidable obstacle to effective use of disclosure as regulation is the current paucity of indicators of risks to health or safety that reflect broad consensus. The current metric for toxic pollution (total pounds of releases) fails to account for toxicity and exposure. But *any* measure of toxic risk today would be politically controversial and scientifically debatable. Giving people useful information about risks associated with contaminants in drinking water is similarly problematic. Disclosure of medical mistakes involves making difficult distinctions between unavoidable adverse events and preventable errors; it may also involve calibrating resulting risks that differ in kind (a poorly set fracture vs. misdiagnosis of appendicitis, for example) as well as in degree (a large overdose of medication vs. a small one). The system of metrics for nutritional labeling is more advanced. It links quantities of nutrients in thousands of different products to a single, widely-accepted scale of percent daily values appropriate to a 2000-calorie diet, all in a label that fits on a soup can. Another encouraging note: Even

sophisticated systems often begin with primitive metrics and only improve over many years or decades. When Congress adopted the Securities Act in 1933, no single set of accounting standards was widely accepted. According to Joel Seligman, an historian of securities regulation, until the 1970s and the creation of the Financial Accounting Standards Board firms' executives chose among a variety of alternative standards that left ample room for misleading the public.⁴¹

Defining the Role of Government

These four systems suggest a range of alternatives for government intervention in the design and enforcement of disclosure systems as well as in the collection, processing, dissemination and analysis of information. Whether government should provide ground rules and enforcement, leaving dissemination of information to private entities (as it does for financial disclosure, nutritional labeling and reports on contaminants in drinking water) or play a more active role in collection, dissemination and analysis (as it does for reports on toxic pollution and proposed disclosure of medical mistakes) will always depend heavily on situation-specific analysis of objectives, issues and existing institutions. But it is important to search for overarching principles as well. Whether wholly private systems of disclosure can be effective over time without any government requirements or enforcement is another question for further analysis. These four cases of legislated disclosure suggest that even government involvement cannot prevent distortions in formats and metrics when powerful interests have much to gain or lose.

Balancing Competing Values and Opposing Interests

Political controversies surrounding the design of disclosure systems suggest that their architecture also is influenced by clashes between values that promote public access and those that suggest keeping information confidential. In particular, enduring societal interests in safeguarding trade secrets, protecting personal privacy and maintaining national security can be compromised by granting public access to some information. To complicate matters, political debates frequently feature self-interested arguments framed in the context of one or more of these values. Computer power and the Internet, which have increased the potential impact of disclosure, have also exacerbated these controversies. However, few of these issues are truly new. Decades of law-making and interpretation by Congress, state legislatures, administrative agencies and the courts have

provided a great deal of guidance about appropriate lines between public access to information and needs for secrecy, albeit in other contexts. Such guidance can provide a valuable starting point for design of future disclosure systems.

Insulating Information from Politics

A related question is whether the integrity of mandated disclosure systems can and should be protected to some degree from political influence. The initial design of such systems, like that of other regulatory regimes, is necessarily a product of political compromise. However, public confidence in data depends on its perceived objectivity and reliability. It might be helpful to analyze institutional arrangements that have been regarded as successful (or unsuccessful) in protecting the integrity of other kinds of information products within a political framework and to consider the degree to which such arrangements might provide lessons for new systems of social disclosure. Data produced by the Census Bureau, Bureau of Labor Statistics and Securities and Exchange Commission, for example, have gained a considerable measure of public confidence.

Judging Cost-Effectiveness

In considering whether to construct a disclosure system, predicting its cost-effectiveness compared with other regulatory options presents particular difficulties. Such systems leave firms free to determine whether, when and how to take action, making both costs and benefits unusually hard to estimate. New information may influence corporate decisions through multiple channels (or not at all) and in ways that cannot be anticipated. Nonetheless, the need for some basis for choosing among regulatory tools (or combinations of tools) is unavoidable. Legislators have an obligation to conserve public and private resources and use them effectively, within political constraints. One initial observation: Any accounting of costs must include not only administrative costs to government and industry (estimates frequently debated by legislators in these four cases) but also estimates of costs to businesses of making changes in practices and products (rarely discussed in these cases).

Matching Disclosure to the Dimensions of Risk

The potential effectiveness of disclosure requirements, like that of other forms of regulation, can be impaired by a scope that is too narrow. If disclosure requirements are successful they create incentives for target organizations to reduce risks that are reported.

But such actions also result in an overall increase in hazards or channel too many resources to reducing relatively minor problems if disclosure is not matched to the dimensions of risk. For example, to assure quick approval by Congress, the assortment of toxic chemicals initially targeted for national disclosure was derived by combining two state lists, both compiled for state-specific purposes. Everyone agreed that many toxic chemicals were not included. That meant that manufacturers' substitutions of unlisted chemicals for those that were listed might increase real risks to the public instead of decreasing them. Early experience with disclosure requirements reinforces two familiar lessons. Distortions are a danger when regulations are directed at narrow slices of perceived risks. And designers of disclosure systems will increase chances of effectiveness by examining with care the context in which incentives will operate, searching in particular for possible unintended consequences.

Viewing Disclosure as a Continuum

Disclosure requirements that aim only to assign blame for misdeeds may miss opportunities for reducing future risks. The political momentum for new public access to private sector information often derives from perceptions of particular wrongs that need to be corrected, as it did in each of these cases. But a culture of blame may not serve lasting interests in risk reduction. The Institute of Medicine's careful recommendations on reducing medical mistakes draw an important distinction. When the main goal is accountability for past practices and the health or safety consequences have been serious, disclosure to the general public is appropriate. But when the goal is prevention of future risks and consequences so far have been minimal, disclosure to a narrower audience may be more effective. Properly structured, limited disclosure may encourage candor and a broad effort to reduce systematic problems. For minor medical errors and near-misses, for example, the Institute of Medicine recommended standardized disclosure among hospitals, analysts and independent monitors. Such tiers of disclosure may open possibilities for reducing risks that would be foreclosed by a choice between disclosure to the general public and inaction.

Adapting to Change

Disclosure systems, like other forms of regulation, can lock in incentives for action that become counter-productive as public priorities, scientific knowledge and

markets change. Labels on processed foods do not inform consumers about risks associated with the dietary supplements they may now contain or prepare them for the next step in biotechnology -- foods that function as medicines. Reports to the public about toxic releases do not include information about the *use* of such chemicals by manufacturers, a controversial addition that would serve the now-prevalent goal of pollution prevention. Such reports also have taken account only slowly of new knowledge about chemicals that accumulate in human tissue and about harmful effects of small quantities of lead and some other toxins. Confronting this problem, the Institute of Medicine recommends that analysis and feedback about how well a disclosure system is working must be considered an essential element, funded generously and used to promote adaptation to change.⁴²

Communicating to Promote Understanding

Effective communication can be complicated not only by political distortions, problems of effective access and variable motivation, but also by cognitive shortcuts that people use to understand risks and by self-serving interpretations by intermediary groups. Recent research by cognitive psychologists and economists suggests that people tend to overestimate rare but catastrophic risks and underestimate risks from frequent but less dramatic events. People also assign disproportionate importance to risks of events that are easily brought to mind, ignore evidence that contradicts current beliefs and tune out when confronted with information overload.⁴³ Growing understanding of cognitive distortions creates both a danger and an opportunity. Corporations, advocacy groups and politicians can use such understanding to manipulate newly disclosed information to suit their own purposes. But honest brokers can use it to improve communication.

CONCLUSIONS

A national learning process about the usefulness of disclosure strategies as instruments of risk regulation is underway. Several complex disclosure systems adopted since the mid-1980s are approaching maturity. They share important strengths and common roots that suggest they constitute a coherent and promising innovation in regulatory policy. However, mandatory disclosure can also clash with the protection of confidential business information, personal privacy and national security and it can

conflict with powerful interests. The result can be political stalemate or distortions in the architecture of disclosure systems that compromise their effectiveness.

A challenge for the future is to maximize the potential of such strategies while minimizing damaging distortions. In addition, designers of future systems face such formidable tasks as improving primitive metrics, deciding an appropriate role of government, protecting the integrity of information from political influence, estimating the cost-effectiveness of such requirements and designing them to adapt to changing science, technology and public priorities. These challenges are not unusual. In our system of government, regulatory innovations are inevitably incremental. Architects of informational approaches to reduce social risks can gain valuable insights from 70 years of evolution in the use of such approaches to reduce financial risks; efforts that were primitive at the outset but now are widely regarded as successful.

The growing prominence of mandatory disclosure as an instrument of risk regulation indicates that the political system is adapting to changing agendas and changing times. Without broad debate or central direction, the government's enduring authority to require the collection and dissemination of information from the private sector is taking a legitimate place beside its authority to set standards and re-distribute resources as a way of reducing some of the risks of modern life that the public fears most.

¹ Structured disclosure is also used to further a variety of other regulatory purposes. For overviews of informational regulation, see Sunstein, Cass R., "Informational Regulation and Informational Standing: Akins and Beyond," 147 U. Pa. L. Rev. 613 (January, 1999); Tietenberg, Tom, "Disclosure Strategies for Pollution Control," *Environment and Resource Economics*, Vol. 11, No. 3-4 (1998), pp. 587-602; and Magat, Wesley A. and W. Kip Viscusi, *Informational Approaches to Regulation* (MIT Press, 1992).

² In 2000, the Innovations in American Government Program recognized a new effort by the federal Veterans Administration to encourage adverse event reporting as a way of improving patient safety.

³ Institute of Medicine, *To Err Is Human: Building a Safer Health Care System* (National Academy Press, 1999) pp. 22-42.

⁴ Safe Drinking Water Act Amendments of 1996, 42 U.S.C. 300 et seq..

⁵ National Research Council, *Diet and Health* (National Academy Press, 1989) pp. 3-17; Surgeon General of the United States, *Nutrition and Health* (Government Printing Office, 1988) pp. 2-20.

⁶ Schiller, Zachary et al., "The Great American Health Pitch," *Business Week*, October 9, 1989, cover story, p. 119.

⁷ Nutrition Labeling and Education Act, 21 U.S.C. 301 et seq.

⁸ The Innovations in American Government program has recognized two creative efforts to extend the reach of this requirement as a mechanism to reduce toxic pollution. In 1999, the Innovations program

recognized a groundbreaking state system that is broader than the federal law: the Massachusetts Toxics Use Reduction Program. In 1997, the Innovations program recognized a federal program that challenged large companies to meet specific goals in voluntarily reducing toxic releases: The Environmental Protection Agency's 33/50 program.

⁹ 1997 Toxics Release Inventory (EPA, 1999) 1-5. (TRI information throughout this paper is taken from the 1997 report.) Two recent and provocative analyses of this disclosure requirement are Karkkainen, Bradley, "Information as Environmental Regulation: TRI and Performance Benchmarking, Precursor to a New Paradigm," 89 *Georgetown Law Journal* 257 (2001) and Pedersen, William F., "Regulation and Information Disclosure: Parallel Universe and Beyond," 25 *Harvard Environmental Law Review* (forthcoming, March 2001).

¹⁰ Mahoney, Richard J., "Monsanto Announces Program to Reduce Air Emissions By 90 Percent," *General Bulletin at Monsanto Company*, June 30, 1988.

¹¹ Residential Lead-Based Paint Hazard Reduction Act (1992), 42 U.S.C. 4852(d).

¹² The final rule for organic labeling ran 313 pages including accompanying explanations and had been debated for 10 years. The rule is published at 65 *Fed. Reg.* 80548 et seq. (December 21, 2000).

¹³ In 1996, the Innovations in American Government program recognized a novel effort by the federal Department of Labor to employ monitoring and public disclosure as means of combating "sweatshops" in the apparel industry.

¹⁴ Brandeis' essays in *Harper's Weekly* were collected and re-published in Brandeis, Louis D., *Other People's Money* (2nd ed. Frederick A. Stokes Company, 1932). The quote appears at p. 92.

¹⁵ Seligman, Joel, *The Transformation of Wall Street* (Northeastern University Press, 1995) pp. 39, 70-71.

¹⁶ For architectural features of disclosure requirements, see Appendix I.

¹⁷ Clean Air Act, 42 U.S.C. 7414; Federal Water Pollution Control Act, 33 U.S.C. 1318.

¹⁸ Restatement of Torts, Section 402.

¹⁹ See, for example, Comprehensive Smoking Education Act of 1984, 15 U.S.C. 1331-41 (warning labels for cigarettes) and 21 U.S.C. 343(o) (warnings labels for products containing saccharin).

²⁰ In addition to mandatory disclosure of private sector information, Congress created a variety of disclosure requirements to improve the performance of public agencies in reducing risks. The National Environmental Policy Act of 1969, for example, required federal agencies to disclose anticipated environmental impacts of their major actions in order to reduce environmental risks, 42 U.S.C. 4321-4370d.

²¹ Sunstein, Cass R., "Informational Regulation and Informational Standing: Akins and Beyond," 147 *U. Pa. L. Rev.* 613 (January, 1999) pp. 618-624.

²² Tom Tietenberg, an environmental economist at Colby College, suggests three economic channels through which disclosure might influence corporate action: product markets, capital markets and labor markets; and two political channels: legislative and judicial. Tietenberg, Tom, "Disclosure Strategies for Pollution Control," *Environmental and Resource Economics*, Vol. 11, No. 3-4 (1998), pp. 591-593.

²³ For example, Monsanto executives concluded in retrospect that the company's commitment to reduce toxic chemicals gained the company "a seat at the table" with regulators.

²⁴ These words are inscribed at the entrance of the Library of Congress in Washington, D.C..

²⁵ For a discussion of disclosure requirements in the context of market efficiency, see Tietenberg, Tom, "Disclosure Strategies for Pollution Control," *Environment and Resource Economics*, Vol. 11, No. 3-4 (1998) pp. 588-590.

²⁶ For an analysis of applying performance-based management to public efforts to improve environmental protection, see Metzenbaum, Shelley, *Making Measurement Matter*, Brookings Center for Public Management (October, 1998).

²⁷ For detailed discussions of these trends from different perspectives, see Sparrow, Malcolm, *The Regulatory Craft* (Westview Press, 2000); Howard, Philip, *The Death of Common Sense: How law is suffocating America* (Random House, 1994); and Osborne, David and Ted Gaebler, *Reinventing Government: How the entrepreneurial spirit is transforming the public sector* (Addison-Wesley, 1992) and Sabel, Charles, Archon Fung, and Bradley Karkkainen, *Beyond Backyard Environmentalism* (Beacon Press, 2000).

²⁸ Quoted from 5 U.S.C. 552(a)(2)(D).

²⁹ Sources for this account include *CQ Researcher*, "Medical Mistakes," February 25, 2000, pp. 139-160 and Kilborn, Peter T., "Ambitious Effort to Cut Mistakes in U.S. Hospitals," *The New York Times*, December 26, 1999, A1.

³⁰ Burros, Marian, "Push is On for Nutrition Labeling," *The New York Times*, March 8, 1989, C1.

³¹ Burros, Marian, "U.S., Ending Dispute, Decides What Food Labels Must Tell," *The New York Times*, December 3, 1992, A1.

³² Dietary supplements are products containing vitamins, minerals, herbs or other substances that are not themselves foods.

³³ For a further discussion of these issues, see Greenberg, David and Mary Graham, "Improving Communication about New Food Technologies," *Issues in Science and Technology*, Summer 2000, pp. 42-48.

³⁴ *1997 Toxics Release Inventory* (EPA, 1999) 1-7.

³⁵ In 1998, EPA reported that 41 percent of air toxics derived from "mobile sources," 35 percent derived from small businesses and other diffuse sources and 24 percent derived from manufacturers and on major sources, EPA, *Taking Toxics Out of the Air* (EPA, 1998) p.3.

³⁶ The list of chemicals required to be disclosed was a combination of lists from New Jersey and Maryland, each compiled for state-specific purposes.

³⁷ The term release, however, does not tell people much that is useful. It includes a multitude of events, each of which has different implications for human health and the environment. Events include release of chemicals directly into air or water, disposal in landfills, injection into underground wells, or storage. They include emissions from smokestacks and drainpipes as well as fugitive air emissions and run-off into lakes and streams. They include routine releases but also accidental spills or leaks. They include events that occur at the plant site or "off-site releases," meaning toxic waste that is shipped elsewhere for disposal.

³⁸ *1997 Toxics Release Inventory* (EPA, 1999) 3-14-15.

³⁹ *1989 Toxics Release Inventory* (EPA, 1991) 1-5; *1997 Toxics Release Inventory* (EPA, 1999) 4-14-16.

Most waste is recycled, recovered for energy, or treated either at the plant site or elsewhere. In 1997, total releases of toxic waste amounted to 2.6 billion pounds. By contrast, 22.2 billion pounds of such waste were recycled, recovered for energy, or otherwise treated by manufacturers. The extent and efficiency of such recycling or recovery varies, of course, not only with chemical characteristics but with changes in markets and technology.

⁴⁰ *1997 Toxics Release Inventory* (EPA, 1999) 2-52; 3-21; 4-20-22 and Table 3-6. Growth in toxic waste is measured by EPA for a group of core chemicals for which accurate comparisons can be made. From 1991 to 1997 production from manufacturing as a whole increased 32.0 percent. Ibid. 4-21-23.

⁴¹ Seligman, Joel, *The Transformation of Wall Street* (Northeastern University Press, 1995) pp. 48-49, 197-201, 551-554.

⁴² Institute of Medicine, *To Err Is Human: Building a Safer Health Care System* (National Academy Press, 1999) pp. 67-68, 156-7.

⁴³ For detailed discussion of these issues, see Breyer, Stephen, *Breaking the Vicious Circle: Toward Effective Risk Regulation* (Harvard University Press, 1993) pp. 33-38; Kahneman, Daniel, Paul Slovic & Amos Tversky, *Judgment Under Uncertainty: Heuristics and Biases* (Cambridge University Press, 1982) pp. 7-11; Magat, Wesley A. and W. Kip Viscusi, *Informational Approaches to Regulation* (MIT Press, 1992) pp. 1-17; Zeckhauser, Richard J., Ralph L. Keeney, and James K. Sebenius, *Wise Choices: Decisions, Games and Negotiations* (Harvard Business School Press, 1996).