

DESIGNING SAFER PRODUCTS: CORPORATE RESPONSES
TO PRODUCT LIABILITY LAW AND REGULATION

George Eads and Peter Reuter

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PREFACE

This paper appeared in the Journal of Products Liability, Vol. 7, 1985. Excerpted from a larger study with the same title, the paper analyzes how manufacturers have responded to various sources of pressure to produce safe products. We offer this reprint in an effort to make the results of the study more accessible. The full report, R-3022-ICJ, is available from the Institute for Civil Justice.

Designing Safer Products: Corporate Responses to Product Liability Law and Regulation

**George Eads
Peter Reuter**

For at least 15 years, the safety of consumer products has been a national issue in the United States. The belief that too many unsafe products were entering the marketplace led to extensive programs of product safety regulation. Even earlier, courts were making it easier for injured consumers to bring suits against manufacturers whose products injured them. Manufacturers now claim that the burden placed on them to ensure the safety of their products and to compensate injured consumers have become excessive. They want the activities of the federal agencies regulating product safety scaled down and the liability rules developed by the courts clarified and narrowed.

Data do not exist to permit judgment of the reasonableness of the current system. It is not possible to measure the improvement, if any, in the level of safety of consumer goods that has resulted from changes in regulation and law. Neither is it possible to measure directly the burden placed on manufacturers.

In this study, which focuses on product design issues, we seek to contribute to the debate on the efficacy of recent product safety developments by analyzing the ways in which firms have responded to various sources of pressure to produce safe products. We believe that we can also shed light on the relationship among changes in law, regulation, and the marketplace. These elements of the corporate environment have generally been analyzed separately, though they have potentially important interactions.

Large manufacturers, the population that we studied, responded visibly to the increased pressure for producing safer products. Most such firms have set up corporate-level product safety offices, few of which existed prior to 1970. These offices provided the focus for this study.

We interviewed corporate product safety officials in nine large manufacturing concerns, as well as a number of professionals involved in product safety matters in insurance companies and other settings. These lengthy and open-ended interviews provided a great deal of detail on the role of the product safety office. All of the manufacturing firms were among those generally recognized as leaders in the safety field; our intention was not to

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describe how firms generally behaved but how innovative corporations responded to changes in their environment.

I. The Pressures

There are numerous pressures on manufacturers to ensure the safety of their products. Injured customers may file claims against the manufacturer; failure to settle those claims to the satisfaction of the customer may engender a lawsuit. Through settlement or suit, the injury will impose costs on the manufacturer.

Over the past two decades, the courts have greatly eased the burden on the injured consumer in gaining a judgment against the producer. Under the doctrine of strict liability for the producer, the injured party need show only that the product is "unreasonably dangerous." This supplants the previously applicable negligence doctrine, in which the plaintiff had faced the greater burden of showing that the manufacturer's conduct was negligent. This change in law has occurred at the state level, mostly through judicial rather than legislative action, and states differ significantly in the standard that they impose on the manufacturer.

The insurance industry serves an important function in transmitting the product liability signal to manufacturers. By setting rates that reflect the true risks associated with the products produced by each manufacturer and by aggregating information about what design and manufacturing practices affect safety, insurers can convey the signal accurately. As product liability has become a more significant cost to firms, insurance companies have become more concerned about their ability to perform these functions. Formerly product liability insurance coverage was not, in general, singled out from other risks which the insurer offered to cover at the same time.

Federal regulatory agencies have also acquired increased control over product safety during the past 15 years. Two major new agencies have been established, the National Highway Traffic Safety Administration (NHTSA) and the Consumer Product Safety Commission (CPSC). Older agencies, such as the Food and Drug Administration (FDA), have acquired increased responsibilities. These agencies intervene at various points in the product development process, as well as collect, analyze, and disseminate safety information.

Even in the absence of regulation and a product liability doctrine that permits injured consumers to make claims against producers, there would be a pressure for firms to ensure the safety of their products. Consumer choices among producers and products is affected by the known safety of individual products. The more consumers know about safety, the better the market incentives work.

These pressures interact. If a regulatory agency orders the recall of a product, product liability suits are likely to follow and the reputation of the producer and hence his market share will suffer. Similarly, product liability suits, some of which receive considerable publicity, may trigger regulatory intervention and cause a producer to lose market share.

The Role Of Organization In Ensuring Greater Attention To Safety

Even without formal attention, safety considerations will play a significant role in the product design process. The "culture" of the designer and engineer assures that they do. Traditional concepts such as the margin of safety are consciously or unconsciously incorporated in decisions concerning the strength of materials to use and even the choice of specific materials. Indeed, some engineers argue that the culture of their profession ensures that safety receives appropriate weight in design decisions and that further efforts are at best superfluous and at worst counterproductive.

The baseline against which the efficacy of formal organizational efforts within the firm focusing on safety must be measured, therefore, is not zero. Instead, such efforts must demonstrate that they can effectively *strengthen* an already existing concern for safety, reveal safety-related trade-offs that otherwise might not be noticed, and influence the resolution of these trade-offs in the direction of safety.

Means of achieving these safety goals—at least partially—can be introduced into existing design practice with little or no organizational change. Although most engineering students even today apparently receive little or no training in hazard identification and analysis, handbooks exist to provide this knowledge.¹ These same handbooks show how safety issues can be incorporated into existing design reviews.

Nevertheless, the authors of these handbooks—and, indeed, all safety professionals whose works we read or to whom we talked—conclude that more is required. Specifically, they stress the importance of having some organization within the firm specifically devoted to safety issues. It is not that they consider improved knowledge and responsibility on the part of the individual design engineer and design decisionmaker to be unimportant. Rather, they argue that, without a formal organization, this improved knowledge will not be appropriately used and the proper amount of safety information will not be generated.

The Need for Organization

The argument of these authors rests on three premises: the complexity of most current products, the subtlety of the hazards that can be generated

1. Kolb and Ross is one such source; Hammer (1980) is another.

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during product use, and the conflicts generated by the multidivisional organization of most manufacturing organizations.

Product Complexity. Products today are made of exotic materials, incorporate complex and sensitive control devices, and must sometimes operate in extremely hostile environments. Often they are built up from subsystems that are themselves extremely complex products; the modern automobile is a prime example. They must be capable of being packaged in containers that serve multiple objectives: protecting the product during shipment, storing the product often over an extended period, and, ultimately, attracting the consumer to the product. It is not enough that each individual element of the design is safe; all of the components and packaging together must be safe—that is, they must not interact in complex ways to generate hazards where none were apparent.

Two examples from our fieldwork serve to illustrate this point. A major appliance manufacturer was redesigning its top-of-the-line version of a particular product to incorporate electronic controls. During this redesign, certain changes were made that, despite the manufacturer's strict design review procedures, in service produced a potential electrical shock hazard. The manufacturer fortunately discovered the potential hazard before any injuries had actually occurred, and recalled the product.

The second example concerns a manufacturer of consumer durables who also had a strict program of safety design review. In this case, the method in which the product was inserted into its shipping container created a potential hazard. Again, the hazard did not turn up during normal review and did not result from either the product or the packaging but from their interaction.

Hazard Subtlety. The problems created by growing product complexity are magnified by changes in consumer use that generate subtle but potentially dangerous hazards. Today, many consumer products are sold by mass merchandisers whose salesmen are not familiar with the product and its intended uses. Some consumers also use products for novel (and unintended) purposes. But even where products are used as intended, the growing knowledge of how product design features can create an unsafe condition that overwhelms the ability of the user to cope with it—or, worse, creates cues that lead to the reverse of the proper response²—suggests the importance of formal identification and analysis of hazards.

2. Classic examples of this occur in aircraft accidents in which pilots act in ways that seem rational, yet thereby contribute to the accident. These accidents were attributed to pilot error until the interaction between pilot and aircraft were recognized. The pilot was receiving too much information from the vast array of instruments in the cockpit; unable to process it all in an instant, he sometimes made the wrong decision.

Organizational Pressures. In the early part of the century, several rapidly growing manufacturing firms faced a major management problem. They were becoming so large that it was impossible for the chief executive officer, or even a small group of executive officers, to oversee all aspects of the firm's operation. To try to do this diverted management from the task of guiding the firm's strategic destiny. Yet, the firm would not manage itself.³

To solve the problem, large firms adopted a multidivisional form of corporate organization. Under this structure, operating units were grouped into divisions and given substantial autonomy in controlling their day-to-day affairs. Performance was monitored through financial controls based on a relatively small set of indicators, including return on investment, market share, and growth of sales.

Critical strategic issues were transmitted upward through the firm's structure, often being examined at different levels. By the time decisions reached the apex of the organization, many of the subsidiary issues connected with them ought to have been dealt with. Only the most difficult or controversial decisions were to remain for top management.

As we noted earlier, product introduction decisions are among the most important strategic decisions that management must make. Since the existence of a substantial safety risk in a product being considered for introduction is certainly a factor that would bear heavily on the product's likely profitability, it seems reasonable to expect either that all such hazards will have been detected and corrected before the product is presented to top management for a go-ahead decision or that any unresolved safety issues will be brought to management's attention as part of the decision.

In practice, this is not so. The structure that is set up to insulate top management from minor details may work to prevent it from learning about safety problems.

Few, if any, managements of large industrial enterprises would knowingly introduce an unreasonably dangerous product into the marketplace.⁴ The question, therefore, is whether subordinate parts of the organization, operating semiautonomously under the influence of limited financial controls, can be trusted to surface and satisfactorily resolve all significant safety hazards without specific oversight to ensure that they do.

Consider, first, the number of individuals and units that must work together to design a product and ready it for production. As the description

3. On the evolution of management in large corporations, see Chandler (1962).

4. It has been alleged that Johns-Manville, the major producer of asbestos products, was aware of the health hazards associated with its products and suppressed the relevant data. For a summary of the issue, concluding that Johns-Manville did not act improperly, see Epstein (1982, pp. 18-19).

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earlier in the section indicates, these individuals and units are spread throughout the firm—some in operating divisions, some at group level, some in corporate staff functions. Although a product manager or product champion is sometimes appointed to see that these diverse individuals and units from various parts of the organization work together effectively, complex or subtle problems may nevertheless receive inadequate attention, especially if no one has been assigned responsibility for their resolution.

Furthermore, one of the greatest pressures during design and tooling is to get the product ready. As Mansfield's (1971, p. 116) data indicate, 1½ years typically elapse between the start of applied research and the beginning of marketing. In many cases, the time is much longer. During this entire pre-introduction period, the product development process drains the firm's earnings.

Actions that either add to direct cost or require additional time increase the probability that the product will fail to earn its required return in the marketplace. Especially if there is an attitude that safety problems are being handled by "someone" and that safety is not a problem as long as competent engineers are involved, there is likely to be resistance to taking the time and resources required first to surface subtle or complex hazards and then to redesign and retest to assure that they have been properly dealt with.

The Benefits of Good Organization

Product safety organizations can (and often do) exist at several levels within the organization. In this discussion, we concentrate on what seem to us to be the most important locations: the division level and the corporate level.⁵

The Divisional Product Safety Organization. The prime responsibility for actively ensuring that safety factors are adequately considered rests with the division producing the product. Even if the idea for the product originates outside the division (in the corporate R&D laboratory, for example) and even if certain of the marketing and engineering responsibility is at corporate or group level, the division performs the bulk of the actual detailed design work required to prepare the product for manufacture.

The interaction of such things as manufacturability, quality control, and packaging can be perceived at the division level. The division is most likely to know about the product's underlying technology and conditions of use. Finally, the division's financial performance is likely to be most directly affected by the failure to adequately deal with safety issues during the design

5. The intermediate (or group) level in most large corporations generally plays a minor role in safety matters. The reasons for this are discussed in Section III.

phase. It will typically bear the cost of any necessary recalls, of warranty work, and, possibly, of product liability claims and suits.

A division may assign an individual the responsibility for overseeing its safety activities. This individual makes certain that engineers in the division know and use appropriate techniques to identify, evaluate, and deal effectively with hazards. The safety officer may generate checklists incorporating safety issues to be used in design reviews, see that these checklists are used, and participate in design reviews. He may provide information on how to resolve difficult safety issues and on the implications of current law and regulations. Within limits (as discussed below), divisional product safety officers may help individual engineers deal with the conflicting pressures of product safety, on the one hand, and the rush to get the product to market within the anticipated budget, on the other.

The Corporate Product Safety Organization. While the divisional product safety organization probably will have the primary operational responsibility for assuring adequate attention to product safety in individual cases, all commentators agree that the corporate-level function plays a critical role in the firm's overall safety effort.⁶ In a large company, however, the corporate-level product safety manager cannot, because of time constraints, participate in all product safety decisions. Even if "hands-on" responsibility were possible, the involvement of a corporate-level staff member in operational issues at the divisional level violates the principle of divisional autonomy. How is this dilemma resolved?

In *The Structuring of Organizations*, Mintzberg discusses the difficulty of linking diverse and normally autonomous parts of complex organizations so that they can focus on a particular objective. He terms organizational structures aimed at this goal *liaison devices* and divides these into three levels: liaison positions, task forces and standing committees, and integrating managers. These three levels correspond to the formality of control desired and the permanence of the problem being dealt with.

We believe that the corporate-level product safety activity is best seen as a liaison device. Organizations structure their corporate-level activities at different points along the spectrum of liaison devices, depending upon their management philosophy, the perceived criticality of their product safety problem, and the nature of their business. All such units, however, seem to fall into the category of liaison devices.

A description of the functions that corporate-level product safety units

6. "The statement of [safety] policy should . . . come from a high level in management. Separate policies for design, production, and marketing simply will not do. These groups are, to some extent, mutually antagonistic in their immediate goals" (Kolb and Ross, 1980, p. 73).

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may perform illustrates their liaison role. First, corporate-level units, like divisional units, may educate. They may organize training for managers and engineers to acquaint them with new techniques for hazard identification and hazard elimination. They may inform managers and engineers of legal and regulatory developments and even conduct mock trials to show engineers the type of issues that arise in actual product liability cases. This could help to sensitize these engineers to what may be expected of their designs when the products enter the marketplace.

The safety units may inform each part of the organization about the safety activities of the other parts. In large corporations, where divisions are often geographically separated, this intrafirm diffusion of knowledge may be important. It is one thing for someone to know what a textbook says can be done to identify and eliminate hazards; it is quite another thing to be shown that someone else in the company has put such theory into practice.

Second, corporate-level product safety officials may perform the task of auditing, i.e., ascertaining that division officials are conforming to the corporation's policies. We noted earlier that divisional product safety officials can develop checklists, make sure that they are used, and even sit in on design reviews. Checklists can—and perhaps for legal reasons should—be developed at the corporate level.⁷ It is probably not practical, however, for the corporate-level product safety officer to participate in design reviews for all new products.⁸ Some sort of auditing function seems essential.

Third, corporate-level product safety organizations may transmit and reinforce top management's commitment to product safety. All commentators underscore the importance of top management's commitment to the success of a firm's product safety program. Among the things universally recommended is a formal corporate policy statement on safety. But these same commentators emphasize the uselessness of such statements and other professions of commitment if they are not followed up effectively.

The corporate-level product safety activity may be the principal channel for following up the firm's commitment to safety. If top management supports the implementation of recommendations by corporate-level product safety officers in the field, this provides a strong signal of the seriousness of management's commitment to product safety. If the corporate product safety officer can introduce indicators of safety performance into the measures used to judge the performance of operating divisions so that the consequences of

7. The corporate product safety officer should at least see that checklists developed and used by divisions do not differ significantly and that divisions do not differ inappropriately in the degree to which such checklists—and other safety techniques—are used.

8. We encountered one case in which he attended at least the final design reviews.

poor safety performance are reflected in the division's profitability (and division executives' bonuses), this also sends a signal.

Finally, the corporate-level product safety officer can act as a court of appeals when a safety issue arises. We noted above that divisional product safety officers may help to overcome organizational pressures to slight safety considerations in the interest of saving money or time during the design phase. A corporate-level safety officer who stands ready to back up division-level safety decisions or, if necessary, to carry them directly to the highest levels of the company may be an important factor in assuring adequate consideration of safety. A corporate product safety officer who cannot do these things sends the opposite signal.

Flores (1982) stresses the importance of the corporation's cultural setting as a factor in ensuring adequate attention of lower-level design engineers to safety issues. He notes that because engineering schools give inadequate safety training even today, young engineers must learn safety techniques primarily in the corporation. Furthermore, the general attitude toward safety, of which the firm's formal safety program is an important part, critically influences how seriously individual design engineers view safety problems.

The corporate-level product safety activity, through its access to top management as well as to the divisions, may well be a central factor in setting this atmosphere of safety in the firm.

The Potential For Conflicting Product Safety Goals

Thus far in this section we have not taken explicit account of the various external social pressures affecting firms' decisions regarding product design. We have discussed whether, owing to the organizational complexity of the modern multidivisional corporation, the technical complexity of the products it produces, and the subtlety of the hazards these products can sometimes generate in the hands of users, there might be an argument for creating somewhere within the firm a unit (or units) whose principal task is focusing on product safety issues. We have left unstated the underlying motivation. It could be short-run profitability, effective management control, or the production of quality products. It doesn't really matter. We have argued that such a unit (or units) could indeed play a useful role in assuring adequate attention to product safety issues.

We noted earlier that the number and kind of social pressures on the firm to improve its product safety performance have been growing over the past decade or so. These pressures often have implications for the firm's profitability. Therefore, they may be expected to reinforce tendencies on the part of firms to adopt organizational responses as a partial cure for their product safety problems.

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Here, we examine whether certain of these pressures—specifically the growing volume and expense of product liability litigation and the need to represent the firm's interests effectively before various federal regulatory bodies—might not create their own independent pressures to establish within the firm organizations with potentially conflicting safety policy goals. We argue that they do and, indeed, that there is some logic in combining these duties with the sort of "operational" duties we described earlier in this section. However, doing so may produce conflicts.

At least in principle, the organizational arrangement that best defends the firm against product liability claims and suits or provides the most effective regulatory liaison may differ from the organizational arrangement that best reinforces the incentives of those involved in product design to direct adequate attention to issues of product safety. We describe what some of these conflicts might be, setting the stage for our analysis of our own interviews in Section III.⁹

Improving the Firm's Ability to Defend Itself against Product Liability Claims and Suits

An organized product safety effort may improve a firm's defense posture in several ways. A product safety unit may be assigned the task of processing and settling product liability claims and tracking product liability litigation in which the firm is involved.

Units at the division level (or below) may be expected to know especially about individual products against which claims or suits have been filed—how the products were designed, tested, and manufactured; how they should or should not be used; the characteristics of users, etc. The participation of these units in the early stages of product development, their closeness organizationally to individual design engineers, and the probable training of these participants all assure their ability to deal effectively with a flow of claims against a single product.

Where liability suits involve many different products, a corporate-level product safety unit can serve as an aggregator of corporate experiences in dealing with product liability issues. Such units can help divisions faced with claims but lacking experience in their handling and tap the services of staff units—the legal department, corporate research and development, etc.

An organized product safety unit may also bolster a firm's defense posture by ensuring that the firm's own standards and procedures are being

9. Analysis of published survey data is presented in Eads and Reuter (1983, Section IV).

followed. Nothing weakens a firm's legal defense faster than the revelation that such a slipup has occurred.¹⁰ For this reason, product safety units, especially at the higher levels of an organization, are often assigned auditing functions.

To be sure, an effective product safety audit procedure can serve objectives other than merely enhancing the firm's legal defense. As we have already noted, firms that lay great stress on modifying their design procedures to assure product safety should be expected to employ audits as a tool. But audits differ, and some might be more defense-oriented than others. An audit may be designed primarily to ascertain that specific procedures have been followed and that required documentation exists (or does not exist if not required)—a defense orientation. Or, an audit may be designed to examine whether safety-related decisions were reasonable, regardless of the specific procedure followed—a more operational orientation.

Finally, a safety unit can improve a firm's defense posture by investigating product safety failures. Many observers stress the importance of an active investigation effort to defend against fraudulent or inflated claims, and stories are common of allegations that, upon investigation, proved unfounded.¹¹

This activity, too, may contribute to an operationally oriented product safety program, but it need not. A clue to the firm's principal interest in accident investigation may be whether it had formal procedures to feed such information back to its design activities, or whether it employed such information solely for litigation purposes. If the firm employed its own engineering personnel to conduct investigations, rather than contracting such work to outsiders, this also might be a sign that the accident investigation function had an operational as well as a legal orientation.

The operational and legal objectives of a firm's product safety activities may therefore conflict. Given current legal incentives, such conflict is all but unavoidable. The operational objective requires increased formalization and documentation of design-related decisions; it requires the disclosure and satisfactory resolution of difficult safety-related trade-offs. These requirements may endanger the legal objective. As one pair of commentators noted, "the manufacturer's records are often a two-edged sword that can be turned against the manufacturer to establish liability on the manufacturer's part" (Williams and Spoto, 1980, p. 712). Subsequent sections will discuss how companies resolve this difficult dilemma and the role that liability laws play in helping to enhance or reduce conflict between these two objectives.

10. We cannot cite cases precisely because the manufacturer will rarely contest, let alone appeal, such a case.

11. See, for example, Nelson (1980, pp. 614-616).

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Representing the Firm's Interests before Federal Regulatory Bodies

Dealing with the regulatory agencies—learning about their proposed activities, developing company responses, ensuring the implementation of regulatory requirements, and, inevitably, keeping regulatory records—is an important function of many product safety units. To a degree, this liaison serves a purpose akin to that of the legal function—it is defensive, although in another arena. But more than “damage limitation” may be involved, especially for the company that structures its product safety program appropriately.

The activities of federal regulatory agencies extend far beyond their primary rule-making function. Many such agencies collect and disseminate important information on the characteristics of product-related accidents. Given potential problems of competition and litigation, the manufacturers often do not themselves collect and exchange detailed data on product performance.

Federal regulatory agencies such as CPSC and NHTSA also have the power to force manufacturers to recall products that they (the agencies) deem defective. The exercise of this authority sometimes seems—and, indeed, may be—highly arbitrary. However, the requirement that firms be able to locate and notify their customers of potentially serious product defects and to refund the customers' money or repair or replace the product reinforces manufacturers' incentives to monitor the performance of their products in the field.

This requirement regarding product defects may cut two ways. The law requires firms to inform the government of a potential defect as soon as it is discovered. However, determining whether a particular incident can be linked to a pattern of similar incidents, thereby creating the presumption of a defect, sometimes requires considerable investigation. Fearful of an arbitrary response, the firm may be reluctant to inform the agency before it has completed its investigation. A firm may deliberately distance its accident investigation function from the individual responsible for regulatory liaison. In an effort to counteract this trend, agencies have been broadening the definition of “responsible individual” for purposes of defect reporting.

The Consumer Product Safety Act also requires the maintenance of records to ensure that firms are complying with its provisions and grants the CPSC access to these records. This requirement may encourage formalization and documentation of design-related decisions, or it may be seen as enhancing the danger to the firm's defense posture posed by potentially incriminating “paper trails.” Much depends on how the commission chooses to exercise its powers in this regard and on how a firm's product safety managers choose to interpret the requirement.

Federally established standards play a mixed role in product safety activities. Although they provide goals for the firm, meeting them has provided little or no protection in a product liability suit, while failing to meet them, even if they make little sense, has been treated as prima facie evidence of liability.¹²

The regulatory liaison function of product safety units may therefore also conflict to some degree with the operational requirements for improved product safety. Whether such a potential conflict turns out to be serious in practice, and how government agencies and firms themselves might act to reduce it if it is, are subjects to which we shall return.

Product Safety as a Multiple-Objective Activity

The formal product safety activities of an individual corporation, as we have seen, serve multiple objectives. They may attempt to improve the quality of design decisions by helping to surface important safety-related trade-offs, establishing design audit procedures and then ensuring the substantive use of these procedures, and transmitting the message that product safety matters throughout the organization. They may also coordinate the firm's product liability defense efforts. Finally, they may play an important regulatory liaison role.

As we have also seen, effective regulatory liaison or product liability defense may conflict with making the operational changes required to improve design practices. Furthermore, the nature of the particular product safety problems that a firm faces—including whether product safety became an issue within the firm because of an important lawsuit that the firm lost, a clash with a federal regulatory body, or a decision by a high-level executive that increased attention to product safety might be good business—likely determines where the firm's product safety units are lodged organizationally, how they are staffed, and what mix of objectives they seek to fulfill.

One of three sorts of stimuli—regulation, litigation, or what we label voluntary efforts—or, more likely, some mix of the three, shapes the firm's particular perception of the product safety problem. The firm may see it as a legal problem (an increased exposure to product liability claims and suits); a regulatory problem (the need to designate a responsible person for CPSC purposes, to keep certain records, to deal with recall issues, to argue against and, if necessary, shape any standards affecting the firm's products that

12. Under the Department of Commerce's proposed Model Uniform Product Liability Act, compliance with governmental and regulatory safety standards would be admissible as a defense in product liability litigation, but this defense could be overturned by a showing that a reasonably prudent product seller could have taken additional precautions. According to Birnbaum (1980, p. 24), this merely restates existing common law. Several states have gone beyond this and have made compliance with governmental safety standards an *absolute* defense.

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federal agencies may propose); or an operational problem (the need to reduce the rate of unsatisfactory products produced by the firm, to enhance the firm's reputation for quality, etc.).

The firm's perception of the product safety problem will color the organization, placement, and staffing of the firm's formal product safety efforts, giving them a legal orientation, an operational orientation, or a regulatory orientation. "Pure" cases are unlikely; a mix of orientations, with a resulting emphasis that could be characterized as primarily legal, regulatory, or operational, appear to be more common. This orientation will affect the changes (if any) that the firm makes in its design and manufacturing practices and, ultimately, the changes (if any) in the safety of the firm's products.

The changes that might result from an operational orientation and their ultimate effect on product safety are the most obvious and, indeed, are the changes hoped for by those who argue that the creation of product safety units is socially valuable. But, to the extent that either the legal or regulatory orientations do not totally conflict with the operational orientation (or themselves generate perverse changes in design and manufacturing practices, such as defensive documentation or defensive engineering), product safety organizations having these primary orientations might still be expected, on balance, to bring about operational changes that ultimately would lead to safer products. However, the implicit hypothesis that more product safety organizations inevitably mean safer products cannot be maintained without an investigation of the intervening relationships mentioned above. We now turn to that task through analysis of interviews with major manufacturers.

III. Corporate Responses To Pressures

Factors Conditioning Firms' Responses

Our ideas on how to organize our interview results emerged as we conducted the interviews and learned about the behavioral complexities of the responding firms. Based on the product safety literature and survey results, a schema emphasizing corporate size as a determinant of organizational complexity and size of corporate safety effort might have seemed plausible. In the end, however, we concluded that factors other than firm size conditioned our firms' organizational responses to product safety pressures. These factors were (1) the inherent seriousness of the safety problems faced by these firms; (2) constraints imposed by the underlying organization of the firm; and (3) constraints imposed by the management philosophy and style of the chief executive officer (CEO).

Potential Seriousness of the Product Safety Problem Faced by the Firm

All products are hazardous in some situations, yet some products are more hazardous, or are hazardous in a wider range of circumstances, than

others. By this we mean that the failure of such a product to perform as intended imposes a risk of serious harm (or death) and possibly does so to an extremely large number of people. Examples of such products are pharmaceuticals, automobiles, and aircraft.

A second category of products can seriously harm the user and does so numerous times each year. But the danger appears less serious, or appears controllable to a large degree by the actions of the user. The number of people at risk may also be substantially smaller. Industrial machinery and some classes of consumer durables (e.g., lawn mowers) fall into this category.

A third class of products is one that people do not normally associate with serious hazards. If these products are improperly designed, manufactured, or used, the consequences for the victim can be just as severe as in the other two classes of product. Such occurrences are rare, however. Certain types of home appliances (refrigerators and freezers, for example) fall into this category.

We propose such a division of product types (and it is, like all such divisions, somewhat artificial) to suggest that product safety is more likely to be a salient issue in firms that produce products in the first category, less so in the second, and even less so in the third. This is true even without the increased social pressures over the past 20 or so years to improve product safety. These pressures may affect the consequences to the firm of producing and marketing a product that is eventually deemed unsafe, but they are not likely to influence the recognition of the product's inherent safety. We found the role played by the corporate-level product safety effort different in each of these cases.

Inherently Hazardous Products. Paradoxically, the corporate-level product safety presence was hardest to pin down in these cases precisely because the product *was* considered inherently hazardous. Recognition of this fact permeated the organization. No single official was assigned the responsibility for product safety matters in the two firms we visited whose products fall most clearly in this class.

In these firms, many officials were concerned with various aspects of safety. For example, the strong regulatory presence felt in both firms led to considerable safety-related documentation and record keeping. In one of the firms, a pharmaceutical manufacturer, FDA requirements drove the safety effort. The product development process, manufacturing techniques, marketing, and labeling all were closely supervised by the FDA. The FDA's efforts dominated, notwithstanding the fact that compliance with these standards does not shield drug manufacturers from liability under current law. Failure to comply with FDA standards, however, is *prima facie* evidence of negligence.

In the other firm, regulatory pressures were only slightly less ubiquitous.

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The scope of federal standards applicable to the firm's principal product was smaller, but the firm had to certify, prior to new product introduction, that all applicable federal standards had been met and, if challenged, to show how that determination had been made. This meant that the firm had to develop internal standards that were, in effect, stricter than the federal standards in order to account for normal manufacturing variability.

Both firms also had experienced a substantial volume of product liability litigation. They considered this an inevitable cost of producing the particular products they specialized in—not a sign of design or manufacturing failure. Both made substantial efforts to keep their product liability problems separate from their ongoing operating decisions.

One of the firms deliberately treated product liability settlements as an overhead expense, though it charged other product quality-related costs to the relevant product line. The other charged product liability costs to the product, but only for pricing purposes (i.e., it recovered the expected cost of judgments by increasing the cost of the product) and for deciding whether particular product lines should be continued. The fact that suits arose and judgments were paid out was not considered to impugn the product or anyone connected with its development or manufacture. In short, both firms treated the information generated by specific product liability suits as random noise, though long-term changes in the cost of product liability claims might affect pricing and production decisions.

We did not press either firm to determine how a genuine failure would be treated. At one firm, a respondent suggested that competitors had encountered major safety-related product failures and had paid a substantial price in terms of product liability judgments and increased regulatory surveillance. The clear implication (one that we were unable to verify with the competitors) was that insufficient attention to safety issues had possibly contributed to the failures and, at the very least, had compounded the difficulties they caused for the companies.

The firm being interviewed used this example to justify its elaborate safety procedures, arguing that such failures would have been picked up long before any substantial volume of suits developed, and certainly long before any final judgments were entered. It and the other firm producing high-hazard products had elaborate procedures precisely to achieve this.

In particular, the firm producing a technologically complex mechanical product from many subsystems had a process for identifying critical parts and subjecting them to special hazard analysis and testing. However, the firm lacked good methods for identifying and dealing with synergistic hazards. The firm producing chemical entities used procedures specified by the registering agency overseeing it as the basis for its process and upgraded these procedures where it felt additional attention was necessary.

If the nature of the product produced causes substantial attention to be paid to safety throughout the development and manufacturing process, is there still a role for a corporate-level product safety effort? Our research suggests two possibilities.

First, a corporate-level effort may help surface especially subtle hazards caused by the interaction of subsystems in a technologically complex product. In an organization that produces a product known to be potentially hazardous and assembles this product from numerous subsystems, many of which themselves may embody potential hazards, there is a temptation to believe that the product as a whole is safe if each subsystem is safe. In some sense, such assumptions are necessary, since the number of possible interactions among subsystems in a complex product like an automobile or an airplane is extremely large.

The emergence of the crashworthiness issue in both aircraft and automobiles has lent new urgency to this interaction problem. We visited one firm that produced such a technologically complex product; there, the responsibility for spotting and dealing with these interactions seemed to rest primarily on high-level engineers who, owing to this company's history, occupied important positions in the management hierarchy. But safety was not their sole, or even prime concern. The firm recognized this as a weak point and freely acknowledged that some sort of formal safety effort might have aided these engineers in their task.

Such an effort could also have been counterproductive, and perhaps this is the reason the firm had not tried it. Assigning formal responsibility for safety at some high level in the organization might have been interpreted as relieving lower-level individuals of their responsibility and thus might have reduced overall safety.

This trade-off is one that appears not to have been widely recognized in the product safety literature. This literature, and researchers advocating a strong, corporate-level safety presence, generally assumes that formal risk-analysis techniques are reliable enough, and a high-level corporate commitment to safety effective enough, to unambiguously improve the safety of technologically complex products.¹³ Based on our understanding of these tools and our (admittedly limited) observation of their use in firms generally considered to have good safety records, we consider this assumption debatable.

13. See, for example, Weinstein et al. (1980); Manuele (1978, pp. 97-104); R. Chandran and R. Linneman (1978, pp. 33-45); and G. Corley (1978, pp. 1-17). In contrast, Kolb and Ross (1980, p. 77) state: "The form that the product safety organization can or should take in one company varies dramatically from that best suited in another—based on the company's size and industry size, the technological sophistication of the product, the production volumes and processes, and the complexities of a product's man-machine relationships."

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A second possible task for a corporate-level product safety activity in high-hazard product firms is the management of the inevitable flow of product-related litigation and regulatory contacts. This role can serve two purposes. First, it can minimize the costs to the company from these activities by preventing virtually everyone from having to become involved at one time or another. In other words, litigation or regulatory "specialists" can be developed and utilized.

Second, and perhaps more important, handling litigation and regulatory liaison in this way can help insulate designers and engineers from what some firms perceive as the potentially counterproductive influences of these activities. It has been argued that an inevitable sizable flow of product-related litigation may demoralize engineers, especially if they were convinced that they were performing their jobs properly.¹⁴ Similarly, having to respond to often uninformed, if well-meaning, government regulators might be frustrating to engineers, leading them to consider all regulatory efforts worthless.

The two firms we visited both had found ways of dealing with this second class of perceived problems; some of these ways we have already mentioned. They had done so without creating a separate product safety organization. Considerations of safety were integrated into the mainstream of their product development decisions in a way they considered to be generally adequate.

Low-Hazard Products. We visited two companies whose products seemed to present relatively low hazards. Both had extremely active product safety programs at the corporate level (this was why we chose to visit them). In one instance, while the program had high visibility, we doubted its effectiveness; attempts to resolve these doubts by follow-up visits were rebuffed by the company. In the other, the program seemed to be an extension of the company's long-standing reputation for producing products of high quality.

Why did companies for which product hazards were seemingly not a severe problem have such active corporate-level programs? Because a major portion of both firms' product lines came under the jurisdiction of the Consumer Product Safety Commission, some form of corporate-level safety organization would have been necessary in any event. But, the product safety efforts of at least one of the firms predated the founding of the CPSC, so that could not be the entire reason. Moreover, both corporate product safety programs seemed to go well beyond the formal requirements of the CPSC.

Another possible explanation is also essentially defensive. Both firms are

¹⁴ Hoenig (1981) argues this in the context of automobile design and crashworthiness considerations.

highly exposed to public scrutiny; their names are household words. One goes so far as to closely associate its corporate identity with the products of its many divisions. By doing this, the firm makes itself a more attractive target for product liability suits.

Given this strategy, the existence of a corporate-level product safety activity that attempts to impose uniform safety processes and procedures throughout the company may be seen as a variant of the process defense suggested by Weinstein et al. (1980) and may thus help to limit the firm's liability exposure. At the least, it may demonstrate the "good faith" and "social responsibility" on the part of the company in dealing with product safety and thus help to reduce the probability of punitive damages.

A third characteristic of both programs may be even more important in explaining their existence. Both were founded by (and one is still headed by) strong "missionary" personalities—individuals whose careers appear to have been directed to "preaching the gospel" of product safety. In firms not routinely faced with obvious product safety problems, the presence of such a personality may be necessary to explain a highly visible corporate-level product safety effort and to keep designers, engineers, and others in the company sensitive to a problem whose consequences they rarely if ever see.

The danger in this sort of situation is that the corporate-level effort will not outlast the tenure of the missionary. Furthermore, without a corporate-level commitment to safety as an important corporate objective—one that management will back up with resources when necessary—the most fervent missionary will be unable to establish, let alone sustain, an effective product safety program.

Moderately Hazardous Products. Firms producing what we refer to as moderately hazardous products may present the most interesting and most complex case. For these firms, in contrast to those producing inherently hazardous products, safety and the consequences of producing a product that is inadequately safe cannot automatically be assumed to be on virtually everyone's mind at all times. Moderately hazardous products may look safe or, conversely, their dangers may be sufficiently apparent to cause the designer to believe that the hazards are so obvious that they need not be considered in design. The failure of one of these products, however, may produce severe consequences.

The firm producing this type of product may not be subject to continuous regulatory surveillance with respect to safety. Often regulators appear only when a failure occurs—or is alleged to have occurred. Such a firm also may not be subject to the frequent product liability suits typical of the firm producing the inherently hazardous product. Yet, almost certainly, suits will have been filed and large judgments may have been entered against the

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company. In such cases, it might be reasonable to expect the firm to view product safety problems in one of two sharply contrasting ways: either as situations in which it finds itself unjustly caught, through no fault of its own, or as something to be controlled through appropriate attention to design, manufacturing, litigation, and regulatory liaison.

Two firms we visited represented close to extreme cases. One produced a considerable volume of consumer goods as well as a broad line of industrial goods. It therefore had occasion to deal with the Consumer Product Safety Commission on a relatively regular basis. The product line of the other was confined almost exclusively to industrial products; its primary point of contact with product safety pressures was through product liability suits.

Both firms had experienced product safety problems—one, through a greater than average incidence of product recalls; the other, through one very expensive (and, in its view, unjust) product liability judgment. The contrast between the corporate-level responses of these two companies was striking.

The firm producing industrial goods almost exclusively had originally hired a missionary type of product safety officer from the aerospace industry who had tried to apply aerospace design-assurance techniques to the firm's products. Given the broad range of hazard potential inherent in this firm's varied product line, this effort was seen as overkill, and abandoned. The experience had left the firm suspicious about the value of formal product safety techniques, and as a result, the locus of corporate-level product safety concerns had drifted to the legal department. Here, an assistant general counsel was struggling to develop a more appropriate corporate response in the face of a relatively hostile corporate attitude.

The other firm had decided that it needed to control its product safety problem, but in a way consistent with its overall management philosophy (see below for more details on this point). The chairman of the company supported the establishment of a small corporate product safety presence, but backed this presence up with his personal prestige and attention. Top corporate officers and the board of directors were kept aware of the firm's safety performance. Divisions with poor product safety records were told to improve, and the resources of the corporate-level office were made available to them. In short, this firm's corporate-level product safety office established and maintained an atmosphere that nurtured the corporation's overall safety efforts (efforts that were primarily the responsibility of the operating units).

Although broad generalizations are always hazardous, our limited interview evidence, plus our consideration of the nature of product safety problems and possible corporate responses to it, suggest that the corporate-level product safety effort potentially can play the most important role—either for good or for ill—in firms producing moderately hazardous products. The placement of the product safety effort in the corporate hierarchy, the re-

sources it commands, and its ability to demonstrate that the firm's CEO backs its actions are all signals that can be read and understood throughout the company.

If the corporate-level response is seen as essentially legalistic and defensive, then it is likely to send the message that product safety is primarily a problem for the lawyers and that no response from the operational side of the corporation is required. If the corporate-level response emphasizes hazard reduction, then the problem may be seen as being as much operational as legal. Thus it may be that moderate hazard companies should give the most serious consideration to how they structure their product safety efforts and the signals these efforts send, both inside and outside the company.

The Structure of the Firm and the Management Philosophy and Style of the CEO

In addition to the inherent hazardousness of its products, the structure of the firm and the management philosophy and style of its chief executive officer determine the need for and potential scale of a firm's formal product safety efforts. We group the firm's formal structure and management strategy together because they are often inseparable. Indeed, formal corporate structure may be largely determined by the management style practiced in a company.

Except perhaps in the case of firms producing inherently dangerous products, safety issues are not important enough alone to drive important structural decisions. Thus, a firm's product safety effort must somehow fit into and be seen as consistent with a preexisting structure. Furthermore, as a firm's structure changes in response to changing strategic needs, the product safety effort must be capable of changing without substantial loss of effectiveness.

The importance of an appropriate match between the placement of the product safety activity and the firm's overall structure was especially evident in one large manufacturing firm we visited. Some years earlier, for reasons unknown to us, the firm permitted its product safety effort to be publicized. Descriptions of its programs and policies, and even copies of the forms it uses in product safety audits, have been widely disseminated outside the company. This gives the impression of a substantial corporate-level product safety presence.

Our visit suggested otherwise. It appeared to us that whatever product safety program the firm now has is concentrated primarily at the division or group level. Given the highly diverse nature of the firm's principal product safety problem, this may be appropriate.

However, the launching of this conspicuous, corporate-level effort, followed by its implicit downgrading owing to inadequate follow-up, may well

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have undercut the potential usefulness of a corporate-level product safety effort in alerting divisions producing low- and moderate-hazard products to available design assurance techniques. Certainly a comparison, especially by the firm's own personnel, of the mismatch between the external impression created and the actual corporate-level interest in product safety could not help but undermine the credibility of any future effort to demonstrate a corporate commitment to product safety.

If a firm's product safety program must be consistent with its structure, so must it also be consistent with the management philosophy and style of the CEO. Indeed, this may be even more critical to its success. In many companies, the personality and style of the CEO permeates the organization. People throughout the firm are quick to judge whether a new function—such as a corporate-level product safety office—fits or does not fit the CEO's style. If it does not fit, then the office will be seen by everyone as a useless appendage created solely for purposes of external relations. If the activity fits, it will have real influence, even if it has few actual resources.

Two examples illustrate this point. We mentioned earlier one firm, producing what appeared to be low-hazard products, which had developed an extremely elaborate and formalistic system of product safety goals and norms. The corporate product safety office published (for internal company use) procedures for determining appropriate levels of risk and undertook major programs to teach personnel in operating units risk assessment techniques, etc. This was clearly the most elaborate corporate-level effort we encountered in any of the organizations that we visited.

The role played by this corporate-level product safety office seemed to contrast sharply with the normal style of this corporation, which was to delegate authority to operating units and to apply only financial performance norms to their operation. Furthermore, we found no evidence that this uncharacteristic style of corporate operation was based on a decision by the CEO. We were therefore suspicious of the effect of this effort on decision-making at the divisional level. Our request to talk to divisional personnel was refused.

The effort at another, somewhat smaller, highly diversified firm that we visited contrasted markedly with the one just described. Here the strong delegation style of the CEO was understood, seemingly throughout the company. Certainly it was transmitted to us. His distaste for overhead costs was also apparent. The corporate-level product safety office was a lean organization. It seemed, however, that the office had managed to accommodate itself to its lack of budgetary resources.

The head of the product safety office—in contrast to the head of the corporate-level product safety office discussed immediately above—did not attempt to develop corporation-wide directives for appropriately safe prod-

ucts. Instead, he viewed his job as mediation. He also made a point of going out into the field to talk to divisions. He provided little formal education to operating officials.

However, this official believed—and, more important, he thought that operating people believed—that he was running the type of corporate-level product safety office that the CEO wanted. Furthermore, in this corporation, where additions to corporate-level staff were closely watched, the fact that the corporate legal department had added a small number of lawyers versed in the legal and operational aspects of product safety must have been seen as a signal that the effort was to be expanded.

Product Safety Tasks

Our interviews, as well as our reading of the product safety literature, suggest that there are a few broad categories of tasks which any corporate-level product safety activity must undertake and against which its effectiveness will be judged. Some of these have already been hinted at, but let us now make them explicit.

Internally Oriented Activities

One group of tasks is essentially internally oriented; that is, the activities are aimed at the company itself and not at those, such as customers, regulators, and suppliers, with whom the firm deals. Of course, the product safety unit's success in external relations may enhance or undercut its internal effectiveness; the two go together.

Setting the Tone for the Firm's Product Safety Effort. Considering the inherent inability (and undesirability) of corporate-level officials involving themselves in the details of day-to-day operations (including design decisions), the task of setting the tone may be the most important function of the corporate-level product safety unit.

To set the proper tone, any formal corporate-level product safety unit must first of all represent both the underlying organization of the firm and the management style or philosophy of the CEO. While failing to do this may not prove fatal to the effort, it certainly will substantially complicate an already difficult task.

Second, the corporate-level product safety activity must match its attempted actions to the resources at its disposal. Setting goals or tasks that clearly are unachievable, or that require more resources than the unit can expect to command, is a signal to the rest of the company that the unit is not to be taken seriously. The head of the product safety unit therefore must exercise considerable restraint.

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For example, the head of the lean product safety unit referred to earlier informed us that his firm used outside claim adjustors to investigate accidents even though the firm was largely self-insured. Remembering the admonitions of Weinstein et al., and our experiences at another company that had, in our view, an extremely effective arrangement for linking data generated in the field to design efforts, we inquired whether this arrangement resulted in the loss of potentially valuable information.

The head of the unit agreed that he lost data that he very much would like to have. He probably could show, he added, that bringing the accident investigation in house would be cost-effective. But, he said, the chances of securing permission to enlarge corporate staff (and overhead) by an amount sufficient to internalize accident investigation procedures were so slight that it seemed not worth his effort to try. In short, he was avoiding a fight that he knew he almost certainly would lose and whose loss would be perceived within the firm as seriously damaging the effectiveness of his unit. He saw this as more than offsetting the information loss that the use of outside accident investigators occasioned.

Contrast this with the corporate-level effort at the firm that previously had publicized its superficially elaborate product safety effort. The minuscule resources available to the head of that corporate-level product safety office, his apparent low level of activity, and his being housed away from the corporate headquarters all seemed to us to signal that the firm did not take the effort seriously. Indeed, he indicated his belief that if a serious product safety issue arose, he stood little chance of being supported by higher-level officials.

This same firm had earlier been involved in a major legal proceeding in which large fines and even jail sentences were imposed. In this instance, top corporate officials had disclaimed any responsibility and had let lower-level officials take the blame (and consequences). This experience, it seemed to him, might well signal what would happen if a major safety problem emerged—a perception that he seemed to feel was shared throughout much of the company.

Structuring and Helping to Enforce Financial and Nonfinancial Rewards and Penalties. At each company, we asked how the consequences of product safety performance were transmitted back to operating units. Companies had different means of doing this, but each official we talked to recognized the importance of feedback.

Only one company developed explicit safety performance goals against which operating unit managers were said to be measured. However, we were unable to learn how much weight safety issues were actually given in assessing an operating unit's performance.

One company reported that it regularly briefed top corporate officials

and the board about the company's product safety performance. The CEO, in turn, raised these problems in a general way at meetings of division heads. If a unit was considered to have a special safety problem, this was discussed at a private meeting between the CEO and the division head. At this meeting, commitments were made concerning how and when the problem would be eliminated.

Most companies appeared to recognize the importance of linking safety performance to financial performance and tried in various ways to charge safety-related costs to the division that generated them. Indeed, one or two self-insured companies had developed actuarial estimates based on expected product safety costs for the coming year—the likely volume of claims, rework and warranty costs generated by safety-related hazards, etc. These costs were then charged directly against the product.

The only exceptions to this general policy were the two high-hazard product firms noted earlier in this section, firms that deliberately treated product liability costs as overhead. In both cases, the companies had explicitly examined the situation leading to the rash of claims and had determined to its satisfaction that their designers and other responsible officials had acted appropriately. They therefore refused to charge the substantial cost of these settlements against the divisions or products, except for purposes of determining whether the product should remain in production.

Developing Links to Other Safety- and Quality-Related Activities in the Firm. In several firms that we visited, the product safety function (especially at the corporate level) was undergoing metamorphosis. Most such units had been set up in the late 1960s or early 1970s and had gained initial strength out of the product liability crisis of the mid-1970s and the controversies surrounding the founding and early operation of the Consumer Product Safety Commission.

The crisis atmosphere in product liability has now faded, except in a few areas such as asbestos and formaldehyde, and the CPSC has become quiescent. Furthermore, the officials who originally established the corporate-level product safety functions, often the missionary types that we referred to above, have retired or are on the verge of retiring. Their successors and others who are in a position to reorient their earlier efforts are looking for a new touchstone.

In certain cases, the new touchstone is quality. This criterion reflects the growing realization that quality costs—the costs of such things as the reworking of products that failed quality control inspections, unsuitable parts received from shippers, warranty costs, and safety-related costs—are in many instances much greater than previously realized.¹⁵

15. This point is made forcefully by Wheelwright (1981).

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One corporate product safety officer to whom we talked is redesigning his firm's product safety effort to integrate it into the firm's developing cost-of-quality program. He believes that this will allow him to induce the firm's engineers to focus more effectively on the design phase where, by spending a little more time and money, safety problems can be detected before they develop. Historically, this firm has emphasized quality control and quick attention to problems as they develop in the field. Its overall safety record appears excellent, but this program's director believes that this excellence can be enhanced (or, at least, maintained) at significantly lower cost by changing the company's design philosophy. He sees the cost-of-quality approach as a way to do this.

The extent of this corporation's reorientation is unique among the firms we visited; its corporate emphasis on product quality is also unique. It exemplifies the importance of linking the firm's product safety efforts to other firm goals in a mutually supportive way, thereby increasing the program's leverage.

Externally Oriented Activities

In view of the strongly legalistic nature of the duties of corporate-level product safety activities as revealed in two large-scale surveys (MAPI, 1972; McGuire, 1979), we expected that a large portion of the product safety tasks facing product safety officials in the firms that we visited would be externally oriented. To a degree this turned out to be true. But the nature of the involvement was not quite what we expected.

Role in Litigation. Several of the firms had experienced substantial product liability problems, i.e., a large number of suits, and had paid out large (sometimes multimillion dollar) judgments and settlements. For this reason, we had expected that the corporate-level product safety officers might have played an important role in developing litigation or settlement strategy, appeared as witnesses to describe the firm's product safety efforts, or helped to identify witnesses inside the firm and to organize testimony.

This was not the case. Product liability defense is a legal problem, handled by the law departments of firms. In some cases, these law departments develop the equivalent of small law firms specializing in product liability. They tap specific skills throughout the corporation, especially in operating units. But, as far as ongoing litigation is concerned, they seem to interact little with corporate-level product safety officials. These officials may be involved in settlement decisions, but this was by no means common in the companies we visited.

More to the point, we were not made aware of any instance in which corporate-level product safety officials were called to the witness stand to

describe their firm's product safety activities. The firms we contacted do not seem to have tried actively to invoke a process defense, even though their product safety processes were probably more complete and more thorough than is typical of manufacturing firms. Even more surprisingly, these officials seem not to have been called to the stand by plaintiffs' attorneys to testify as to whether their firm's established design review processes were indeed being followed, though in one case it seemed clear that they were being largely ignored. In short, plaintiffs' attorneys do not seem to believe that they can use failure to comply with established process as evidence on which to win judgments against the companies.¹⁶

Regulatory Liaison. The role that corporate-level product safety officials played in regulatory liaison differed substantially among firms, depending on the nature of the company's products. We have already mentioned the two cases of firms producing inherently hazardous products, where the level of regulatory interaction was so high that both firms had senior officials designated as regulatory compliance officers.

In firms producing products under CPSC jurisdiction, the corporate-level product safety officers seemed to be the principal points of contact between the commission and the firm. And although the Conference Board survey suggests that an extremely low percentage of corporate-level product safety officers "manage recall campaigns," several of the ones we interviewed play major roles in determining whether and when recalls should be initiated, how and when the CPSC should be informed, and how the recall was to be conducted. They also were heavily involved in various negotiations between the companies and the CPSC.

IV. Conclusions And Implications

Product Liability

Of all the various external social pressures, product liability has the greatest influence on product design decisions. The other influences largely work through the product liability mechanism. In industries with potentially high-hazard products, but not subject to significant product-related regulation (e.g., industrial machinery), product liability probably dominates design decisions, in terms of safety considerations.

In industries subject to moderate regulatory pressures (industries subject only to CPSC regulation, for example), the influence of product liability likely overshadows that exercised by the regulators. Indeed, regulatory ac-

16. In his sharp critique of the Weinstein proposal, Professor Henderson (1981, pp. 608-611) argues that plaintiffs' lawyers would use such evidence.

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tions in such industries may be perceived as important or unimportant depending primarily on their impact on a firm's liability exposure. Even recalls mandated by regulatory agencies may have their major effect in the form of more product liability suits and a weakening of the firm's defense in such suits.

Only in a few highly regulated industries (drugs and aircraft, for example) does regulation likely exceed product liability as a design influence. Even here, the liability consequences of design decisions are seldom far in the background.

Although product liability exerts a powerful influence on product design decisions, it sends an extremely vague signal. Because the linkage between good design and a firm's liability exposure remains tenuous, the signal says only: "Be careful, or you will be sued." Unfortunately, it does not say *how* to be careful, or, more important, *how careful* to be.

Considerable interest has been expressed in the creation of a federal product liability statute to preempt existing state law. This interest reflects the belief that current product liability law creates two quite different sources of uncertainty for business. First, it is made by judges and differs among states. Businesses attempt to solve the problem by monitoring the development of the law in many jurisdictions and by assuming that the operative standard is that (or close to that) adopted by the strictest state. Second, as society's attitude toward the burden that should be placed on the manufacturer or product seller to ensure safe products and toward sharing the burden of product accidents has changed over the years, the center of gravity of the law has shifted.

Legislation now under consideration by the Congress¹⁷ seeks to alter both the variance and the mean of current product liability law, especially as concerns what constitutes unsafe design. It would reduce the variance by its sweeping preemption of state product liability law. It would shift the mean by making it substantially more difficult for plaintiffs to prove that a design is defective.

In practice, however, the reduction in variance of product liability law may not have much effect, at least for a number of years. To avoid overburdening the federal courts, the bill provides that a federal product liability statute would be administered in the first instance by state courts. To be sure, the state courts would be administering a federal law. In its current form, however, the bill contains numerous phrases possibly subject to a wide range of interpretation. Thus, the immediate reduction in variance might not be substantial. Only after federal appellate courts had sorted out the various

17. Product Liability Act, Bill S. 44, as considered by the 98th Congress.

interpretations—probably a matter of years—would a body of consistent law develop.

The proposed federal law would simplify the task of the corporate product safety office, which has the function of conveying to the designer the strictures contained in the current interpretations of the law. The body of law will be both more consistent and more stable. However, we were struck in the companies that we visited by how few changes in law were transmitted to those involved in design decisions. The product safety officers were unable to identify more than a few relatively minor legal decisions that had directly impinged on design and production criteria for the firm.

Uncertainty in the law is costly, if only in psychic terms. In reality, however, the connection between the law and product design is sufficiently weak that even quite major changes in the law would have little effect on the behavior of firms with respect to consumer product safety, except to the extent that such change led to significant changes in the overall cost of product claims.

Insurance

Much of the recent debate about product liability has focused on the insurance industry. Indeed, Congress became concerned with the issue largely because of assertions that insurance rates were rising unreasonably rapidly and that small firms were unable to obtain adequate coverage. Despite the concern about product liability insurance, there have been no suggestions for reforms to improve the insurance industry's performance in this area. State insurance regulators lack relevant expertise, and there is no data base that permits judgment of the profitability of this line of insurance.

Our interviews suggest that the insurance industry is likely to play a declining role with respect to the large manufacturers that produce most of the consumer goods in the nation. These manufacturers have shifted largely to either self-insurance or policies involving high deductibles and significant coinsurance. Several factors may explain this shift. Differences in the incentives of insurers and insureds lead the latter to seek more control over decisions to litigate or settle. The flow of information may be better when the firm controls more of these activities.

Whatever the reason for the shift away from conventional insurance, the consequences may be significant. Insurers may have a smaller data base on which to develop rates and from which to draw product liability prevention expertise. This situation may lead in turn to further reliance on subjective rate making and a continuing minor role for the insurance industry in product liability prevention. Small firms may continue to have difficulty in obtaining adequate coverage at reasonable prices.

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Regulation

Safety regulation consists of many instruments and strategies, ranging from control of the product development process to the collection and dissemination of postdistribution data. The proper regulatory strategy is a complex function of characteristics of the product and industry involved.

Except for a small number of high-hazard industries, product standard setting by regulatory agencies has not been effective. The agencies have promulgated few standards and those standards have frequently been successfully challenged by consumers or producers. The development of a standard under the due process requirements imposed by the various enabling statutes, made even longer by the litigative activities of the affected firms, is not an attainable goal for many consumer products.

Regulatory agencies, such as CPSC and NHTSA, are making much greater use of their ability to require recall of products that have been identified as hazardous after entering the stream of commerce. The recall power is particularly potent because it disseminates information adverse to the firm's reputation to purchasers of the firm's product.

However, the recall has been used narrowly; i.e., either all or none of the units involved have been recalled. In cases where a recall cannot be justified on cost/benefit grounds, agencies might instead disseminate the information concerning the potential hazard to the users. The prospect that such hazard information might engender successful product liability suits for injured consumers may lead to more voluntary recalls on the part of producers, who have, in many cases, successfully prevented agency-mandated recalls.

In general, regulatory agencies seemingly have failed to make use of marketplace incentives to affect manufacturer performance. A greater stress on collecting and disseminating information that would permit consumers to make better judgments about the relative safety of particular products and producers might be the most effective strategy for regulators dealing with medium- and low-hazard products.

Corporate Management

Corporate product safety units were created in many large firms in response to a perceived crisis. That sense of crisis has receded as it has become evident that product liability claims will not become a significant cost to most manufacturers. This respite raises a question as to whether product safety offices are likely to and should disappear.

Considerable evidence indicates that product safety remains a serious concern among the American people. Many people believe that they are still exposed to too many hazardous consumer products. Consumers appear dissatisfied with the quality of goods manufactured in the United States.

In light of this, the need for corporate product safety offices continues. The safety of products is importantly affected by the way the design process is organized. The complexity of products means that corporate-level efforts are still required to assure that even in large organizations there is a continued pressure to ensure that safety considerations are given due weight at all points in the process.

This is not to argue, however, that the product safety organization need be highly formal. At the corporate level, the extent of resources devoted to product safety does not appear to determine the effectiveness of the office as much as does the way in which the office is structured. Three considerations in particular affect the proper design of the office.

What appeared to us to be the most effective product safety organizations were those that were sized, located, and financed at a level consistent with the safety problems inherent in the firm's products, with the need for higher-level supervision or monitoring of safety-related design decisions, and with the interest of the chief executive officer (CEO) in the firm's safety performance.

A lean product safety organization that has the ear of the CEO and a good working relationship at various levels of the firm is likely to be much more effective than a highly visible unit that establishes procedures but lacks either the resources to impose them or, even more disastrous, the support of the firm's top officers when such support is necessary.

In short, there is no single best or correct way to structure a firm's product safety effort. Virtually every firm can use such an effort, however, even if certain of the social pressures that stimulated the establishment of such units during the 1970s recede somewhat.

As the source of a firm's concerns changes, the firm's product safety activities can (and should) change also. If product liability and regulatory pressures decrease in importance, firms should change the focus of their product safety organizations. But, the rise of other concerns—improved product quality, for example—provides other avenues into which the activities of such units can expand. Some of the firms that we interviewed have sensed this and have embedded their product safety activities in their overall quality assurance program.

We consider the combining of product safety and quality control appropriate, provided it is carefully done. The sources of information that both activities use are likely to be highly complementary. The nature of the intrafirm failures that lead to a suboptimization in the area of product safety appear quite similar to those that lead to similar problems in product quality. But, the change in focus should not be merely a change in title.

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