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THE IMPACT OF SARA TITLE III ON THE COMMUNITY**

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**Policy Design in Complex Arenas: The Impact of  
SARA Title III on the Community Management of Hazardous Materials**

Louise K. Comfort and Harry Hui-Ping Dai

**The Policy Problem: Designing Effective Action in Complex Arenas**

Complex, dynamic, uncertain, interdependent arenas pose difficult contexts for policy design. Organizational decision processes increase in difficulty and ambiguity in rapidly changing, interactive environments, in which information may be incomplete, vague, or inaccurate and the consequences of action may be unknown (March, 1988; Simon, 1969, 1981; Argyris, 1982; Axelrod, 1984; Cohen, 1981, 1984).

The policy problem involves a paradox. For organizations designed to change the external environment, engaging in activities to do so tests the capacity of the organization to function internally as a coherent, efficient system. In turn, if the organization's internal functioning is in disarray, its capacity to operate effectively in the external environment is adversely affected (Mackenzie; 1986; Luhmann, 1989). This tension between internal organizational integration and external organizational performance increases with the size of an organization, the social importance of its goals, the range and diversity of its internal tasks, and the scope of its actions in the external environment. It involves the dynamic interaction of micro organizational processes with macro societal processes in a continuing evolution of social change and complexity.

The problem becomes how to design a decision process that allows the organization to operate more efficiently in its internal system in order to function more effectively within its external environment. Such a decision process needs to allow interactive feedback from external operations to inform constructive adaptation in the organization's internal system, thereby enabling more effective performance in the external environment.

This paper has four objectives. First, it will review briefly the research literature relevant to the problem of policy design in complex environments. Second, it will examine this problem in the context of an actual policy designed to effect social change, the Emergency Planning and Community Right to Know Act of 1986, also known as the Superfund Amendment and Reauthorization Act (SARA Title III). This federal law represents a conscious effort to improve community management of hazardous materials through policy design. Third, it will identify observed relationships between internal organizational performance in the newly created Local Emergency Planning Committees established under SARA Title III and the capacity of the organizations to act effectively to achieve the intended objectives of improved community management of hazardous

materials. Fourth, the paper will propose a beginning model of dynamic organizational problem solving in complex arenas.

### **Interorganizational Problem Solving in Complex Arenas: Theoretical Context**

The concept of interorganizational problem solving draws upon a long-standing and distinguished body of research on decision making under conditions of uncertainty and ambiguity. This literature was reviewed in a previous paper (Comfort, 1991) and will be summarized only briefly here. The initial research on problem solving focussed on individual processes (Simon, 1969, 1981; Newell and Simon, 1972). Problem solving processes increase significantly in difficulty and complexity when inquiry moves to the organizational level, involving multiple actors, multiple demands and interactive, dynamic conditions.

Familiar forms of organizing action often prove ineffective, costly or both in complex environments. Four major research perspectives or traditions of practice have explored the problem of organizing action in complex environments. First is the tightly structured form of hierarchical organization, exemplified most vividly by the military tradition of command and control (Taylor, 1911, 1967; Gilbreth, 1917, 1973; Perrow, 1972). While this form of decision making to support organizational action proves functional and robust in stable, well-structured conditions, the structure often fails or proves inadequate in rapidly changing, dynamic environments (Cohen, 1981; 1984; Carley, 1988; March and Weissinger-Baylon, 1988).

Recognizing the inability of hierarchical organizations to function consistently in dynamic, ambiguous environments, researchers explored alternative forms of decision processes that operated largely without hierarchy. This second perspective of research investigated decision processes in "organized anarchies", acknowledging that intelligent reason did operate to produce organizational decisions even in conditions of ambiguity and uncertainty (Cohen, March and Olsen, 1972; March and Olsen, 1976; Cohen and March, 1974). However, organized anarchies were recognized as inefficient means of mobilizing resources and personnel to support timely, coordinated action to cope with problems in their respective environments (March and Weissinger-Baylon, 1986).

A third research perspective explored processes of evolutionary learning and adaptation as a means of organizational decision making in complex environments through trial and error (Holland, 1975; Piaget, 1980; Axelrod, 1884; Comfort, 1986; Haas, 1990). Again, intelligent reasoning is exercised in patterns of preferred choice over recurring events under uncertain conditions. After taking action based upon the best information available in a situation of uncertainty, observing the consequences of that action in terms of fundamental goals, organizational decision makers, as

individual decision makers, are likely to select the outcome perceived to be most beneficial to the continuing performance of the organization. This pattern evolves from repeated trials in an environment of incomplete, vague or uncertain information. While problems may eventually be resolved through evolutionary learning, constraints of time and resources have compelled practicing managers and researchers to seek more efficient and effective means of decision making in rapidly changing environments.

A fourth research perspective, organizational problem solving, addresses the problem of decision making under conditions of uncertainty through the design (or redesign) of systemic patterns of communication, information and action (Deutsch, 1963; Churchman, 1971; Lindblom, 1979; Meltsner and Bellavita, 1983). This perspective acknowledges information as the driving force of organizational action (Deutsch, 1963), and considers skills in search, processing and utilization of information central to the design of structures for action (Churchman, 1971; Habermas, 1976; Burt, 1982). This perspective is directed toward discovering means to facilitate organizational problem solving under constraints of time and resources.

The limitations of each of these models of decision making for organizations operating under conditions of uncertainty has spurred researchers to explore means of reformulating the concept of organizational problem solving to include technical as well as organizational infrastructure to increase problem solving capacity (Comfort, 1991a; 1991b). Decision making under conditions of uncertainty requires a dynamic model that allows the integration of information from diverse sources in a continuously adapting format to reflect accurately the interaction of events, actors and conditions in the changing environment. Within this environment, organizational problem solving represents a significant increase in complexity from individual problem solving. It involves engaging multiple organizations simultaneously in multiple types of action to address a complex problem (Newell and Simon, 1969, 1981; Comfort, 1991a).

Three concepts drawn from Niklas Luhmann's (1989) recent work offer insight into important characteristics of a model of organizational problem solving under uncertain conditions. First is Luhmann's (1989:7) concept of "autopoiesis" or the instinctual drive for continuing creative acts of self expression. Different from Darwin's concept of "survival of the fittest," Luhmann identifies a more refined and intense drive for creative expression that can be observed in individuals, but more importantly, can also be observed in social organizations. It is the energy that drives an organization to search for new information, to innovate, to try new approaches when existing patterns fail to achieve their intended objectives. Autopoiesis necessarily involves interaction with the environment, and compels the organization to respond to changing conditions in order to maintain its own vitality. Once a threshold



level of original performance has been achieved by an organization, it develops an internal drive to continue that level of self expression. This energy, recognizable in vital organizations, drives continuing social interaction with its environment in a process of evolving complexity.

The second concept, clarified by Luhmann (1989) but recognized by other researchers (Parsons, 1951; Almond and Verba, 1962; Burt, 1982) is the concept of functional differentiation. Functional differentiation serves as a means of reducing complexity (Luhmann, 1989) to facilitate organizational performance. This concept refers to the analytical task of identifying differences as a means of conceptualizing unity. That is, a set of actors may distinguish itself as a 'system' by identifying its boundaries as distinct from the environment. This task involves identifying which interactions are designed to be performed within the organization to achieve certain goals in the larger environment. This identification defines a new system of interactions as a separate entity from the environment. In turn, it enables the new organization to operate within the environment more effectively, thereby temporarily resolving the paradox of excessive environmental influence that inhibits the achievement of organizational goals.

The organization, with an established drive for creative expression and clearly differentiated functions to accomplish its valued goals, nonetheless is able to do so only by generating sufficient "resonance" with its environment to elicit the consensus and cooperation needed to support purposive action. Luhmann's (1989) third concept of resonance occurs when an organization is able to activate supportive response from the society on the basis of articulating shared meanings for a wider, more diverse audience and offering an appropriate format for common action.

All three concepts operate through communication of information. The process of discovering shared meanings with receptive social groups stimulates an organization to integrate new information with previous experience and create new shared meanings for a larger social audience. This process, which generates its own heady drive for renewal and continued expression, leads to the design of institutions and programs to protect the newly discovered values and accelerate the fulfillment of goals shared with the community.

The capacity for organizational problem solving necessarily creates a second level of interorganizational problem solving, as the initiating organization is able to marshal sufficient understanding, support and resources from other relevant organizations in its environment to sustain its own capacity to act effectively in the larger arena. This second level of interorganizational problem solving represents a new system of interorganizational action, which now develops its own autopoiesis, or self-generating capacity for creative action in the wider environment. The process

continues to evolve in iterations of increasing complexity, as new systems become capable of addressing larger problems, and consequently create even more complex means of intervening in the environment to coordinate common action and mobilize resources to solve those problems.

To observe this process in a practical environment, it is necessary to make some simplifying assumptions that set the parameters for the study. This inquiry makes four basic assumptions regarding the operating premises and conditions of interorganizational problem solving. They are:

1. Complex, technical problems challenge routine organizational decision processes in interdependent systems, stimulating change both within participating organizations and within the larger field of systems interaction in response to the problem
2. Implementation of programs to manage the social consequences of technology generates change in the environment that, in turn, influences the organizations implementing the technology
3. Relationships within organizations and between organizations and their respective environments can be construed as communicative acts (Luhmann, 1989)
4. Information, transmitted through communication processes, activates organizational performance in both internal and external environments

These assumptions will focus the exploration of a process of interorganizational problem solving in reference to the actual problem of community management of hazardous materials. They also serve as the basis for formulating a preliminary model of interorganizational problem solving. The model is stated briefly below.

#### **A Preliminary Model of Interorganizational Problem Solving**

1. **Goal:** To establish a rational 'ecology' (Dryzek, 1987), or system, of interacting organizations in which organizational units create the appropriate degree of 'resonance', or shared understanding, with their environment to elicit sufficient support to continue their creative performance
2. **Actors:** Participants in interorganizational problem solving include public, private and nonprofit organizations that are mutually affected by a common problem, risk or opportunity for action
3. **Stimulus:** A perceived risk or actual threat disrupts the normal operation of multiple organizations in a commun-

ity, compelling them to search for new information or new means of resolving the threat in order to continue their respective forms of creative performance (Holland, 1975; Piaget, 1980)

4. Conditions: A set of four conditions appear to be necessary but not sufficient to initiate interorganizational problem-solving. These conditions include:
  - a. the articulation of commonly understood meanings (Luhmann, 1989; Simon, 1969, 1981) between the organization(s) seeking to initiate change and the relevant audiences in the environment
  - b. sufficient trust among leaders, organizations and citizens to enable participants to accept direction toward achieving a shared goal
  - c. the activation of sufficient resonance between the organizations seeking change and their relevant audiences to elicit resources and support for action
  - d. the capacity to sustain collective action among participating organizations in order to achieve a shared goal
5. Means: Trust, resonance and collective action are achieved through communicative acts between individuals, organizations and subsystems within the whole system of the environment (Luhmann, 1989)
6. Criterion for Resolution: Resolution of a common problem occurs when the participating organizations are able to continue their creative expression through a new or improved level of coordinated performance in interaction with the dynamic environment
7. Obstacles: Inadequate or interrupted communication processes among the elements of the newly defined system impair its capacity for interorganizational problem solving

The model operates as community organizations act to continue and renew their respective capacities for creative expression through interaction with the environment. Doing so means acknowledging perceived threats and/or opportunities, and responding appropriately to actual events in ways that minimize risk and enhance creative expression. Operating within constraints of limited time, attention and resources, organizations seek to reduce complexity in the environment through functional differentiation of tasks.

In order to retain the internal creative capacity of their respective units, organizations that confront a common problem may seek to design coordinated action to solve that problem. The act

of doing so defines a new interorganizational system and effectively distinguishes a fresh set of broadly shared meanings from the boundaries of the previous organizational units, now considered subsystems of the larger system. Enabled by a growing capacity for coordinated action, the new interorganizational system develops an autopoiesis of its own, with a distinctive energy, shared goals and common understanding that propel its self-generating creative capacity.

### **Method of Inquiry**

This paper presents the characteristics of interorganizational problem solving in the context of community management of hazardous materials, as implemented under SARA Title III. The law is a practical example of conscious intent to build interorganizational problem solving capacity at the community level. This inquiry considers three types of evidence in examining the proposed model of interorganizational problem solving in reference to the shared problem of managing hazardous materials at the community level. First, it reviews briefly the design of the interorganizational problem solving process as specified in the requirements of the law and regulations stated for its implementation as an innovative process for community management of hazardous materials.<sup>1</sup> Second, it summarizes critical findings from reported observations by state managers regarding the design of the state planning process in two states, California and Pennsylvania.<sup>2</sup> Third, it presents selected findings from a survey of members of Local Emergency Planning Committees (LEPCs) conducted in five states, California, Kansas, Louisiana, Pennsylvania and South Carolina regarding the implementation of SARA Title III in their respective states.

To assess the effectiveness of the design and implementation of SARA Title III at the community level, the senior author designed a five-state survey of members of Local Emergency Planning Committees (LEPCs). The Local Emergency Planning Committees are established by law as the primary mechanism for integrating planning for hazardous materials management into community-wide plans for risk reduction and strategies for response.<sup>3</sup> The intent of the survey was to identify managerial perceptions of the threat of hazardous materials, appropriate means of coping with this threat and means of evaluating the implementation of the law at the community level.

The design for the survey is a representative sample of organizations and jurisdictions involved in implementing SARA Title III at the community level, carefully constructed to ensure independence of respondents. Out of 50 states, five (5) were selected for inclusion in the sample to ensure representation by geographic location, degree of exposure to hazardous materials and level of economic performance. Within each state, five (5) LEPCs were selected using the same criteria of geographic location, exposure to hazardous materials, and level of economic performance

(5 x 5 = 25 LEPCs). Within each LEPC, five (5) members were selected to represent the designated organizations and positions specified in SARA Title III for community representation (5 x 5 x 5 = 125 cases). The total sample included 125 cases. For each LEPC, three alternates were selected in addition to the respondents, to be used if a respondent should not be available for telephone interview. The total number of alternates selected was 75 cases. Of these, only a small number were actually substituted for the respondents originally selected. Out of 125 selected respondents, 122 interviews were completed for a response rate of 97.6%. This sampling strategy allows a small sample of carefully selected respondents to represent the larger universe of members of the Local Emergency Planning Committees engaged in the implementation of SARA Title III in their respective communities. The sample represents local elites engaged in the planning process, that is, community leaders with the responsibility and authority to implement changes in hazardous materials practices. The survey was conducted by telephone during July-August, 1990.<sup>4</sup>

Findings from this survey will be discussed in terms of evidence that offers explanation of the processes linking information, communication, and action that lead to interorganizational problem solving. Finally, an interpretation of the findings in terms of the preliminary model and initial recommendations for improving the interorganizational problem solving process are presented.

#### **The Design for Interorganizational Problem Solving at the Community Level: The Intent and Provisions of SARA Title III**

SARA Title III represents a significant change in public policy toward hazardous materials in at least three ways. First, the focus of governmental action moves from reactive response to proactive planning in order to reduce the risk of hazardous materials at the community level. Second, the burden of responsibility for designing and implementing emergency plans for hazardous materials management shifts from the federal government to local communities. Third, the dominant means of modifying performance of local organizations to meet designated standards of hazardous materials management changes from the enforcement of regulations by external authority to voluntary initiatives at the community level, based upon informed managerial choice (Argyris, 1982) and public review.

These changes indicate not only a marked shift in policy toward hazardous materials, but a recognition of the interdependent nature of the problem. The shared public goods of clean air, water and land can only be protected by common action. One careless release can contaminate the whole community. The law (SARA Title III) also represents a search for improved mechanisms to solicit responsible action from all of the parties involved in community-wide efforts to manage this risk. This marked shift in

the design of national policy toward the problem of hazardous materials is important for at least four reasons. First, the scope of the problem is nationwide. Every community that has a gasoline station with an underground tank and a freeway or railroad crossing its boundaries is exposed to risk from hazardous materials on a daily basis. Attempting to enforce adherence to regulations using federal authority alone would require a massive and expensive enforcement program.

Second, efforts to solve the problem recognize time as a measure of efficiency. When a hazardous materials incident occurs, the need for action is urgent and immediate. Contaminated air or water are difficult elements to control. Problems escalate rapidly with multiplying costs and consequences. Delay may be costly, in terms of impact upon both life and property. Planning ahead for possible disaster is a prudent means of reducing costs when incidents do occur, as is increasingly likely in advanced industrial societies with interdependent systems of infrastructure, energy distribution, services and transportation. Failure in one system is likely to trigger failure in subsequent systems that depend upon the first.

For example, when a large storage tank collapsed at an Ashland Oil site twenty-seven miles south of Pittsburgh on January 2, 1988, it released approximately 700,000 gallons of diesel fuel into the Monongahela River, water source for tens of thousands of people in Metropolitan Pittsburgh. The water intake valves were closed to prevent damage to the filtration systems of the local water companies. As the water was shut off, fire departments in the affected communities were without their primary means of fighting fire, and feared the consequences of a major fire under those conditions. Schools closed rather than place children in unsafe or unsanitary conditions. Businesses dependent upon ready and inexpensive water supply closed, losing income and adversely affecting employees. The region quickly devised alternative means of coping with the situation, but failure in the primary water supply triggered adverse safety, economic and social conditions for a significant portion of the population of the metropolitan region.<sup>5</sup> Planning increases efficiency and offsets the ordinary processes of organizational entropy through active review, reflection and redesign.

Third, adverse impact on the environment creates a painful "tragedy of the commons" (Hardin, 1968). Allowed to deteriorate through negligence or excessive demand, public goods such as air, water, green space or waterways no longer meet the needs for healthy access in a democratic society. Consequently, the cumulative contamination of these goods diminishes the quality of life for everyone. The more difficult question is how to generate responsible action. Is it possible to create a democratic political culture that voluntarily regenerates and renews its public goods, such as water, air and shared community services?

SARA Title III represents a policy directed toward that goal.

Finally, the complexity of interaction necessary to solve the problems of hazardous materials management escalates the difficulty beyond the ordinary tools of governmental action. Such interdependent problems are likely to be solved only through community-wide networks of collective action and shared responsibility. Designing public policy for collective action in complex environments necessarily transforms the process of planning to one of organizational learning (Benveniste, 1989) and interorganizational problem solving as individuals and organizations seek new means of managing the risk of hazardous materials.

#### The Provisions of the Law

SARA Title III is organized into three subtitles. Subtitle A includes specifications for "Emergency Planning and Notification". This subtitle outlines the functions and responsibility of the Local Emergency Planning Committee, as the primary planning body for the community in minimizing risk from hazardous materials. It also includes guidance for the development of emergency response plans, procedures for notification of responsible parties in event of emergencies and programs for training emergency response personnel.

Subtitle B, "Reporting Requirements," outlines the responsibilities of facilities that produce, use, store, or ship hazardous chemicals and specifies reporting requirements to the relevant authorities. These requirements include the timely submission of Material Safety Data Sheets (MSDS forms), chemical inventory forms and toxic chemical release forms. The requirements outline an intensive data collection and monitoring program to assess the presence of hazardous materials in local communities.

Subtitle C, "General Provisions," specifies the means by which information gathered under Subtitles A and B should be made available to the public. It also includes procedures for enforcement of the law, limitations, exemptions and protection of trade secrets.<sup>6</sup>

The design of the law allocates legal responsibility for assessment and monitoring of the presence of hazardous materials to both public and private organizations. The composition of the LEPCs specifies the inclusion of representatives from the major types of organizations in a community that are likely to be affected by a sudden, threatening release of hazardous materials and that are responsible for community protection. The intent, substantively different from previous legislation, is to engage the vital organizations and groups in local communities in the active design and maintenance of their own programs to reduce risk from hazardous materials.

## The Role of the States in Implementation

The intent of the law was to set basic standards for community protection from threat of hazardous materials across the nation. Yet, states have significantly different levels of exposure, experience with hazardous materials, access to economic resources, professional training, knowledge, expertise, and organization in their efforts to reduce the risk of hazardous materials. Recognizing the need for programs of action to be fitted closely to the needs and capacity of each state, the law allocated responsibility to state executives for the design and development of the implementation program in their respective states. Interviews were conducted with managers responsible for the design and implementation of SARA Title III in two states, California and Pennsylvania, regarding the applicability of the law to the specific needs of each state and the respective approaches adopted for implementation. The experience of the two states is interesting, for their respective approaches represent different levels of administrative engagement and, consequently, different levels of benefit resulting from the implementation of the law.<sup>7</sup>

While a full discussion of the implementation process at the state level is beyond the scope of this paper, the experience of the two states illustrates two significant issues in the implementation of the law. These issues point to substantively different results in community interaction and improved capacity to minimize the risk of hazardous materials. The first issue is the degree to which SARA Title III strengthened and extended prior experience in planning and managing hazardous materials in the communities. The second issue is the design of a statewide information system that actually enables local organizations to plan more effectively within their own communities, to build constructive relationships with neighboring communities in minimizing the threat, and to improve the professional response to hazardous materials incidents.

California, with high exposure and extensive experience in seeking means to reduce risk, already had a substantive program of state standards and regulations in place for the management of hazardous materials by 1986<sup>8</sup>, when SARA Title III was passed. Consequently, in an effort not to disrupt existing organizational procedures for emergency planning and response, California adopted a regional approach in establishing its LEPCs. The state had already grouped its 58 counties into six regions for emergency response under its state-wide All Hazards Emergency Plan. Consequently, California chose to build on this relatively new, but existing administrative structure and designated the six regions as LEPCs, although the geographic size of the regions precluded the identification with local communities that was intended as a basic strength of the law. Pennsylvania, in contrast, designated its 67 counties as primary geographic and legal service areas for the LEPCs, drawing upon already existing loyalties to the respective communities that served as an important integrating force within



the LEPCs.

The second issue, still unresolved in most states, is the effective design of an information system that allows appropriate access to the information submitted for actual community planning and response. The questions of aggregation of information and access by local managers with responsibilities for emergency planning and response are still not resolved. The problem clearly becomes more difficult as the data collection, analysis and synthesis moves further away from the communities. State managers, seeking to find the balance among compliance with federal regulations, actual risk of exposure to hazardous materials in communities, and cost of assessment and monitoring this risk, reported varying degrees of utility for actual problem solving from the vast amounts of information collected as specified by law. The appropriate role for state managers in this intergovernmental process is still under discussion and debate.

#### Survey Findings and Interpretation

Reviewing the findings from the survey of local emergency planners, the evidence supports a substantially favorable view of the impact of SARA Title III on the development of local capacity to plan for hazardous materials. Strong majorities of local managers believed that SARA Title III provided positive support for local communities in four out of five states, as shown in Table 1. Only California had a less enthusiastic view, but still the majority of respondents acknowledged some help in planning from the law. Table 2 cites the degree of perceived effectiveness of the Local Emergency Plan developed under the law. Approximately two-fifths of the respondents in four of the five states found the emergency plan to be very effective, with three-fourths of the Pennsylvania planners reporting the Plan to be very effective. Only two respondents in the entire sample perceived the local plan as not very effective.

These findings indicate that in their efforts to accomplish the goals of the LEPCs, local planners achieved a high degree of resonance with their respective local environments. The high degree of consensus is especially important because representatives from very different organizations in the community serve on the same LEPC. This finding illustrates the integrative function of the structured composition of the LEPCs in scheduled, face-to-face communication. The California exception is likely due to larger regional boundaries within which the LEPCs operate, rather than smaller, more familiar county boundaries which draw upon local loyalties. Until sufficient resonance is achieved between the LEPCs and their larger environments, California planners are likely to have difficulty in mobilizing support for collective action.

The findings from the survey also report seven basic characteristics indicating the development of community capacity to

**Table 1**

**Perceived Impact of SARA Title III on Community Planning  
for Hazardous Materials by State**

Q. How much difference, if any, do you think SARA Title III has made in the development of emergency planning for hazardous materials in your community? Would you say that it has helped a lot, helped a little, helped in some ways while hurt in others, made no difference, or made things worse than they were before?

	5 States		CA		KS		LA		PA		SC	
	N	%	N	%	N	%	N	%	N	%	N	%
Helped a Lot	71	58.2	4	16.0	16	64.0	20	80.0	17	70.8	14	60.9
Helped a Little	42	34.4	15	60.0	8	32.0	5	20.0	6	25.0	8	34.8
Helped & Hurt	3	2.5	1	4.0	1	4.0	--	--	--	--	1	4.3
No Difference	2	1.6	2	8.0	--	--	--	--	--	--	--	--
Worse	4	3.3	3	12.0	--	--	--	--	1	4.2	--	--
Total	122	100.0	25	100.0	25	100.0	25	100.0	24	100.0	23	100.0

Note: Hierarchical loglinear procedure shows that the states differ on this question at .01 significance level.

**Table 2**

**Perceived Effectiveness of Local Emergency Plan by State**

Q. In your opinion, how effective was the Local Emergency Plan when activated -- would you say it was usually extremely effective, fairly effective, not too effective, or not at all effective?

	5 States		CA		KS		LA		PA		SC	
	N	%	N	%	N	%	N	%	N	%	N	%
Very Effective	30	48.4	2	40.0	4	44.4	7	36.8	12	75.0	5	38.5
Fairly Effective	31	50.0	3	60.0	5	55.6	11	57.9	4	25.0	8	61.5
Not Very Effective	1	1.6	--	--	--	--	1	5.3	--	--	--	--
Total	62	100.0	5	100.0	9	100.0	19	100.0	16	100.0	13	100.0

Note: Total represent respondents who say that their local emergency plan has been activated in the past 12 months.

manage the risk of hazardous materials. These characteristics will be summarized briefly below, citing the appropriate tables.

- 1. The capacity to move from micro to macro processes, that is, to shift from short-term to long-term goals within organizations and to extend that perspective between organizations at the community level**

Tables 3A and 3B indicate that planning for hazardous materials, as a distinct and relatively newly perceived threat, has been integrated with planning for other emergencies in the respective communities. Again, except in California, the majority of respondents considered this process of planning for hazardous materials initiated under SARA Title III as a short-term goal that is being integrated into their long-term goal of all hazards planning.

This finding indicates that the law fosters adaptive learning for the LEPCs. Flexibility is crucial to achieve long-term goals of community management of hazardous materials. Good integration is strong evidence for the developing macro perspective in community management that involves interorganizational problem solving.

- 2. The capacity for interactive processes of searching, receiving, synthesizing and transmitting information to serve as a basis for action, reflection and continued learning for the whole community**

A rich mix of sources of information and assistance are used in planning for hazardous materials, as shown in Table 4. All seven of the principal sources were cited by almost half of the respondents, with three sources -- local government, state government and private companies -- cited most frequently. Table 5 shows that the three sources of information perceived to be most useful coincide with the three most frequently cited sources of assistance, with slight variations.

When old patterns failed to provide guidance for newly created LEPCs, members engaged in an intense search for information. This search occurred most visibly at state and local levels. Traditional regulations pit public agencies against private industries. SARA Title III reframed the problem of hazardous materials to place these actors on the same side, working together to manage the risk in their communities. As shown in Table 4, 100 respondents reported a flow of information and assistance between private industries and the LEPCs. Further, private industries ranked second on the list of most useful sources named by LEPC members (Table 5). These findings indicate the articulation of commonly understood meanings between public and private agencies, which is the core of interorganizational problem solving.

**Tables 3A & 3B**

**Perceived Integration of Hazardous Materials Planning  
With All Hazards Planning by Sample**

Q. How well is planning for hazardous materials incidents integrated with planning for other emergencies in your LEPC district?

**A. Five States Total:**

	Five States	
	N	%
Extremely Well	41	33.6
Fairly Well	53	43.4
Not Too Well	21	17.2
No Integration	7	5.7
Total Cases	122	100.0

**Perceived Integration of Hazardous Materials Planning  
With All Hazards Planning by State**

**B. Five States Separate:**

	CA		KS		LA		PA		SC	
	N	%	N	%	N	%	N	%	N	%
Extremely Well	2	8.0	8	32.0	16	64.0	10	41.7	5	21.7
Fairly Well	11	44.0	14	56.0	7	28.0	9	37.5	12	52.2
Not Too Well	11	44.0	2	8.0	--	--	2	8.3	6	26.1
No Integration	1	4.0	1	4.0	2	8.0	3	12.5	--	--
Total Cases	25	100.0	25	100.0	25	100.0	24	100.0	23	100.0

Note: Hierarchical Loglinear procedure shows that the states differ on this question with at .001 significance level.

**Table 4**

**Sources of Information and Assistance to Community Planning Process by LEPC Members**

Q. From what sources did your community receive information or other help when you were setting up your local emergency planning process to comply with SARA Title III?

from...	Respondents Who Acknowledge Receiving		Respondents Who Claim Not Receiving		Respondents Who Have No Idea		Total	
	N	%	N	%	N	%	N	%
Local Government	114	93.4	5	4.1	3	2.5	122	100.0
State OES	109	90.1	7	5.8	5	4.1	121	100.0
Private Profit Companies	100	82.0	17	13.9	5	4.1	122	100.0
EPA	71	58.7	26	21.5	24	19.8	121	100.0
Other Federal Agencies	70	57.4	27	22.1	25	20.5	122	100.0
The Governor's Office	64	52.9	40	33.1	17	14.0	121	100.0
Non-Profit Organizations	58	47.9	50	41.3	13	10.7	121	100.0

**Table 5**

**Utility of Sources of Information**

Q. Which of the sources that provided information would you say provided the most useful information or guidance in setting up your LEPC? (Number & percentage of respondents who identify a particular source as the most useful).

Sources	N	%
State OES	39	35.1
Private Profit Companies	34	30.6
Local Government Agencies	17	15.3
Other Federal Agencies	7	6.3
EPA	6	5.4
Governor's Office	5	4.5
Local Non-Profit	3	2.7
Total	111	100.0

**Table 6**

**Frequency of LEPC Meetings by State**

Q. How often are the LEPC meetings now scheduled (when there is no problem requiring one)? (Number and percentage of respondents who identify the frequency of their LEPC meetings).

Intervals	5 States		CA		KS		LA		PA		SC	
	N	%	N	%	N	%	N	%	N	%	N	%
Once A Month	46	39.7	16	64.0	7	33.4	10	43.5	9	37.5	4	19.0
Every Two Months	26	22.4	9	36.0	2	8.7	4	17.4	10	41.7	1	4.8
Four Times A Year	37	31.9	--	--	10	43.5	7	30.4	5	20.8	15	71.4
Twice A Year	2	1.7	--	--	2	8.7	--	--	--	--	--	--
Other Arrangement	5	4.3	--	--	2	8.7	2	8.7	--	--	1	4.8
Total	116	100.0	25	100.0	23	100.0	23	100.0	24	100.0	21	100.0

Note: Hierarchical Loglinear procedure shows that the states differ on this question at .01 significance level.

**Table 7**

**Allocation of Attention to Selected Aspects of LEPC Implementation**

Q. How much time is spent discussing the following subjects at your recent LEPC meetings?

Subjects	Lots of Time		Some Time		Very Little Time		No Discussion		Total Respondents	
	N	%	N	%	N	%	N	%	N	%
Goals/ Objectives	32	26.7	54	45.0	12	10.0	22	18.3	120	100.0
Implementation	32	26.7	62	51.7	8	6.7	18	15.0	120	100.0
Results Achieved	11	9.2	57	47.5	26	21.7	26	21.7	120	100.0
Problems Encountered	35	29.2	56	46.7	18	15.0	11	9.2	120	100.0

**3. The capacity of the newly organized systems, in this case, the LEPCs, to observe and evaluate their own internal performance as well as the external environment**

Self-evaluation is a critical characteristic of evolving interorganizational problem solving. How LEPCs evaluate their own performance and their allocation of attention to the tasks of implementation is indicated by the findings cited in Tables 6 and 7. Table 6 reports the frequency of meetings, documenting their regularity in all five states but showing California with the highest proportion of respondents reporting monthly meetings. Table 7 presents the allocation of attention to key aspects of the implementation process both internally and externally.

Internally, more time is spent on goals/objectives, implementation and problems encountered than on results achieved, indicative of a developing organizational system. Externally, these findings also show that the LEPCs are developing a capacity to observe and evaluate their respective operating environments, a skill essential to the development of a viable new system.

**4. The capacity to generate resources for self-maintenance**

Table 8 shows the allocation of attention to maintenance issues. Members spend substantially more time discussing the availability of resources than resolution of conflicts. It is not clear whether the more urgent problem of resource availability crowds the discussion of conflicts out of the agenda, or simply that there are few conflicts. However, at scheduled LEPC meetings, the problem of resource availability was identified by 82.5% of the respondents as taking some or much of the discussion time. This finding indicates the recognition by the LEPCs of the need to find consensual means to support their activities within their respective environments.

**Table 8**

**Allocation of Attention to Issues of LEPC Maintenance**

Q. How much time is spent discussing the following subjects at your recent LEPC meetings?

Subjects	Lots of Time		Some Time		Very Little Time		No Discussion		Total Respondents	
	N	%	N	%	N	%	N	%	N	%
Available Resources	46	38.3	53	44.2	12	10.0	9	7.5	120	100.0
Conflicts	13	10.9	35	29.4	28	23.5	43	36.1	119	100.0

**5. The capacity for communication of information within and between the newly created systems**

Our model stipulates that communication of information is a necessary although not sufficient condition for discovering shared meaning among a group of diverse participants. Table 9 shows that 71% of the LEPC members communicate with other members on a regular basis outside of LEPC meetings. This finding indicates that the intraorganizational communication processes initiated in the LEPC meetings frequently extend to communication between organizations in the wider environment.

**Table 9**

**Frequency of Communication with LEPC Members  
Outside of LEPC Meetings**

Q. How often do you communicate with any other members of your LEPC on LEPC issues outside of LEPC meetings?

	N	%
Often	43	35.5
Sometimes	43	35.5
Rarely	34	28.1
Never	1	0.8
Total	121	100.0

**6. The capacity for interorganizational problem solving**

Problem solving occurs through communication of information within and between organizations (Deutsch, 1962; Newell and Simon, 1972; March, 1988; Comfort, 1991). Evidence of conditions that support interorganizational problem solving is shown in Tables 4, 5, and 9, cited above. By mandating information exchange between the private and public sectors, the law apparently has had a substantial impact in generating a significant degree of shared information between representatives of industry and public agencies. Further, the law has also resulted in regular and frequent communication regarding planning for hazardous materials management through establishing the organizational structure of the LEPCs. This finding indicates a marked shift from previous patterns of adversarial interaction between public agencies as enforcers and private companies as potential violators of regulations governing the domain of hazardous materials. From this evidence, we infer that the organizational structure mandated by SARA Title III has played a significant role in initiating community planning for hazardous materials by facilitating interorganizational information flow and communication.



Further evidence of a growing recognition of the need for interorganizational problem solving is cited in Table 10. Table 10 shows that nearly 60% of the respondents report that the LEPCs spend some or a lot of time discussing community outreach.

**Table 10**  
**Allocation of Attention to Community Outreach**

Q. How much time is spent discussing the following subject at your recent LEPC meetings?

Subject	A Lot of Time		Some Time		Very Little Time		No Discussion		Total Respondents	
	N	%	N	%	N	%	N	%	N	%
Community Outreach	29	24.2	42	35.0	25	20.8	24	20.0	120	100.0

These findings indicate strong evidence of integration occurring in thought and action on the problem of hazardous materials outside the regularly established structure for planning. These findings indicate a beginning development of autopoiesis, or a self-generating capacity of community leaders to engage in hazardous materials planning that is not externally imposed.

**7. The capacity to sustain collective action to achieve a shared goal**

The development of the long-term capacity to sustain collective action in community management of hazardous materials requires voluntary commitment from a broad spectrum of the residents of the community. The weakest aspect of LEPC implementation appears to be the engagement of the planning committees with the general public. Table 11 cites a relatively low rate of participation by the public in planning activities for hazardous materials management.

**Table 11**  
**Public Participation in Hazardous Materials Planning Process by State**

Q. How actively has the general public participated in planning for hazardous materials management in your LEPC District?

	5 States		CA		KS		LA		PA		SC	
	N	%	N	%	N	%	N	%	N	%	N	%
Very Active	3	2.5	--	--	1	4.0	1	4.0	1	4.2	--	--
Somewhat Active	28	23.0	5	20.0	4	16.0	7	28.0	4	16.7	8	34.8
Not Too Active	59	48.4	7	28.0	18	72.0	13	52.0	11	45.8	10	43.5
Not at All Active	32	26.2	13	52.0	2	8.0	4	16.0	8	33.3	5	21.7
Total	122	100.0	25	100.0	25	100.0	25	100.0	24	100.0	23	100.0

Note: Hierarchical Loglinear procedure shows that the states differ on this question at .05 significance level.

This finding may indicate that the greatest amount of energy and effort within the committees is spent on the integration of community organizations through the mechanisms of the LEPCs. It also indicates an area that needs strengthening, if a true autopoiesis or continuing generative capacity for community management of hazardous materials is to be developed in future years.

### Conclusions and Recommendations

The findings from the study indicate that SARA Title III has made a substantive and important difference in the capacity of communities to engage in planning to reduce risk from hazardous materials. Returning to the preliminary model (pages 5 - 6, above), the five major elements specified for interorganizational problem solving appear to be present and functioning in reference to community management of risk from hazardous materials.

The goal of emergency planning to reduce risk from hazardous materials at the community level, as defined by the law, appears to be clearly understood and accepted by LEPC members. The actors are those organizations that engage in, or are affected by, the production, use, transport, or storage of hazardous materials, as identified by the law. Selected representatives of those organizations make up the membership of the LEPCs in their respective communities, again as specified by the law. The stimulus for initiating planning action again is the mandate of the law, which laid out a schedule of tasks, requirements and incentives for accomplishment. The four conditions -- commonly understood meanings, trust, resonance, and capacity for collective action -- identified by the model as essential to interorganizational problem solving are documented in developmental form by survey findings from LEPC members. While these conditions may still be in nascent

stages in many communities, it is clear that the structure of the law has contributed to the development of trust, resonance and emergent collective action by requiring a format and schedule for community planning to reduce risk from hazardous materials. Through the active use of this format for interorganizational communication, community leaders appear to be reaching commonly understood approaches to reducing that risk.

In sum, the findings indicate that SARA Title III serves as a lens for focusing attention in a systematic manner upon identifying the existence of hazardous materials in local communities and in assessing the degree of the threat posed by their presence. In seeking means to protect the community, the member organizations, through the LEPCs, have indicated their acceptance of different functional tasks, a means of coping with the complexity involved in managing risk on a community scale. Beginning evidence of "resonance" or capacity to activate the community in response to actions to reduce risk is shown. Yet, this area needs significantly more development. As the integration of the LEPCs becomes stronger and improves their internal performance, they are likely to be more effective in establishing the resonance necessary to elicit favorable response from the wider environment.

The findings indicate the initiation of a new interorganizational problem solving process for hazardous materials planning and response at the local level. The process, importantly, is supported and sustained through interaction with state and federal agencies. The balance of energy is clearly shifting to the state and local levels in the management of risk from hazardous materials. However, this shift acknowledges an undeniable drive to continue the creative functions of community through a form of "autopoiesis", or self-generating renewal at the local level.

## NOTES

1. The authors acknowledge the contributions of Irene Witt and Amy Ganulin, who assisted the senior author in reviewing the law and regulations associated with the implementation of SARA Title III. This material draws upon their theses presented to the Graduate School of Public Policy, University of California, Berkeley, in partial fulfillment of requirements for the Master's degree in Public Policy.

2. Ms. Witt and Ms. Ganulin conducted interviews with state managers in Pennsylvania and California, with the guidance of the senior author, during the Spring Term, 1989. The findings reported in this paper are drawn from these interviews.

3. Emergency Preparedness and Community Right-to-Know Act of 1986, also known as Superfund Amendments and Reauthorization Act of 1986, Title III (SARA Title III). Public Law 99-499, 100 Stat. 1613 (1986), 42 U.S.C. Section 11001-11050, ELR. Stat. EPCRA 001.

4. The survey was conducted through the Survey Research Center of the University of California, Berkeley. The authors acknowledge the professional skills of Karen Garrett and Selma Monsky, who ably guided the research process, and Percy Tannenbaum, director.

5. A detailed analysis of this case is presented in L. Comfort, J. Abrams, J. Camillus and E. Ricci, "From Crisis to Community: The Pittsburgh Oil Spill," Industrial Crisis Quarterly, Vol. 3, No. 1, 1989: 17-39.

6. These paragraphs summarize the major provisions of SARA Title III. Harry Dai, Irene Witt and Amy Ganulin have contributed to the collection and synthesis of this information.

7. A thorough discussion of the implementation plan for SARA Title III in Pennsylvania is presented by Irene Witt in "The Emergency Planning and Community Right-To-Know Act of 1986: Implementation in the State of Pennsylvania." A similar analysis for California is presented by Amy Ganulin in "SARA Title III: Emergency Planning and Community Right-To-Know Act of 1986 - Implementation in California." Both analyses were conducted in partial fulfillment of the requirements for the Master's degree in Public Policy at the Graduate School of Public Policy, University of California, Berkeley, Spring, 1989.

8. See Susan Sherry and Regina Purin. 1983. Hazardous Materials Disclosure Information Systems: A Handbook for Local Communities and Their Officials. Golden Empire Health Systems Agency, Sacramento, California. See also State of California. Assembly Bill 2185,

1985 and State of California, Health and Safety Code. Chapter 6.95,  
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