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The Invisible Cupola:
From Causal To Collective Attribution in Ecological Liability[1]

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I. Loosening Causal Links

When I speak about the Cupola, it is not Brunelleschi's architectural masterpiece crowning the Florentine duomo that appears before my eyes. Rather, I see the ugly architecture of organized crime, the brutal super-secret 'cupola' on top of the Mafia's hierarchy which overshadows social life in Italy. Does this cupola exist or not? Over the last years, the Mafia's cupola has been the object of a bitter struggle between Italian judges. While the lower courts have been sending numerous mafiosi to prison because they made part of the invisible cupola controlling "tutti i grandi delitti", the court of the next instance has stubbornly denied the cupola's sheer existence and has set the Godfathers at liberty. In February 1992, in a landmark decision, la Corte di Cassazione for the first time acknowledged the cupola's legal existence. Is the cupola a phantom - a fantasy product of paranoid judges? Or is it a social reality that lawyers have to face if they want to understand organized crime and macro-criminality? In my view it is neither one nor the other; neither lofty legal fiction nor hard social reality 'out there'. The cupola is an artificial construct of legal architecture that serves one overriding purpose. It allows the punishment of individuals whenever certain facts can be proven that indicate their membership in this 'organization'. Whoever is member of the cupola, is as such responsible for the mafia's crimes. The legal construction of the cupola makes the causal attribution of individual crimes superfluous by replacing it with collective attribution. It transforms individual liability into collective liability.

The contours of a similar cupola are emerging in some recent legal constructions of ecological liability. Ecology is a world of tremendously complex interacting causes. The complexities of causation in the three ecological media - air, water, soil - have frustrated lawyers in their attempts to construct causal links between individual actions and ecological damage. Accordingly, they tend to rely less and less on the underlying architecture of causation, resorting instead to rather audacious legal constructions that weaken the structures of individual causation. Causation-in-law, prima-facie, enhanced *res ipsa loquitur*, reversing the burden of proof, probabilistic causation, joint and several liability in multiple causation, enterprise liability, market share liability, Superfund liability - all these new forms of "risk liability" (Robinson, 1985) tend to reduce or even eliminate individual causal

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linkages between acts and damages and to replace them with an overarching cupola of quasi-collective responsibility for ecological damages (Bush, 1986: 1480ff.; Abraham, 1987: 859ff.)

While lawyers are busily constructing the new cupola, they are at the same time anxiously trying to keep it invisible. They hide it behind the conceptual façades of "probabilistic causation", "risk liability" , and "lost value" which stress the individual nature of risk contributions and do not speak about collective attribution (King, 1981; Robinson, 1985: 749; Rosenberg, 1984: 866ff.; Celli, 1990: 652ff.). George Priest, one of the leading architects of the new constructions of risk liability emphatically denies that these changes represent "a decline in commitment to individual responsibility or, perhaps, a shift of expectation toward an impersonal or a collective responsibility." On the contrary,

> "far from incorporating a diminished view of individual responsibility, the shift of the law's purpose toward risk control represents a vastly expanded commitment to standards of individual responsibility." (Priest, 1990: 214).

Against these anxious attempts to hide the ecological cupola I want to argue in this paper that it makes a lot of sense to make the cupola visible. It is crucial to the further development of ecological liability to understand more precisely under what circumstances and in what way courts and legislatures are shifting liability away from the individual responsibility of single actors towards a new collective responsibility of risk networks. As one commentator puts it we need to confront the "emerging shift in tort law from individual to group responsibility and its legal, political, and philosophical implications" (Bush, 1986: 1473). It is important to understand both the implications for legal doctrine and the real-world consequences of this new achitecture. It is far from clear whether the law of ecological liability is able to control this process of risk collectivization in such a way that the obvious loss of individual responsibility is outweighed by the gains of collective responsibility. This depends mainly upon the dynamics of self-organizing processes in the real world and upon the way the law perceives and reacts to them.

I shall put forward the following four propositions:

(1) By loosening the causal links between acts and ecological damages, the courts have come to realize how inadequate individual attribution of reponsibility is in a world of complex interacting causes. Ecological interdependencies press the law to substitute the dominant actor perspective by a systemic perspective. The law tends to create new forms of risk pooling, and even, in some cases, outright formal organizations of risk management which seem to be more adequate to the characteristics of certain ecological risks.

(2) The new risk pools created by liability law pose a challenge to the capacity of legal doctrine to design their external relations and internal structure. What are the

limits of the organization? Who is a member? What organizational rights and duties are imposed? What are the rules that govern the internal redistribution of liability? These are some of the difficult new problems for the law of ecological risk associations.

(3) With the re-entry of these legally created risk pools into socio-economic reality, self-organizing processes of collective action are set in motion. Their effects on ecological responsibility are rather ambivalent. On the one hand, there are clearly negative side-effects - moral hazard, free riding, loss of individual incentives. On the other hand, new forms of collective risk management are emerging which may compensate for those side-effects and may even create incentives for collective ecological innovation.

(4) The question of whether law is in a position to partially direct these self-induced developments via institutional design will be decided by the strength and quality of self-organizing processes. The negative effects of collective action can be partially compensated for by a secondary re-individualization within the risk pools. More importantly, tendencies toward collective risk management can be strengthened if the law helps to organize those corporate actors that reallocate risks, monitor behavior and develop new technologies. This may make it necessary to blur the line between 'private' liability mechanisms and 'public' regulatory institutions.

II. Collective Elements in Ecological Liability

Lawyers tend to underestimate systematically the dramatic changes that occur when - under the pressure of ecological damages - the causal links are broken. They like to see it as a merely technical evidential problem which can be solved by reducing the rigid legal requirements of proof (e.g. Nicklisch, 1991: 346ff.). Either one replaces full proof by statistical evidence or by the means of legal techniques such as prima facie, reversing the burden of proof, or rebuttable and non-rebuttable presumptions one shifts the evidential standards. The most they are willing to admit is that causation as a legal concept, which has historically already changed from causation-in-fact to causation-in-law, is undergoing a new change towards probabilistic causation and risk responsibility (Robinson, 1985; Celli, 1990). In any case, the changes are regarded as being limited to the concept of causation itself with the general principle of individual responsibility remaining intact (Priest, 1990: 213f.).

It is as if these lawyers blind themselves to avoid facing the ecological cupola. As I have already said, whenever the law loosens legal requirements for causation-in-law it is necessarily creating constellations of collective liability. Individual actors are made responsible for deeds which other actors may have committed. Their responsibility is no longer exclusively connected to actions of their own that caused the damage, but is mediated by the overarching cupola that covers them and other actors. They become part of one and the same risk creating community - the eco-mafia, as it were.
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This is already true of the seemingly harmless cases in which legal certainty is reduced from full to probabilistic proof of causation. To the extent that full causation differs from statistical causation, individual actors are burdened with an additional responsibility for actions that other actors have committed and over whose actions they have no control. This realm of collective liability is growing the more we move toward reversal of the burden of proof or towards legal presumptions of responsibility. If a defendant is not in a position to prove that his actions could not have caused the environmental damage, he also bears the responsibility for the actions of others.

What we find in these constellations is an asymmetric collective responsibility, a kind of 'horizontal' vicarious liability. With 'vertical' vicarious liability in hierarchical organizations, employers are made responsible for the actions of their employees. Here the law, by imputing causation where no causal link can actually be proven, makes one individual vicariously responsible 'horizontally', for wrongs that have been committed by some other members of a group of actors.

This asymmetric responsibility becomes symmetric in the cases of multiple causation with contribution, market share responsibility, Superfund liability, and, more generally in cases of risk liability. Here, it is the actual membership in a class of risk-bearers that makes individual actors mutually liable for the actions of each other, independently of the factual causal chain that led to the damage. People like to call this technique "risk contribution" for it can once again be attributed to individuals (Celli, 1990). However, our context is not penal law where sanctions can be imposed for the mere creation of a danger independently of actual harm. Our context is financial liability for ecological damages. Here the question is: Who pays for the damage? And the answer is: The collective is responsible. If you happen to be a member, you have to pay. This is fully-fledged collective liability. Membership, not action, determines liability.

Thus, what Priest (1990: 214) and others euphemistically call the new risk law's "vastly expanded commitment to standards of individual responsibility", is, in reality, only the desperate attempt of sworn-in individualists to cope post factum with the perverse effects of their having manipulated the law of causation. The sacred principles of individual causation have been violated, even if they do not admit it. The original sin against the holy principles of individualism consisted in accepting probabilistic and statistical evidence (Bush, 1986: 1493). The inevitable effect is the creation of a "liability collective" which in principle has no boundaries. One should not try to downplay this effect, but instead face the radical consequence that under such a concept of risk contribution every action - and omission - in the whole society is risk generating (Priest, 1990: 215). And, as a consequence of this, it becomes necessary to construct artificially new secondary criteria that define the somewhat arbitrary boundaries of a risk community and to re-individualize responsibility via a similarly arbitrary risk apportionment within such a risk community. This is what the legal architects are actually doing. First they collectivize liability, and then they try to do away with the consequences of their own action by re-individualizing it as much as possible. After creating de facto a collective liability regime they have to define

intra-organizational rules of loss allocation in order to determine to what degree a member has to bear an individual share of the collective's responsibility.

How are we to interpret these dramatic changes in ecological liability law? Obviously, they cannot be limited to problems of causation alone. They give rise to the more fundamental question of whether for ecological risks with a complex web of interacting causes, "it is no longer tenable to attribute them to individual decisions (rational, intuitive, or habitual)". Should we not, instead, experiment with a "strictly sociological approach" to these ecological risks (Luhmann, 1991: 13)? Such an approach would identify networks of communication as the exclusive bearers of risk, rather than individual or corporate actors. It would no longer focus on individual preferences, individual risk perception, individual choices and individual responsibility but on communication about ecological risks as self-organizing social processes. Driven to its extreme, such an approach would expect that the attribution of risk to communication in modern society takes place even in cases where a decision cannot be identified at all (Luhmann, 1991: 130).

It is the very interwovenness of ecological risks in these constellations that drives the fundamental assumptions of liability law into a deep crisis. While the reasons for the crisis, and its symptoms have been identified, it is rather unclear what direction ecological liability law is going to move in. Specifically, three conspicuous features of modern technology have been identified that render causal isolation for the purposes of individual attribution almost senseless (Bechmann, 1990: 128ff.; Bechmann, 1991: 222ff.; Wagner, 1990: 27ff.) There is, first, the so-called butterfly effect. Small-scale technological effects gradually accumulate and lead to sudden catastrophic changes. Secondly, there are problems of interference. Several technologies may have unanticipated effects in their combination with each other. Thirdly, situations of highly improbable coincidence arise when two or more causal chains intersect in a non-foreseeable way.

These problems of causal isolation make it almost impossible to identify the traditional elements of liability rules. These are the conceptual symptoms of the structural tensions between ecological risks and liability law:
(1) How can we identify the "individual actor", the "action", and the "injury" if we face a gradual long term development with the interference of several risks?
(2) How can we disentangle a causal link between action and damage if causation is multiple, interwoven and circular?
(3) How can we define the boundaries of the potentially dangerous actions?
(4) How can we identify the victims as social units if they form an amorphous mass (ecological damages, future generations)? (Rabin, 1987: 27ff.; Brüggemeier, 1991: 297ff., and in this volume; Luhmann, 1991: 99f.; Schmidt, E., 1991: 378ff.).

Let us try to determine more precisely the collective element in ecological liability. Obviously, it is not only collectivization in the sense of the well-known shift to impersonal liability, from the traditional highly personalized liability to a standardized liability of "role bundles" of legally constructed "persons". Rather, it is individual attribution to "persons" as such which is increasingly being doubted. However, since

a very specific collectivization seems to occur it is also too simple to speak - as Bush, (1986) and Abraham, (1987) do - only of a general shift to "collective liability" (Köndgen, 1991: 105).

Nor can the new ecological liability be subsumed within the standard cases of collective liability - vicarious liability and respondeat superior - in which either managers in the upper echelons of a hierarchy or the whole corporate actor are made liable for actions of organization members (Prosser & Keeton, 1985: § 69). These are attempts by the law to change the risk perception of whole organizations instead of individual actors (see Brüggemeier, in this volume). But in our case of ecological liability there is no pre-existing overarching organization, no hierarchy, no corporate actor which would coordinate action and serve as the point of attribution.

Equally situations of 'piercing the veil' in corporate law, or the extension of liability beyond the traditional boundaries of the corporate limits of liability or contractual privity in contract law, are not comparable (for ecological liability of groups, see Hofstetter, in this volume; for the limits of contractual privity, see Adams & Brownsword, 1990). In all these constellations the law still refers to socially pre-existing corporate actors or at least, some stable co-operative arrangements and makes the encompassing collective unit responsible for the members' actions. Admittedly, in these cases, the law does redefine and reshape the collective units according to its liability policies, frequently against the intent of the actors involved. But these extensions of individual liability into collective liability do not and cannot go beyond the boundaries of a pre-existing collective social arrangement.

However, when the new law of ecological risks attaches liability to markets, to "bubbles" of air pollution, and to contaminated sites, it does not focus on actors, whether individual or corporate, and their risk perceptions. It totally abandons the actor perspective, and focuses on risk communication as such. Risk communication is generated within social configurations that cannot easily be identified as organized systems. And the law attaches liability to this risk communication, to a set of activities as such - a product market, a contaminated site, an air pollution bubble - which do not necessarily aggregate into the organized will-formation of a corporate actor. The crucial difference seems to be that the law does not refer to pre-existing social units but creates anew networks of ecological risks. It does not attempt to change the risk perceptions of existing collective actors created as a result of organizational decision making. Rather, it tends to influence ongoing, non-coordinated risk communication in a social area which is defined by attributing a specific level of ecological risk. And whenever individual or corporate actors enter such a communicative space they become compulsory members of such a risk pool by force of the liability law. They become collectively liable without regard to their psychological will-formation and its social aggregation, and without regard to the causal links between their individual action and the damage.

In some cases, the law even goes one step further. It seems as if modern ecological liability in the new American Superfund (Stewart, 1991), as well as in the most recent discussion of ecological risk associations (Umweltgenossenschaften)

and ecological funds in Germany, is inspired by Old Bismarck with his compulsory associations of the Berufsgenossenschaft from 1884 (Kinkel, 1989: 297; Rehbinder, 1989: 161; Wagner, 1990: 52ff.). Here, law not only creates compulsory risk pools for certain categories of actors for liability purposes, but it also creates fully-fledged corporate actors - compulsory associations which have a corporate capacity for action. Risk pools are not only made liable for failing certain ecological standards but also for failing to take corporate action in collective risk management. Here, we face the merging of collective liability with the active regulation of collective innovation (Rose-Ackerman, 1990: 746).

Now we understand better why some lawyers emphatically warn against manipulations of causation-in-law (Epstein, 1985: 1377; Medicus, 1986: 781, 785; Abraham, 1987: 898). What began as a simple equitable demand - not to leave uncompensated victims in cases involving complex causal networks - becomes a fundamental transformation of individual liability into collective risk pooling. Those lawyers see this manipulation of causation as an "overshooting", as

> "creating wrong incentives for prevention and falsifying resource allocation, since it burdens actors who have not caused the damage with costs" (Rehbinder, 1989: 157; see also Assmann, 1988: 111).

However, this argument overlooks two crucial points. First, it would not only be unfair but even more inefficient if victims remained uncompensated in those cases of complex interwoven causes. There would be no incentive for prevention at all, and resource allocation would be even more misdirected (Rehbinder, 1989: 157). The choice at hand is not collective liability versus individual liability since the complexities of causation make individual liability virtually impossible. The real choice in these cases is collective liability or no liability at all.

Second, the critics indeed hit the mark with their claim that actors bear costs for damages which they did not cause, but they ignore the cupola. It is as if they do not want to see the potential of collective attribution. This has to do with their ideology of methodological individualism which compels them to systematically devalue collective action by dissolving the corporate actor in a nexus of individual contracts. They cling to individual attribution in a situation where - as they well know - it has become totally inadequate, nay, where it is impossible to establish individual causal links. If one admits, however, that in these situations risk, action, causation and responsibility can be attributed to risk pools created by fiat of the law then one sees clearly that the law burdens precisely those collective actors who have actually caused the damage. Incentive creation and resource allocation must then be rethought, so that they do not only deal with individuals and pre-existing corporate actors but also with the newly created risk pools.

III. The Contours of the Cupola

When lawyers are replacing the single causal links of individual responsibility

with the overarching cupola of collective liability, they are confronted with a whole new set of construction problems, the questions of how to design the inner architecture. How far can one expand the outer contours of the ecological cupola - without the whole edifice breaking down? Who is covered by the roof of the cupola as a member? What duties does a cupola dictate for its members? How does the cupola distribute losses among its members?

The first question for legal doctrine is how to identify the risk pool. When the causal links are broken, one of the hardest tasks for a collective liability is to find reasonable boundaries for limiting the range of risk creating activities. Any social communication can potentially contribute to ecological risks, and thus the ecological cupola seems to cover the whole society. "Almost every human action will increase the probability of occurrence of loss in all contexts. It follows, thus, that under modern conceptions of risk, no action is ever truly innocent" (Priest, 1990: 215). And the main question becomes: "How far do we expand enforcement of tort standards based on probabilistic measures of harm?" (Robinson, 1985: 796).

Desperately seeking a corporate actor - this is how the courts initially tried to cope with multiple causation in different countries, after they came to realize that the individual actors had been lost. Apart from attempts to narrow the problem down to the technical question of proof of causation, the more conscious doctrinal attempts to design collective liability were looking for workable criteria that would identify an acting collective, a purposive organization, or at least planned cooperation which could be made responsible as a whole.

In the United States, under the original tort doctrine of "concerted action" joint liability could be imposed upon

> "all those who in pursuance of a common plan or design to commit a tortious act, actively take part in it, or further it by cooperation and request, or who lend aid or encouragement to the wrongdoer, or ratify and adopt the wrongdoer's acts done for their benefit." (Prosser & Keeton, 1985: 323).

This doctrine tries to identify a collective through certain characteristics of individual actors (intention to cooperate) and structural characteristics of action (interwovenness). It, thus, sticks as closely as possible to the original actor model: "the act of one is the act of all, and liability for all that is done is visited on each" (Prosser & Keeton, 1985: 346). However, the structures of ecological risks do not follow the logic of cooperation and, therefore, strain the doctrine of concerted action. Express agreements to damage the environment are not common, tacit understanding is difficult to prove, and seems anyway to be alien to the typical constellation of multiple causation, and especially of ecological risk causation.

The courts then attempted to develop the idea of collective liability and invented so-called "enterprise liability" by further loosening the requirements for conscious, planned and purposive cooperation (Sheiner, 1978: 995-1006; Podgers,

1980: 827). In Hall vs. DuPont, the court was satisfied that there was a "joint enterprise" between otherwise independent actors only where there was "joint control of risk" through common adherence to industry safety standards and the delegation of the functions of safety investigation and design to a jointly sponsored trade association (345F. Supp. 353 (E.D.N.Y. 1972), at 375-6). Although a formal joint venture is not required to prove "joint control", at the very least evidence should be provided of shared research, joint testing of products, and joint legislative lobbying (Connor v. Grand Western Savings & Loan Association (1968) 69 Cal. 2d 850). A minimal requirement for enterprise liability is an "insufficient, industry-wide standard of safety as to the manufacture of the product" (Sheiner, 1978: 995). But again, this doctrine fails to catch the typical risk structure and even turns out to be counter-productive. It cannot cover "parallel conduct" on the part of the maufacturers (Bush, 1986: 1483; Spitz, 1990: 626), and even has the strange effect of privileging parallel conduct in relation to collective attempts of joint risk control. Attempts at joint risk control are punished by imposing enterprise liability while competitive individual "parallel conduct" without any attempt at collective risk management does not give rise to liability. Enterprise liability thus has the perverse effect of creating disincentives to industry-wide cooperation and risk control.

Following this it seemed only logical to give up the vain search for a corporate actor and to choose the market itself as the new collective unit on which to base a collective liability, despite its non-cooperative and competitive character. This is what happened in the famous "market-share liability" (Abraham, 1987: 861ff.). Any attempt to find an overarching organization, be it a firm, a corporate group, or a cooperative network which coordinates action in a "joint enterprise", is dismisseed in favour of the search for the "relevant" market.

Whenever you enter a market, you become responsible for the ecological risks which the market is creating. This is a very strange idea which seems to contradict the well-founded principles of collective liability, presupposing cooperation, joint activities, and mutual control (Bush, 1986: 1477). The competitive market is the very opposite of a joint enterprise as a plausible basis for collective liability (French, 1982; French, 1984). How can I be made liable for the actions of others if there is not any cooperation among us and if I have no control whatsoever over their actions which could justify common attribution? This contradicts the commonsensical understanding that "companies are liable only for the harm their own product does, not for their rivals' damage" (The Economist, Feb. 29, 1992, p. 16). And the fact that market share liability limits my liability to my market share does not really make things better. I will still be made responsible for the damaging actions of others and the limitation to the share only anticipates the existing apportionment of losses within the risk pool (Bush, 1986: 1485; Abraham, 1987: 862).

Looking to doctrinal developments in my own country there are similar tendencies which produce similar dilemmas (Medicus, 1986; Assmann, 1988; Brüggemeier, 1991; Köndgen, 1991). The German Bürgerliche Gesetzbuch recognizes joint liability for multiple tortfeasors whenever each tortfeasor could have caused the whole damage and the action was committed jointly (§ 830 I2 BGB).

Initially, the courts demanded a cooperative link between the actors, at least in the sense of mutual knowledge of the dangerous activities in the mind of each of the tortfeasors. But this link has been progressively loosened so that today a certain "unitary spatial or temporal connection" is sufficient for joint liability. The Federal Court (Bundesgerichtshof - BGH) even goes so far as to reverse the burden of proof whenever the interaction of two causal chains makes the identification of individual causes impossible (BGHZ 66, 70 - Steinbruch - 1976) - a result which is criticized by academic commentators as unprincipled equity (Köndgen, 1991: 101f.). In the discussion of a new Environmental Civil Liability Act (Umwelthaftungsgesetz) the giving up of the requirement of "alternative causation" in certain key ecological areas was seriously considered in favour of joint and several liability. However, the final version is much more limited (Gesetz über die Umwelthaftung vom 10.12.1990, BGBl I S. 2634 - UmweltHG). It creates a presumption of causation for an individual operator under certain conditions (§ 6 UmweltHG) and extends this presumtion to multiple operators (§ 7 UmweltHG).

The German doctrinal developments do not lead to exactly the same results as their American counterparts. However, they have one thing in common. Liability law artificially creates a collective in situations of non-cooperative behavior. The courts no longer search for pre-existing purposive coordination of action as a premise for collective liability. They have given up linking collective legal responsibility to social collectives, or de facto cooperative behavior, let alone linking it to the existence of a fully-fledged corporate actor. They no longer attempt to identify a collective in social reality, but bluntly impose a collective by the force of law.

This innovative move resolves one problem at the cost of producing a new one. If there is not a pre-existing collective in social reality, then what is the underlying principle that guides the artificial and authoritative imposition of a risk pool by law? The American experience would suggest that the market be chosen as the risk creating unit. But which is the 'appropriate market'?: the local, the regional, the national, or the global market? What happens in market share liability if the ecological damage occurred in an area geographically distant from one industrial polluter in the product market? And why market and not industry liability? In the (in)famous DES case, the national US-market was a convincing solution for identifying the dangerous medical products, but is the market a generalizable criterion for cases of ecological liability?

The German solution suggests a more abstract 'spatial or temporal unity of risky activities' or an equally abstract 'non-traceable interaction of causal chains'. But both criteria reveal the usual fault with German abstractions. They may be theoretically convincing but are too vague and too general to be useful in practice.

I suggest seeing the underlying principle as a legal policy that defines the relevant risk pool as an ecological problem area according to its suitability to collective risk management. The crucial criterion is neither ecological interwovenness nor pre-existing cooperative links but the capacity for risk

management. This is, admittedly, "opportunistic" attribution (Luhmann, 1991: 129), though not causal but collective. For the purposes of collective liability, the law can identify concrete areas of ecological risk (a lake, a river, a site) with an eye to creating a social arrangement that can deal with these risks. This can be in two senses. The first is that of dealing with past damages. The law delineates the collective so as to make compensation possible in cases of multiple causation and to create a sufficient finance pool for covering the losses and spreading the risks ('deep pocket', 'risk spreading'). In the second sense, and perhaps more importantly, risk management means the collective influencing of future behavior (Bush, 1986: 1553ff.). The law designs the contours of the risk pool in such a way as to create a realistic basis for an active and joint risk prevention in an area where ecological problems are concentrated. In both aspects, the law isolates a social space for collective responsibility, combining ecological and social criteria so that a joint ecological risk technology has a chance to develop and operate. In cases of conflict, it could even cut through ecological interdependencies if reasonable limits for a social arrangement could be identified.

Admittedly, this formula does not provide clear means for setting the conceptual limits of the collective, as the more traditional search for pre-existing hierarchical or cooperative arrangements was able to do. A policy-mix would be responsible for a 'reasonable' pooling of risks. The situation resembles the strategic policy-mix that insurance uses when creating different risk categories among the insureds ("risk classification", Abraham, 1988: 949; Eubank, 1991: 194). The formula is wider than the American doctrine's concentration on markets with their individual risk contributions, but narrower than the spatial and temporal unit of German doctrine which gives no criteria by which the 'unit' can be defined. The formula has the advantage of allowing the identification of a whole range of different risk pools to which collective liability can be attached: not only product markets, but also ecological chains, contaminated sites, poisoned lakes and rivers, pollution bubbles and other ecological problem areas. Suitability for ecological risk management should I would argue, always be the overriding criterion.

Under this formula, market share liability would only be one among several options for choosing an ecological problem area. In the case of hazardous products that are distributed in a consumer market, the ecological risk area would seem to be best identified by the market itself:

> "... the industry rather than the individual manufacturer should be the focal point for liability because it can best allocate risks, distribute costs, and take preventive measures" (Sheiner, 1978: 1002-4)

But the subsequent question of how to identify the "appropriate market" (Spitz, 1990: 619ff.) - in terms of identity of the product and the geographical extension - should not only be answered by reference to its economic properties (substitutibility of the product, marketing approaches, and density of transactions) but openly by criteria of ecological risk management. Equally, it is frequently unclear whether the 'appropriate

market' is local, national or global. Under our formula this choice would not be made independently of such considerations as: Is the market widely enough defined as to be able to financially absorb the damages? Will the definition of the market lead to an acceptable spreading of risks? Is it, on the other hand, narrow enough to allow the actors involved to cooperate and to create a decentralized joint risk control? Is there a realistic chance of collective risk management?

The Hall v. Dupont case clearly showed that suitability for risk control was a concern by emphasising that its opinion only applied to,

> "... industries composed of a small number of units. What would be fair and feasible with regard to an industry of five to ten producers might be manifestly unreasonable if applied to a decentralized industry composed of thousands of small producers" (378).

What market share liability does is to induce a partial horizontal integration of firms. Liability law creates "joint ventures", in a manner of speaking, for collective risk management in a given market. This makes sense - as in the DES case - when a product market for hazardous goods exists. In other situations, however, the ecological risks are quite different. In an ecological chain, for instance, the typical hazards can only be identified if one takes different stages into account: raw material delivery, production, distribution, consumption and waste disposal. In these situations, it is not horizontal but vertical integration that is required. Liability law should create a vertical liability chain, which might induce new forms of vertical risk management in the different phases of product transformation. There are Japanese and German experiences of ecological arrangements between firms in a whole production chain (Weidner, Rehbinder & Sprenger, 1990). Liability law should not hesitate to use the threat of drastic financial sanctions in order to facilitate such arrangements.

In the American Superfund a different principle again is at work (Stewart, 1991). Here, collective liability is no longer attached to socio-economic configurations - whether formal organizations, markets, or vertical production chains. Instead, the law defines geographical units. Contaminated sites are the new ecological problem areas to which certain actors have a close relation. The law creates a compulsory association between rather heterogeneous actors - landowners, producers of hazardous materials, transporters and site-managers - who are made jointly and severally liable for damages and clean-up operations. It is the social arrangement centering around a geographical risk-area that becomes the 'unit' of risk management policies. And the Superfund law gives wide discretion to the regulatory agency, not only to define the broad risk pool of the contaminated site itself, but also to choose a core group of key actors within this pool that have the resources and the expertise to be especially suited to collective risk management (Stewart, 1991: 112).

'Bubbles' are comparable collective risk units also defined along geographical

lines. Groups of air polluters are collected into bubbles in which, after the definition of global pollution limits for the whole bubble, individual pollution rights can be traded (Dales, 1968; Raufer & Feldman, 1987). If these limits are overstepped then problems of collective liability occur (Keeler, 1991). One answer might be pollution share liability. But, more interesting is the case of pollution right trading within the bubble leading to perverse effects such as "hot spots", where there is the undesired local concentration of pollution within the global limits of the bubble. In this case new collective liability problems occur that can be shifted to government as the initiator of the bubble (Roberts, 1982: 1026ff.; Peeters, 1991: 162). But with the same right they can be shifted to the polluter collective "bubble" itself (Boucquey, in this volume).

In Germany, there is a lively discussion of whether and, if so, how to create regionally decentralized ecological associations (Umweltgenossenschaften) which would combine collective liability with joint risk management (Bohne, 1987; Kinkel, 1989: 295f.; Rehbinder, 1989: 161; Wagner, 1990). They could make use of old collective institutions, the so-called water associations (Wasserverbände), which regulated damages from the usage of water and mining. The associational purposes would be redefined according to new ecological needs:

> "Creating risk pools of all polluters of one river or of all air polluters in one area offers unique possibilities for an ecological damage prevention which would take account of regional and functional characteristics. Since ecological damages mainly depend on the concentration of toxic material and the time span of exposure and since the greater part of emissions have regionally limited effects, regional institutions seem to be desirable for ecological damage prevention." (Wagner, 1990: 112).

This makes clear that it is the suitability for joint risk management which leads to the preference for regional and decentralized risk pools.

If the contours of the ecological cupola are thus defined by the ecological problem area concerned, this still leaves the question of which activities the cupola will cover: Who is a member of the risk pool? Once again, suitability for joint risk management would seem to be the overriding concern. It is not by chance that the German courts who were asked to make government liable for the Waldsterben (death of the forests) did not for a moment consider attaching collective liability to car-driving as the most obvious cause of the disaster in a typical ecological problem area (Bundesgerichtshof - BGHZ 102, 350, 362f.). The reason for this exclusion is a simple policy-consideration: suitability for joint risk management. The small scale risk contributions of millions of individual car-drivers aggregate into a large scale risk - and this peculiar situation seems to be the main underlying motive for not attaching liability. This is not the typical situation faced by the new collective liability, which can induce smaller groups of risk contributors to undertake an active joint risk management whether on the basis of a collective deep pocket, or by creating an institution of joint risk control. Active joint risk management thus refers to

"homogeneously composed, relatively small, interactive collectives" (Wagner, 1990: 109; Kinkel, 1989: 296). This suggests a definition of liability pools which leaves out ordinary people and concentrates, instead, on "corporate, professional, and governmental defendants" which leading in turn to better prevention and better risk spreading (Priest, 1990: 219).

A similar principle is at work in market share liability. There a frequent concern is to attach liability only to "substantial" risk bearers (Sindell v. Abbott Laboratories, 607 P.2d 924 (Cal. 1980)). The same is true for multiple polluters' liability in the German Water Resources Management Act (§ 22 Wasserhaushaltsgesetz). The American Superfund has a de minimis clause which allows the regulatory agency to settle financially with small scale contributors and to concentrate attention on the large and powerful players (Stewart, 1991: 112). In all these instances legal responsibility is attached to a certain capacity for social action.

Finally, there is the issue of organizational duties that are attributed to the individual members of the risk pool. For individual firms, an intra-firm 'duty of ecological loyalty' has emerged parallel to duties of associational loyalty - fiduciary duties and good faith duties - that we are accustomed to in corporate arrangements. § 5 of the German Bundesimmissionsschutzgesetz, for example, sets out the "duty of ecological organization" (Feldhaus, 1991: 931). Similar developments are going on at the inter-firm level. "Hot spots" in "bubbles" may once again serve as an example (Roberts, 1982; Boucquey, in this volume). In a market for pollution rights members are free to buy and sell as many pollution rights as they wish. But the institutional context imposes duties of loyalty, which derive from the ecological 'purpose' of the bubble. It is not, after all, just an economic institution, which allows the courts to develop rules of unfair competition. It is an ecological institution created with the overriding purpose of protecting the environment against pollution by establishing a market of pollution rights. This legal purpose justifies the judicial development of ecological loyalty duties beyond the usual duties of loyalty in purely economic institutions. In the situation of a 'hot spot', even if the overall emission standards are not overstepped, individual members are 'estopped' from buying and using so many pollution rights that they create an unbearable local concentration of pollution. The further evolution of risk pools may reveal many other instances of similar ecological good faith duties for pool members.

The most worrying problem, but at the same time the most promising issue, in this context, has to do with "solidarity" within the ecological risk pool (Bush, 1986: 1473ff.). As we have said, collective liability means that individual actors are made responsible for the activities of others. If we translate this into the language of legal duties, it means that pool members are burdened with the duty of monitoring each other's behavior. This seems to ask the impossible! Even those actors that make every attempt to reduce their own individual risk as much as possible cannot escape from this duty. They have to face the inevitable consequence of the loosening of the causal links: their individual risk sphere is no longer the single firm but the whole pool. This, of course, has given rise to criticism in the name of fairness and efficiency and leads to the condemnation of the whole collective approach to ecological liability

(see above). Especially under the Superfund-liability it seems "questionable from an efficiency point of view whether current owners of pieces of land who had no influence on pollution should be jointly and severally liable with the former owners and polluters of the land" (Hofstetter, in this volume, p. 13). At the same time, advocates of risk liability seem to regard this as the main motive for making the cupola invisible.

There is only one solution, only one way to fulfil this duty - to cooperate! In our constellations, improvements in ecological safety are,

> "... a 'local public good' to the industry. A concerted industry effort to improve safety is required since, by definition, the problem is inherent in the nature of the product and is not the result of carelessness by individual producers" (Rose-Ackerman, 1990: 745).

Thus, in the last instance, collective liability law creates - de facto - a duty to cooperate in joint risk control, a duty to organize in collective action, and a duty to create institutions that take over the collective management of collective risks, primarily through prevention research.

Of course, in the context of strict liability it is not very meaningful to speak of a legal 'duty' of cooperation, since liability is attached to the damage whether this duty was fulfilled or not. But even in this context, the 'duty' reappears as a factual burden of prevention. If you enter a market governed by market share liability and wish to reduce your own liability risk it is not enough to reduce risks in your own firm. It is also necessary to ensure that a collective institution exists that monitors the behavior of all members in the market.

It also makes more sense to think further about such a duty of cooperation in liability for negligence (see also Brüggemeier, in this volume: 4.3). Defining the concrete duty of care in a situation of joint liability cannot be limited to the measures taken by the individual firm. It also requires the definition of the kind of measures that have to be taken so that risks are reduced within the whole risk pool. The law has created a 'duty to organize' according to which the management of the individual firm has to make sure that a collective effort is created among individual firms to organize personnel, material and technical operations in such a way that environmental risks are reduced. And, finally, thought must be given to the question of whether an adequate individual contribution to collective risk control can serve as a means of escaping this collective liability (see below V).

IV. Real World Effects

At this point, however, we should take care. After all, when talking about negligence and prevention we are no longer dealing exclusively with the symbolic world of legal doctrine but with its real world effects. And this relation is not as close and direct as the assumption of norm-sanction-obedience in traditional legal doctrine

suggests. Nor should we be carried away by the law-and-economics rhetoric which wants us to believe that small changes in the law, for example changes in the judicially defined level of due care, are directly translated into economic incentives for prevention (Tietenberg, 1989: 308ff.). Rather, we should listen carefully to what empirical research on the economic effects of liability law and its theoretical interpretation have to say about the more complicated relation between legal norms and corporate behavior (e.g. Weber, N., 1987; McGuire, 1988). This suggests that we replace the over-optimistic model of "incentives through legal norms" by the the more modest model of "social order from legal noise" (Förster, 1981: 17; Teubner, 1993: ch. 5).

Empirical research on the effects of liability law suggests that the corporate world perceives changes in liability law - even dramatic ones like the change from negligence to strict liability - only as outside noise, as extremely vague messages, and not as the clear signals for the fine tuning of corporate behavior that the law and economics literature tends to assume:

> "All the firms viewed product liability as essentially a random influence, generating no clear signal as to how to adjust design behavior. .... we were struck in the companies that we visited by how few changes in law were transmitted to those involved in design decisions" (Eads & Reuter, 1983: 107 and IX).

Sociological theorizing on law, politics and economy from Max Weber (1978: 319ff.) to Niklas Luhmann (1988: 324ff.) tells us that this lack of transmission is not a simple loss of information that could be easily corrected by improving the quality of communication. Rather we face here systematic communicative distortions which result from the inner logics of different worlds of meaning: ecological politics, the tort law system, the relevant market, the inner politics of formal organizations. No doubt, politics and law send signals to the economy, which has to orient its actions toward these differences,

"However, this effect cannot be called political regulation of the economy, and this effect is itself not under political control. It depends on the context of the other system how the difference is constructed and how it is subsumed under the existing economic self-regulation programs" (%Luhmann, 1988: 337).

The corporate world will not observe legal norms as precise normative commands requiring obedience. Rather, this world perceives legal norms highly selectively and reconstructs them in a wholly different meaning context. Legal signals are re-interpreted anew, according to the inner logic of the concrete market and the concrete organization. In principle, each of these worlds reconstructs legal signals, but the same legal signal can reappear in a multiplicity of reconstructions (see Teubner, 1991: 129). And the choice between different reconstructions depends on the concrete situation. The world of economic transactions will reconstruct liability

rules in a variety of ways: as mere cost factors, as economic property rights, as bargaining chips, and only rarely as changes of preferences. And the world of intra-organizational decision-making reconstructs them again in a multiplicity of meanings: as organizational constraints, as internal power positions, as new elements in the goal set, as exclusively legal questions concerning the lawyers, as cost factors concerning the finance department, and only in rare cases as incentives for managers to change the monitoring of production and for engineers to change the design.

This leads to a more deeper explanation of empirical findings which contradict optimistic assumptions about incentive-creation in the market:

> "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 ... except to the extent that such change led to significant changes in the overall cost of product claims" (Eads & Reuter, 1983: ix).

Due to the typical division of labor between different departments within economic organizations, the legal message usually gets lost before it can create incentives for different decisions (Stone, 1975: 201ff.; Scharpf, 1987: 117f.). And in some organizations empirical research has even identified conscious strategies that made "substantial efforts to keep their ... liability problems separate from their ongoing operating decisions" (Eads & Reuter, 1983: 94). After such a twofold communicative distortion of legal messages in market and organization, the signals of legal liability tell at best: "Be careful or you will be sued" (Eads & Reuter, 1983: viii). And of course, this vague signal does not necessarily translate into preventive measures but into all kind of evasive behavior according to the dominant organizational policies.

The norm-incentive model has no systematic account of these complicated reconstruction processes in different worlds of meaning, in ecological politics, in liability law, in market transactions, and in intra-organizational dynamics. It subsumes them all within the impoverished language of economic cost considerations, and deals with real world deviations either by ceteris paribus clauses or by ad hoc adaptations of the models to "reality" (Tietenberg, 1989: 315ff.). This makes the norm-incentive model of limited use to our problem of how liability law relates to the real world when it begins to create a new collective ecological liability. We can better replace it by a model of recurrent 'legal pressures' and 'corporate responses' which give rise to new pressures and new responses in an infinite self-organizing process. Thus, we should be skeptical about our technical ability to design sophisticated cost incentives, which are supposed to change the behavior of rational actors within the universe of economic rationality. Instead we should work with a multitude of self-organizing processes - ecological politics, the law of liability, the product market and the formal organization - that are separate from each other but at the same time structurally coupled to each other. They do react to each other, but only in a highly selective and rather unpredictable way (Blecher, in this volume).

"'Sustainable development', not efficiency emerges thereby as the ultimate paradigm" (Hofstetter, in this volume: p. **14).

We should be equally skeptical about the predictive power of elegant norm-incentive models. Consequentialism in liability law is possible and meaningful, but not in the sense of ex ante predictions as if liability law could effectively predict the effects of its changes with the help of economic models and react to these effects by anticipatory adaptations. Consequentialism ex post seems to be more realistic, in the sense that liability law institutions should become more sensitive to their empirical effects in the corporate world than they are at present and reshape their concepts according to their factual experience with corporate responses, creating new legal pressures and new corporate responses in a long-term 'discovery process' based on 'order from noise'.

What can we say about the corporate responses to the new ecological risk liability? The retreat of the insurance industry from ecological risks? The invention of new insurance techniques that are adapted to joint and several liability? The emergence of institutions of joint risk management? The opportunistic behavior of firms in situations of collective action leading to an inefficient level of ecological risk prevention? The completely defensive behavior in massive litigation strategies? There is some empirical research available - especially in the field of product liability (Eads & Reuter, 1983; McGuire, 1988). But this is not yet sufficiently rich to enable us to speak about stable patterns of corporate responses to which liability law could react by issuing new pressures and awaiting new responses. And if this is the case then we can only retreat to the discussion of alternative scenarios in which, on the basis of the scarce experiences available, we speculate about possible courses of action in the parallel legal and economic processes.

V. Scenario I: Opportunism - Self-Interest Seeking with Guile

While such a collective liability regime will have benefits in terms of corrective justice it will at the same time create collective action problems to which corporate actors may react opportunistically. Is there in turn an adequate legal reaction to an opportunistic corporate response to a collective liability regime?

To be sure, compared to the lack of any liability under a strictly individualist regime, our new collective liability has its merits. First, the goals of corrective justice are served since under collective liability victims will be compensated. This would not happen if one stuck to fully-fledged individual causation. Second, one can expect a redirection of resources on the aggregate level because full cost internalization to the risk pool is achieved. In theory, all costs are brought back to the ecological risk pool. This will have an overall effect on prices and will make ecologically risky activities more expensive throughout the pool. Third, one can also expect a certain deterrence effect, if only a rather weak one. Each individual member of the risk pool is threatened by a certain share of collective liability, whether it be the risk of being singled out for joint and several liability in first tier litigation, the risk of being sued by the first responsible firm via second tier contribution, or the risk of facing market

share or another form of direct apportionment of liability according to individual risk contribution. This situation may change the way that individual actors calculate their risks and lead to a higher level of prevention. Ideally, this threat would be translated into a joint effort by the polluters to minimize ecological risks. But here the famous collective action problems arise.

If cooperative links within the pool are weak, problems of 'moral hazard' will emerge which are comparable to those of collective insurance which spreads individual risks to a risk community (Adams, 1985: 225ff; Abraham, 1987: 863; Rehbinder, 1989: 151; Wagner, 1990: 45f.). If they are not observed, individual firms will not reduce their specific risk contribution because this will not reduce their liability to the same degree. And since their liability relates to acts of other over whom there is no control they would spend even less on the prevention of ecological damage. Thus, the level of individual prevention would be lower than in a hypothetical situation of strict individual attribution. Empirically, it has been shown that this is a real danger. Keeler (1991) revealed that within a "bubble", a market for pollution rights in which only a global instead of an individual limit to pollution is set, the risk of violation of the standard is higher than in a highly individualized system.

Similar problems arise for collective measures of prevention. Although it would be in the interest of each pool member to engage in collective risk prevention in order to reduce the liability risk and the concomitant costs of compensation for each of them, under certain conditions it is unlikely that they do so. Mancur Olson (1965) would teach us that if the number of pool members is high, cooperative links are missing, a sense of competitiveness prevails and 'selective incentives' or massive negative sanctions do not exist, the pool members will not join in collective action even if it would reduce the costs for each pool member.

This Olson problem for collective risk control, together with moral hazard for individual prevention, has given rise to strong criticism of several new collective liability regimes - market share lability, Superfund CERCLA and more general joint and several liability in multiple causation (Epstein, 1985: 1377; Huber, 1985: 277; Abraham, 1987: 883ff.; Marino, 1991: 672ff.). Economically educated lawyers display a deep mistrust of collective solutions, even where corrective justice is served and resource allocation is efficient. They are harsh in their criticism of the weakness of prevention, although they are well aware that this criticism only holds if they compare collective liability to a strictly individualist liability regime which cannot work in complex ecological cases.

At this point, efforts to re-individualize collective liability make sense. If the corporate community reacts to a collective ecological liability with moral hazard, free riding and other forms of opportunism as "self-interest seeking with guile" (Williamson, 1985: 47) then the appropriate response of liability law would be to make the individual firms 'see' at least their individual share of pollution, if not more, and to "redesign the sharing rule" (Marino, 1991: 672). These efforts cannot, of course, eliminate the collective element stemming from the breakdown of individual causation and the concomitant creation of a risk pool. However, they can re-

apportion the collective loss according to individual characteristics of the pool members.

The situation is comparable to the creation of a corporate actor. As a first step ('pooling'), actions, rights and obligations are attributed collectively to the collective actor as such; in a second step ('redistribution'), losses and gains are apportioned individually among the members according to individual contributions. The advantage of such a two-step procedure is that it can combine the distributional advantages of collective liability with the incentives of an individualizing apportionment. Collective liability makes sure that victims will be compensated in situations where no individual causation can be established; individual re-apportionment creates incentives for individual actors to reduce the ecological risk.

Several liability techniques are available, the combination of which determines the balance between corrective justice, deterrence and allocation. Does it make sense to apply joint and several liability in first tier litigation with post hoc cost recovery in second tier contribution litigation among the tort-feasors? Or is direct allocation of risk shares through the courts more reasonable, as in market share liability? Should one combine strict liability and negligence for the imposition of collective liability and the individual apportionment? What are the criteria for apportionment: pro capita, market share, risk contribution, negligence? In the literature, several combinations of these techniques are discussed (Kornhauser & Revesz, 1989: 837ff.; Marino, 1991; Bodewig, 1985: 531ff.). Especially interesting are proposals for "weighted market share liability" that combine the criteria of market share with individual accident probabilities (Marino, 1991: 674). Of equal interest is the combination of negligence and strict liability in market share liability: primary liability to negligent actors in the market, secondary strict liability according to shares (Kornhauser & Revesz, 1989: 837ff.)

I would suggest the following combination. In the relation between the victim and the risk pool, strict liability should govern because it will further the distributional goals of corrective justice. In the relation between the pool and its members, the apportionment should be individualized as much as possible so that individual incentives for risk reduction are created. Negligence should be the governing regime; if this is not possible then apportionment according to individual risk contribution; if this is not possible then pollution share or market share; and if this is not possible then pro capita liability.

It is difficult to make the choice between joint and several liability with contribution among the pool members on the one side and direct apportionment through the courts in the first trial on the other side is difficult to make since both have grave disadvantages (Rosenberg, 1987: 220f.). Joint and several liability is very generous to the victims, allows them to choose arbitrarily among the tortfeasors, gives full compensation to the victim from just one pool member, frees the first trial from any calculation of the individual pool shares, and leaves it to the first defendant to litigate the re-apportionment among the pool members according to their share of risk and negligence in a series of consecutive suits. Its disadvantages are fairness

problems for the first defendant who is burdened with the full risks of the first tier damage suit and its consequent second tier apportionment, and with tremendously high relitigation costs (Weber, A., 1989: 1488f.). The second one - direct share allocation through the courts in the first tier proceeding - does solve the fairness problem and saves the transaction costs of relitigation. It burdens, however, the ecological victims with the problem of identifying and suing every pool member, and the additional problem of litigating a just share allocation among the pool members has turned out to be a costly process (Rose-Ackerman, 1990: 743ff.). In the interest of ecological victims I would prefer the first solution. We should be aware, though, that both solutions have a grave fairness problem and produce unproportionally high transaction costs.

However, there is a deeper problem with all those efforts to make the individual apportionment as precise as possible.

> "Fine-tuning damage awards to better reflect marginal harms, however, may be just so much academic hairsplitting because of a deep paradox that lurks beneath those cases where damages are exactly proportional to market share. ... the efficiency of a market-share test is very limited ... it will not generate efficient caretaking unless firms can collude" (Rose-Ackerman, 1990: 745).

This is hard to swallow! On the one side, the most sophisticated procedure of individual damage apportionment leads to inefficient prevention. On the other side, collusive solutions that might be efficient in prevention will violate sacred principles of competition law. This paradoxical situation is the reason why Rose-Ackerman in the last instance argues that torts should be done away with in favour of a reliance on governmental regulation, whatever its vices (746; see also Menell, 1991).

But why not take "collusion", more seriously as the third path between torts and regulation more serious? Is there not a chance for self-organization within the risk pool that could solve the fairness problems and diminish drastically the transaction costs of re-apportionment, which necessarily come up when an outside authority - a court or a regulatory agency - imposes the rates of re-individualization. And above all, could not such a "collusion" create "efficient caretaking behavior" (Rose-Ackerman, 1990: 745)?

"In effect, the threat of joint and several liability motivates a collaborative solution among tortfeasors. Just as the defendants will collaborate to minimize their joint expenses as if they were a single person or entity in a concert of action case, so a group of independent firms may apportion liability through contract to avoid inefficient and unfair effects of joint and several liability" (Rosenberg, 1987: 229ff.).

Indeed, self-organization of re-apportionment is an attractive solution. If only the

ecological risk pool were organized as a collective actor, the disadvantages of both solutions discussed could be avoided. The victim would have to sue only one defendant (the pool or one of its members, according to the legal construction of the pool), could ask for full compensation and would avoid touching any issue of re-apportionment within the pool. These would concern internal self-regulation. Rules for apportionment could be agreed upon in advance and according to criteria that are easy to manage. This would save considerably information costs and litigation costs. The costs of such a private risk allocation "are likely to be less than those entailed by post-accident judicial allocations using either apportioned liability or the increasingly common contribution rule" (Rosenberg, 1987: 231). Ideally, the rules of private apportionment would re-individualize the pool liability to such a degree that individual incentives for prevention are created. But what about joint prevention of ecological risks?

VI. Scenario II: Joint Ecological Risk Prevention

Is this just the fantasy of socio-legal dreamers who do not learn the lessons from hardcore legal economics? There are at least some bits of empirical evidence according to which certain corporate responses to the pressures of liability law seem to contradict the prevailing economic cynicism about cooperative action. In some instances, institutions of joint risk management have emerged - whether or not they are compatible with Mancur Olson's theory and its authoritarian consequences. They took over the task of internal loss distribution, and in some cases did more than just that. It has been reported that, in some cases, they monitored the activities of the pool members via surrogate regulation. And perhaps the most promising aspect of such collective risk regulation is the chance for joint ventures in ecological innovation to develop "integrated ecological technologies" and turn away from the "end-of-the-pipe technologies" (see also Brüggemeier, in this volume).

However, the chances for collective risk management induced by liability law vary from context to context. Numbers of actors, structures of the market, power relations in the market, size of the risk pool, density of cooperative links, the existence of corporate actors initiating industrial cooperation (insurances, trade associations), an industrial culture of cooperation, and the role of public institutions in persuading or even forcing private actors into cooperation - these seem to be the decisive factors which influence the spontaneous development of joint ecological risk prevention. It is an open question of whether the law is capable of taking these differences into account in order to facilitate and support cooperative arrangements.

1986 was a year of ecological disasters - Chernobyl and Sandoz. In 1987 the Ciba-Geigy group formulated the corporate response to a wave of public accusation of the pharma-industry, to the deterioration of its public image, to the threats of governmental action and to the pressures of liability law. It initiated the so-called RAD-AR ("Risk Assessment of Drugs - Analysis and Response") among the main pharmaceutical firms. Joint ventures of risk management were founded in each of the main countries concerned: USA, Canada, Japan, Great Britain, and Germany.

One working group was the "Pharmacoepidemiology Group" whose task consisted in gathering information on damages and the interconnection of damages with prescriptions. The other working group was the "Perception/Communication Group". Its task was risk perception and public relations (Burley, 1991: 152f.).

This is the typical situation of an oligopolistic market with a few powerful actors where one can indeed expect collective risk management to emerge. Given the enormous resources of the powerful chemical industry, joint efforts may be possible that go beyond a mere insurance function and take on tasks of research into ecological risks and develop technologies of risk prevention, which could not be done by single firms alone.

In decentralized markets with numerous actors the chances for joint risk management are much smaller than in a situation of oligopoly. Cooperation is likely to develop only if there are pre-existing links of cooperation (Rosenberg, 1987: 232). It may be the case that holdings and loosely integrated groups of independent companies with decentralized decision-making have a chance to respond to the pressures of liability law by creating inter-firm risk management that takes care of ecological issues. Legal economics argues in favor of such a group risk management, as opposed to outside control through the courts of through regulatory agencies, since the "... monitoring cost for preventing the pollution would basically be lower on the part of the parent than on the part of the political community" (Hofstetter, in this volume, p. 13). Empirical findings suggest that this is a fertile field for intense inter-firm cooperation. Under the pressures of liability law, individual firms that have created environmental offices tend to shift these environmental offices from the single firm to the inter-firm level. In a group situation with a high degree of internal division of labor this shift is of special importance because "...there is a temptation to believe that the product as a whole is safe if each subsystem is safe". Thus, a cooperative effort between the single firms "may help surface especially subtle hazards caused by the interaction of subsystems in a technologically complex product" (Eads & Reuter, 1983: 95).

The situation is different again if the risk pool is defined along vertical lines in a product chain or in an ecological chain. Here, the chances for cooperative risk prevention are greater since there are pre-existing contractual links that can be exploited for arrangements that define liability risks and monitor behavior. Actors "will in effect comprise an economically interdependent enterprise spanning the entire chain of production and marketing" (Rosenberg, 1987: 230). Marketing experts predict more vertical integration as a result of the new risk liability:

> "The growth of market share liability could lead to greater cooperation within the channel as well as attempts by the most vulnerable channel members to control channel operations. Thus, the tendency toward vertical marketing systems is likely to be stimulated.
> Fewer, larger manufacturer-distributor combinations will be better able to withstand the financial impact of intra-industry joint liability lawsuits. The economies of such large-scale operations may even allow the

> participating firms to self-insure should intra-industry risks become unratable. Smaller firms unable to withstand the financial impact of such a suit will be either forced out of business or compelled to become members of substantially larger distribution channels.
> Current problems experienced by a channel member in seeking indemnification from other members will also lead to increased channel integration. ...
> As a result, manufacturers may begin to monitor the actions of their suppliers more closely, perhaps demanding assurances about the quality of the supplied component or assuming some of the testing and inspecting functions" (Boedecker & Morgan, 1986: 74f.).

Some experiences of Japanese and German delivery networks and distribution chains corroborate these findings. They are related to situations in which a vertical chain was transformed into a wheel shaped relationship due to the existence of a hub firm that was dominating the whole chain (Rosenberg, 1987: 230). Some Superfund experience indicates that in such situations the hub firm tends to take over the role of the key corporate actor coordinating efforts of joint distribution of losses, monitoring behavior of the others and planning risk prevention. Again, liability law plays a crucial role. Under Superfund the financial threats are so high and the risk pool is defined in such a way that wealthy firms almost automatically take over this coordinating role (Stewart, 1991: 112f.)

In other constellations, trade associations tend to take over the role of the central agent. In the US there is not a great deal of experience with these arrangements (Rosenberg, 1987: 231). There are some reform proposals that advocate government-controlled industry-wide self-regulation of ecological risks, especially through the creation of industry-wide risk funds (Eubank, 1991: 216ff.). The European tradition of corporatist self-regulation, however, has produced successful instances of private associations and semi-private Quangos that take on the task of risk regulation and risk prevention. There are encouraging examples of governmentally sponsored corporate self-regulation in the field of work accidents with an elaborate system of financial distribution and an impressive record of "surrogate regulation". The professional cooperatives (Berufsgenossenschaften) are a successful example of semi-private regulatory agencies which serve as a model in the ongoing discussion about the creation of ecological cooperatives (Umweltgenossenschaften) (Wagner, 1990: 106ff.). The problem seems to be the legal definition of adequate risk pools. While the Berufsgenossenschaften define their risk pools according to branches of industries and are rather centralized unitary organizations on the federal level, potential Umweltgenossenschaften should be organized according to ecological problem areas on a decentralized, regional level (Wagner, 1990: 111ff.).

Private insurance companies seem to be especially well equipped for tasks of a collective risk management in an ecological problem area (Abraham, 1988: 954f.; Eubank, 1991: 174). They have the professional experience of risk spreading and

can collect risk related information in order to re-apportion costs on a highly individualized basis. There are also empirical instances especially in the health sector, where insurance companies played an active role in monitoring and developing techniques of risk prevention. However, the new ecological liability, especially in its collective forms of enterprise liability, market share liability and Superfund joint and several liability have driven the insurance industry into a deep crisis (Eubank, 1991: 197ff.). In the United States, the insurance industry simply retreated from insuring ecological liability, despite the fact that ecological insurance promised to be the super-profitable business of the eighties (Brockett, Golden & Aird, 1990).

It is currently an open question whether this crisis is due to a profound incompatibility between collective liability, especially joint and several liability, and the fundamental principles of insurance as some authors have suggested (Eubank, 1991: 197ff., 209ff.). It is equally plausible that the insurance industry is going through an experimental period, after which new forms of risk calculation and even a new type of insurance organization may emerge. In any case, at the moment alternative forms of insurance seem to be necessary in order to cope with the specific structures of collective risks. The risk retention group of Superfund is one possible answer, another is mandatory insurance for a whole industry, and a third is the institutionalization of an industry-wide fund for ecological risks (Eubank, 1991: 216f.). This last solution seems to be especially appropriate for atomistic, highly competitive markets where industry-wide cooperation has no structural chance and where joint and several liability and market share liability seem rather inadequate.

Finally, the abovementioned problems of collective action and moral hazard may make "hybrid" forms of regulation necessary. In a mixture of private law liability and public law regulation, governmental agencies are combining their regulatory powers with the weapons of liability law in order to organize collective risk control. While such hybrid regimes for the public control of private self-regulation in ecological affairs are clearly making progress on the intra-firm level (Feldhaus, 1991: 928ff.), their chances on the inter-firm level remain unclear. Of course, the American Superfund for cleaning up sites contaminated with hazardous toxics is the most exciting experiment today. And, for us, one point is crucial. The costs of litigation are a staggeringly high amount compared to the sums that effectively went into clean-up activities (Comment, 1988: 289). This highlights the central importance of collective arrangements - 'contract allocations' - that are struck out of court among the firms involved. As one sympathetic commentator observes:

> "In effect, contract allocation tailors legal regulation of toxic substance risk-taking to the individual needs of the parties and context. Its flexibility, in contrast to the more formal and rigid rules of judicial allocation, promises benefits in lower costs, swifter enforcement against cheating, and more protection for confidential information ... legal regulation of toxic substance risks may often be achieved effectively by creating incentives for, and by all means allowing, private contract and enforcement as an alternative or supplement to

centralized command and control decision making by courts and other government agencies " (Rosenberg, 1987: 237).

VII. Palermo or Firenze?

These scattered experiences of "hybrid regulation", combining regulatory activities with private joint arrangements, suggest a perspective of ecological neo-corporatist arrangements, which rely on public institutionalization and public control of collective inter-firm self-organization. The idea is not to replace in toto individual liability or governmental regulation with a new form of collective risk management. It is, rather, to define a limited and specific area of ecological risks where the joint risk management of private actors will complement individual liability and regulatory activities. It focuses on those situations of ecological risk in which individual attribution of causation is no longer feasible, but where the identification of a relatively small class of polluters is, nonetheless, still possible. A collective liability of this group should be combined with incentives to institutionalize collective risk control in a way that compensates damages, reallocates individual risk contributions, monitors the risky behavior of the group members, takes joint preventive measures and engages in technological innovations of risk control. Of course, this collective liability cannot cover diffuse large-scale ecological risks generated by a large number of actors within a great time-horizon or over great geographical distances. In this case society wide ecological funds and ecological taxes are clearly preferable (Wagner, 1990; Hohloch, 1992). Equally, it should not replace classical individual liability in cases of clearly identifiable causal links but provide for a legal remedy when the causal links cannot be attributed to individual actors but only to a group of actors.

It seems as if the ecological cupola is changing its shape. It may yet develop from the sinister threatening hierarchy of the eco-mafia into an institution protecting the environment. Is the cupola Palermitana gradually being transformed into the cupola Fiorentina?

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