Journal of Contingencies and Crisis Management

Special Issue: New Directions in Reliable Organization Research
Guest Editor: Gene I. Rochlin

Volume 4 Number 2
June 1996

ARTICLES

BOOK REVIEWS

BLACKWELL Business

Reliable Organizations: Present Research and Future Directions

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This special issue of the *Journal of Contingencies and Crisis Management* marks a turning point in the work that has become widely known as the Berkeley 'High-Reliability Organizations' project.[1] It was, appropriately enough, 1984 when the three original participants (La Porte, Roberts and Rochlin) first joined to explore their mutual interest in studying organizations that were effectively managing and operating complex and intrinsically hazardous technical systems. Although Chernobyl and the *Challenger* disaster still lay in the future, Three-Mile Island had resulted in the first systematic studies of the organizational causes of accidents and errors in sophisticated technical systems, and *Normal Accidents*, the founding work in the genre (Perrow, 1984), had just been published.[2]

What brought the Berkeley colleagues together was their shared observation from three different disciplinary perspectives that the attention being paid to studies and cases of organizational failure was not (and still is not) matched by parallel studies of organizations that were (and are) operating safely and reliably in similar circumstances. What followed owed as much to serendipity as to planning. Among us we had reasonable acquaintance with contacts in several local-based organizations that were candidates for such a study, and whose leaders showed considerable interest in participating. From our preliminary observations, and discussions with our original contacts, we thought that the three activities—air traffic control, electric utility grid management and the operation of a US Navy aircraft carrier—had much in common. Accordingly, we brought leaders, 'managers' and supervisors of 'operations' from all three together for a number of joint workshops.

All had similar challenges to maintain reliability, performance and safety, simultaneously, at very high levels and similar dependencies upon the individual and collective skills and high degree of responsibility of human operators. They posed similar conundrums for managers seeking to keep operational performance high in the face of continuing pressure to achieve higher levels of performance at lower cost without thereby increasing the risk to the organization or to the public. As the participants began to compare the three systems, it became clear that there were also remarkable similarities not only in organizational design and response, but also, once stripped of specific technical dialects, in language, modes of discourse and problem definitions.

It is never easy for researchers to gain access to organizations working under such demanding conditions, particularly those who perceive their public and regulatory environment to be highly politicized. Fortunately for us, the combination of trust from prior relationships of long standing and the prospective benefits that began to be discussed by managers in the workshops allowed us to gain the kind of direct, intimate, observational access that few organizational researchers ever hope to achieve. Armed with a set of preliminary research questions concerning decision-making, culture, technical adaptation and structure, we quite literally set out to sea to begin our field work—aboard the USS *Carl Vinson*.[3]

What we uncovered in this demanding laboratory showed us that our original assumptions and trial hypotheses had, if anything, been too timid and our scope too narrow. The role of technology and structure was not fixed, but varied from task to task. The organization had not one, but many overlapping cultures, tied together by a common purpose. Its performance was shaped not only by the skill and dedication of the operators, but also by intelligent and sensitive management. And, in sharp contrast to the usual predictions of the organizational literature, dedication to the common goal of collective performance took precedence over the usual processes of jealous specialization, hoarding of information, intergroup competition and conflicts among administrators, managers and operators (Rochlin, La Porte and Roberts, 1987).

The study quickly expanded in two directions. Analytically, it evolved from straightforward interview and survey work to a more complex blend of organizational analysis, studies of organizational culture and ethnographic observation at all levels of the organization. At the

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same time, its scope expanded to include units of three different organizations with similar problems but quite different purposes and formal structure. These were the Oakland Enroute Air Traffic Control Center and the Bay Traffic Radar Approach Control (TRACON) of the Federal Aviation Administration's air traffic control system; the US Navy's Carrier Group Three, based at Alameda Naval Air Station, with its two nuclear powered aircraft carriers, the USS *Enterprise* (CVN 65) and the USS *Carl Vinson* (CVN 70) and their air groups; and those departments of the Pacific Gas and Electric Company responsible for grid management and for power plant operation.[4]

Although we found many differences that were of considerable use to us in arraying the organizations along different axes (see, for example, the articles in this issue by La Porte and by Schulman), what was most striking were the many similarities and commonalities (Rochlin and Von Meier, 1994). These we have summarized in many ways that go far beyond the usual notion of a 'culture of reliability', including, *inter alia*, flexible delegation of authority and structure under stress (particularly in crises and emergency situations); respect for, and nurture of, the skill and dedication of operators and workers at all levels; constant training; a system of rewards for reporting and discovering error not just even, but especially, one's own and a mix of welcome for, and resistance to, technical and organizational change that is based almost entirely on thoughtful evaluation of their short- and long-term effects on organizational reliability and performance (see, for example, Roberts, 1990; La Porte and Consolini, 1991; Rochlin 1993; Roberts, Rousseau and La Porte, 1994).

Over time, the core group expanded to include a number of insightful and thoughtful contributions from several able and experienced colleagues who were drawn in one way or the other to the 'HRO' project, including Paul Schulman, who eventually became one of the core group, and a series of incredibly bright and hard-working graduate students.[5] Nevertheless, the challenge of not only identifying and characterizing the behaviour, structure and culture we had observed, but also describing them in the formal language of organization theory soon pressed us to the limits of our resources. Each step of the research seemed to widen rather than narrow the gulf between our observations and those set out in the existing literature. Our findings were difficult to integrate into methods and theories developed for organizations operating simpler or less hazardous technical systems, or in environments more politically benign. And although our research was intended from the first to complement and expand upon the growing body of studies of organizational sources of, and causes for, error and failure, it was taken in many quarters as running counter to it (see, for example, the debate among La Porte (1994), La Porte and Rochlin (1994), Perrow (1994) and Sagan (1994) in this journal).

Although we have, from time to time, been urged to generalize or adapt our work for the purpose of organizational design, many of the things we learned from working with these organizations makes us very cautious. The experience is such that there were several instances where our credibility depended upon our explaining that 'making things work better' was not the reason for our being there, nor the purpose of our work. We were not engaged in a search for excellence, although we saw much that was indeed excellent, nor for a prescriptive set of rules or procedures for avoiding errors and failures. We did not attempt to span the universe of possible organizations, or technical systems, to generate comparative studies or speculate on the relative frequency of organizational successes and failures, but worked with a very special set for the explicit purpose of trying to determine how and why they performed so well, and why others considered that performance to be so special.

To extend our work to a more systematic general survey of other organizations similar along one or more of the several dimensions we explored would have become a major project far exceeding the time and resources of the original core group. What we hoped to do, instead, was stimulate others to test our hypotheses and framework on other organizations, performing under similar circumstances, to which they had or could obtain their own access. To adopt a metaphor used by Roberts, the original HRO work was a fountainhead from which issued many streams of possible research and inquiry, to a variety of purposes.

Many of these are now being fished in different ways, not only by the original research group and its associates and former students, but by other colleagues who continue to explore the growing demand for high organizational performance and the costs and requirements of managing and regulating ever more sophisticated and complex socio-technical systems, with new modes and modalities of risk and consequence, in a world where the growth in dependency is accompanied by less and less tolerance for errors and failures. This special issue of the *Journal of Contingencies and Crisis Management* is, therefore, a survey and a prospectus rather than a summary and a conclusion. Its purpose is to sketch out the geography and geology of prospective future

research by following the exploration of a number of distinct and separate streams of inquiry that carried different aspects of the original research into a variety of different technical and organizational settings.

The first two papers are most closely connected to the intent and scope of the original project. Todd La Porte continues to explore the relationship of our findings to the existing organization theoretical literature, reviewing our provisional findings and relating them to another growing body of literature on what have come to be known as 'large technical systems'. Because these quasi-public, socio-technical institutions penetrate deeply into the structure of modern societies, a considerable amount of institutional trust is required if they are to be allowed to continue to perform their tasks without intrusive, and potentially damaging, micro-management. Each of the organizations originally studied had many of the characteristics that are necessary to build and maintain trust — most notably a proven record of successful operation. But he concludes that even a continuous record of success may no longer be a sufficient condition for establishing trust, or even for maintaining it over time, in an increasingly skeptical and critical socio-political environment.

Paul Schulman has long been interested in the still unresolved ontological problem of trying to define the various axes that can be used to separate and differentiate even those few organizations studied in the original project. These differed on so many variables, structural and formal, as well as social and informal, that we have always been hard pressed to determine which were of greatest significance for which particular set of observations. In this essay, he turns his attention to the fascinating matter of 'hero stories', a common means of perpetuating organizational learning and culture that was strangely and conspicuously absent in some of the organizational settings we studied, arguing that they are, indeed, a guide to understanding some aspects of the structural differentiation of different organizations, measured along an axis from holistic to decomposable, that, in turn, reflect the need to adopt different strategies in differing circumstances.

The remaining three articles represent new directions of future research based upon the original work. Thomas Mannarelli, Karlene Roberts and Robert Bea use the framework and approach developed in the study of organizations where safety concerns are central and critical, to ask the extended question of how much of what we found applies to studies of organizations that perform tasks that may be somewhat less complex and somewhat less consequential. Although such organizations may now be under somewhat less pressure to reduce risk and perform reliably, they may increasingly come to resemble either HROs or 'large technical systems' as tasks, demands, technology and scope evolve. The blend of detailed analysis and deep on-site fieldwork that Roberts helped to pioneer in the original study is used to explore the extent to which an established thread of organization theory, resource dependency, can be used to frame different strategies for error reduction and risk mitigation in varying organizational and political environments.

The three organizations we studied were, and are, operating under particularly demanding conditions, and the means and methods by which they ensure safety and reliability under constant demands to increase efficiency and decrease the potential for human error are very costly in personal, economic as well as organizational terms. What has made it possible for them to command the necessary financial, organizational and human resources has been their credibility in claiming that performance at the expected levels of safety and performance would not be possible otherwise. It is not a design strategy to be lightly undertaken, particularly in conditions in which the range of possible outcomes or contingencies is not tightly circumscribed, or to be turned over from human to automatic control. In her essay, Chris Demchak develops these concerns in more specific detail, exploring in some detail how the United States Army, searching to capture the prospective benefits of advanced information and communication technologies, seems to be attempting to replicate HRO form and structure in an operating environment sufficiently rich in ambiguity and uncertainty that the costs involved not only may fail to produce benefits, but may, in fact, lower performance.

Mathilde Bourrier brings to the work a perspective derived from an entirely different research tradition and approach. She essays her extensive and very detailed empirical field work at four nuclear power plants in the US and France to compare the HRO approach with that of the more familiar approach and methods of strategic analysis; the framework within which she independently began her work in France before joining the Berkeley group. Seeking by this means to provide a careful and detailed comparative test not only of the methods but also of their theoretical and analytic frameworks, she concludes that neither is complete, either as a method or as a frame for research and analysis. Rather, some means to blend the strengths of these (and other) organizational approaches are necessary if we are to advance our detailed understanding of the internal dynamics and social structure of reliability-demanding organizations.

Taken together, these five contributions begin to delineate some of the new directions being taken by research derived from, and related to, the original research. It will probably not come as a surprise to the readers of *Journal of Contingencies and Crisis Management* that each of the articles separately comes to the conclusion that there is still a great deal to be learned about these and similar organizations. The need for such research is as pressing now as it was a decade ago.

As this issue was being assembled to go to press, the need for a change in perception about success as a baseline for organizational performance was illustrated by three different news stories. One, in the context of Diane Vaughn's book on the *Challenger*, issued on the tenth anniversary of that disaster (Vaughan, 1996), picked up admirably on her framing the story as one of the deconstruction of a reliable organization under external pressures to perform (Broad, 1996); a second, dealing with problems with FAA Air Traffic Control, acknowledged the role that anticipation of a technical fix, the 'advanced automation suite', played in diminishing the capacity of the organization to maintain reliability through human action (Wald, 1996); a third, having to do with the crash of a Navy F-14 fighter, correctly identified the organizational difficulty of trying to balance safety against performance under the most demanding non-wartime conditions imaginable (Schmitt, 1996). What has clearly changed over the past decade is the degree to which the claim that successful performance rather than failure should be taken as a baseline for organizational performance is no longer controversial.

It was nearly twenty years ago that Barry Turner (1978) first pointed out the capacity of organized human beings to bring about events that could not be decomposed or analyzed at the individual level and, thereby, began the analysis of organizational sources of risk and error. We hope that the HRO work, designed to point out the role of organizational structure and culture in developing and maintaining high levels of human performance in the face of quite extraordinary demands, has contributed to the more recent appreciation, by analysts and publics alike, that organizations can also act to minimize risk and control error. But we also must accept that there is considerable empirical evidence for both types of behaviour, even among organizations that seem from the outside to be quite similar.

We may be a little closer to understanding the role of management, structure and culture in the operation of complex, tightly-coupled organizations operating sophisticated and complicated technical systems that by their nature involve the potential for great personal or public harm, but there is still a long way to go. Pressures to increase efficiency, while extirpating error, remain, as does a fundamental belief in many quarters that the best way to do that is to replace humans with programmed machines, or human decisions with programmable algorithms (Rochlin, 1996). Without a better understanding of the social dynamics at work in already reliable organizations, in a wider variety of cases and under a broader set of circumstances, it will be difficult to evaluate either the claims of those who promote new technical or organizational 'solutions' to promote efficiency and reliability or the counter-claims of those who insist that any such effort will inevitably increase reduce safety and increase risk.

There is no shortage of high quality, policy and socially relevant work to be done in this domain, even within the realm of organization theory. And there are other bodies of related literature that are moving toward analyzing the role of organizations in controlling or mitigating risks, such as those derived from psychological and human factors perspectives (see, for example, Rasmussen, Duncan and Leplat, 1987; Reason, 1989; Short and Clarke, 1992; Roberts, 1993), with which our primarily organization-theoretic work could usefully be combined. These multiple perspectives on, and approaches to, describing and understanding collective performance open new and exciting streams of research, many of which will undoubtedly be explored and navigated by readers of this journal. I am sure that the editors join me in hoping that much of it will also be reported in its pages.

Notes

1. That appellation has always been somewhat misleading, in that not all the principal researchers have been from the University of California's Berkeley campus; not all the organizations are subject to the same definition and standards of reliability; and, perhaps most importantly, 'high' is a judgmental and not an absolute variable. What drew us to these organizations was not some absolute standard of performance, but their ability to operate potentially hazardous technical systems under very demanding conditions, while maintaining a level of performance and safety far above what might be expected from the literature, or from comparison with other organizations (see, for example, Mannarelli, Roberts and Bea, 1996).
2. Sagan (1993) has summarized the 'normal accident' perspective as: (1) accidents are inevitable in complex, tightly coupled systems; (2) safety is one of a number of competing goals; (3) redundancy often reduces safety by increasing complexity and opaqueness and encouraging risk-taking; (4) there is a fundamental organizational contradiction between decentralizing to deal with

complexity and centralizing to deal with coupling; (5) adopting a military model of intense discipline, socialization and isolation to cope is incompatible with democratic values; (6) organizations cannot train for unimaginable, highly dangerous or politically unpalatable operations; (7) denial of responsibility, faulty reporting and reconstruction of history cripple efforts at learning. See also La Porte (1994).

3. Our initial field work was supported by Office of Naval Research Contract N-00014-86-k-03123. Subsequent work was supported through grants SES-8708804 and SES-8911105 from the National Science Foundation. Additional funding for specific portions of the research was provided by Brookhaven National Laboratories, through Contract 459427, by the University of California's University-wide Energy Research Group and by the Institutes of Governmental Studies, International Studies and Transportation Studies of the University of California, Berkeley.

4. In later years, other air traffic control centres, other nuclear power plants and other US Navy ships also came under study by individuals or subgroups of the original team.

5. In addition to Paul Schulman, other faculty participants who played important roles included Geoffrey Gosling, Denise Rousseau, Karl Weick, and Sonja Haber. A series of brilliant and imaginative graduate students, including Paula Consolini, W. E. Douglas Creed, Barbl Koch, Edward Lascher, Alexandra Von Meier, Suzanne Stout, Craig Thomas and Mathilde Bourrier, contributed not only to the field work, but in many ways to the intellectual, methodological and theoretical development of the project.

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High Reliability Organizations: Unlikely, Demanding and At Risk

Todd R. La Porte*

The HRO project is cast within a broader socio-political context, by first, reviewing its practical origins, its conceptual/logical framework, and a summary of the project's provisional findings, including a brief observation about the importance of a 'culture of reliability.' Then some socio/political implications for HROs are explored as they assume the status of large technical systems (LTSs) and become quasi-public institutions. This paper ends with a reflection on the challenges of institutional trustworthiness that confront HRO operators, managers, and overseers.

Introduction

There is a growing literature on crisis management and system safety theory of which this journal is an exemplar. It draws those interested in the technical and organizational phenomena associated with the causes and prevention of operating failures in systems of potentially great negative consequences, as well as benefits, to economic well-being, human health and environmental quality (see also Bignell and Fortune, 1984; Covelo, Menkes and Mumpower, 1986; Morone and Woodhouse, 1986; Rasmussen, Duncan and Leplat, 1987; Shrivastava, 1987; Heimann, 1993; Sagan, 1993; and the *Industrial Crisis Quarterly*).[1] Such interests command attention to organizations whose performance and internal processes have degraded well below expected levels of achievement given the degree of intrinsic hazard associated with system operations — such as Three Mile Island, *Challenger* or Chernobyl.

Much of this emphasis is devoted to showing *post facto* the structural and behavioural causes and precursors of operating failure (Perrow, 1984; Heimann, 1993). They are based, in part, on the tacit assumption that our present understanding of operational dynamics is more or less adequate, though not fully explicated. One needs simply to repair this or that inductively discovered characteristic to return the more or less well-functioning system to the desired level of safety. An alternative view holds that nearly accident-free performance is impossible and flawed operations should be considered normal with reasonable likelihood of occurrence (Perrow, 1984; Sagan, 1993). We are skeptical of either view—their concerns are too narrow (Rochlin, 1993).

Another tack has been taken by the High Reliability Organization (HRO) Project. It was initiated to explore the conditions that are associated with large-scale operating systems *already* performing at an extraordinary level of safety and productive capacity in the face of very demanding circumstances (La Porte, 1987; Roberts, 1989). Our tacit assumption was that such systems' performance is quite unusual, very difficult to sustain and theoretically inexplicable (La Porte and Consolini, 1991). There are neither theoretical nor empirical reasons to expect failure-free operations in large organizations that attempt to perform demanding tasks with little margin for error. Indeed, there are sound reasons to reject this as a possibility. Perrow (1984) argues succinctly that knowledge available to regulators, planners, managers and operators declines compared to knowledge requirements as technical complexity and tight coupling increase, increasing errors — especially in the context of rigid, hierarchically structured organizations. Indeed, Perrow claims that safety measures themselves can become sources of error if they serve to further increase complexity and coupling.

Yet, however intrinsically demanding it may be, an increasing number of organizations are committed to utilizing very powerful, costly technical systems that are inherently dangerous, calling for highly hazardous, low-risk performance as a condition of delivering their benefits.[2] Their operational challenges are two-fold: to manage complex, hazardous, demanding technologies while avoiding major failures; and, at the same time, to maintain the capacity for meeting intermittent, somewhat unpredictable, periods of very high peak demand and production (Rochlin, 1993). That is, they are pressed to operate continuously at a level

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usually understood to be very much above average, often near peak capacity. This is a situation in which any change in circumstances, internal processes or technical innovation is more likely to degrade than to improve existing operations. These are extraordinary expectations for any social collectivity; the presence of any 'high reliability organizations' (HROs) is both remarkable and unexpected.

When HRO phenomena are present, they are likely to be associated with systems of great benefit that are so hazardous in their design that, depending predominately upon management strategies based on trial and error, they are seen as very costly.[3] Corporate managers, public managers and military commanders alike count on very high levels of operating performance and safety when failures lead to severe loss of capacity to project military power; to limit health hazards on the job and in communities; to maintain public safety via safe navigation through congested air space or immediate responses to threats of fire, floods or contagion; or to avoid severe damage to human environments and ecosystems.

The HRO project then sought to explicate phenomena which are surprising and unexpected — as well as skeptically received as incredible within the scope of current social science understanding of complex organization (Sagan, 1993; 1994; Perrow, 1994) — even though the organizations that provided initial research settings were well established and had records of sustained, high performance (La Porte and Consolini, 1991; Roberts, 1993b). These organizations — namely, US air traffic control systems, a large-scale electric power generation and distribution system and two nuclear power aircraft carriers — should not have existed in their present form given what one could infer from current organization and management theory. Yet, they do exist and they continue to exhibit extraordinary patterns of behaviour and system performance across a wide range of varied and turbulent conditions (La Porte and Consolini, 1991; Roberts, 1990b; 1993b; Schulman, 1993b).

As societies come to depend on systems designed and deployed in ways that risk putting their operators, consumers and citizens in harms way, demands for HRO-like performance are insistent (perhaps increasing) (Perrow, 1984; Sagan, 1993). There is an attendant concern that even the systems upon which we now can depend may not, perhaps cannot, continue to perform as well in the future.

Much of the crisis management literature is marbled by expressions of this anxiety, worrying that the conditions necessary to motivate operators and executives to persist in the difficult tasks that make up the so-called safety culture, will not be sufficient to sustain it (IAEA, 1991). Though equally interested in the factors associated with effective performance, similar concerns also animate the growing literature of probing the characteristics and dynamics of large technical systems (LTS) introduced below (La Porte, 1988; Joerges, 1994).

Understanding the structure, operating dynamics and social and economic costs of sustaining HRO patterns becomes increasingly salient not only for our understanding of a wider range of organizational phenomena, but for improving the bases for the design and expectations of technical systems — perhaps dampening our enthusiasm for systems whose benefits are conditional on highly reliable behaviour (La Porte, 1994a). The HRO project tracks organizational responses in their attempts to overcome the intrinsic limits of complex technical operations and, in the process, radically minimizes the number and severity of failures in the face of them. As such, the project was intended neither as a contribution *per se* to studies of safety or risk management as they are now framed (although we hope it will be), nor is it in the spirit of the 'search for excellence' perspective (Deal and Kennedy, 1982; Peters and Waterman, 1982). In a sense, one can see this work as a complement to the large body of work that demonstrates the intrinsic costs and difficulties of seeking continuously to achieve failure-free performance in large organizations and the theoretical impossibility of assuring it under all conditions (Rochlin, 1993; Demchak, 1996).

Following a brief discussion of central research perspectives and some provisional findings of the HRO work, this paper situates such systems within the broader perspective of large technical systems (LTSs) studies, suggesting that, 'willy nilly', HRO/LTSs take on at least a quasi-public organizational cast. Thus, they become potentially subjected to the rigors of assuring the conditions that foster a sense of public trust and confidence or political legitimacy (La Porte, 1995).

Study perspectives

What patterns of relationships and organizational dynamics characterize HRO performance, especially in demanding environments? Our work was organized around the following questions.[4]

1. HROs' central day-to-day preoccupation is continuously to operate complex, demanding technologies without major failures while maintaining the capacity for meeting intermittent periods of very high, peak

production, for example, peak traffic, power demand loads or maximum air operations. What patterns of *formal organization structure and rules* have developed in response to these requirements under conditions of constrained resources? Complex technologies tend to increase the interdependencies within and among operating organizations. What are the patterns of *interdependencies* associated with units requiring reliability? What processes have emerged to coordinate and manage them in meeting the demands of reliability and potential peak pressures?

2. Top management seeks to commit the organization to high levels of performance, while senior operating officials are committed to assuring superior reliability (and safety) in the face of often unexpected operating conditions. What *decision-making and communication dynamics* evolve in the processes of day-to-day planning and operation when contingencies are expected but their specifics are unpredictable? How are the operational constraints inevitably imposed by formal structure dealt with, especially when conducting those activities from which unacceptable failures may arise?
3. Formal structure and rules (SOPs), or informal operating rules, rarely provide guides for behaviour sufficient to account for the technical and cooperative skills or motivations necessary for effective organizational performance. These gaps are filled variously in the development of an organization's *culture*, whose substance is likely to be crucial for effective operation of HROs. What group norms are evident within and between units requiring reliability in relations with, and obligations to, group members and to the organization as a whole? How are they created and maintained?

The orienting perspective of the project included these aspects within a framework of familiar functional relationships (see Figure I) and emphasized those elements that are associated with HRO phenomena (in italic print). These elements constitute a complex pattern of factors that, while they are not likely to be sufficient conditions for high reliability operations, are surely necessary.

Provisional findings

What have we come to know more firmly, with more confidence, about HRO phenomena?[5] This summary is arranged in terms of the factors highlighted in Figure 1, moving across the

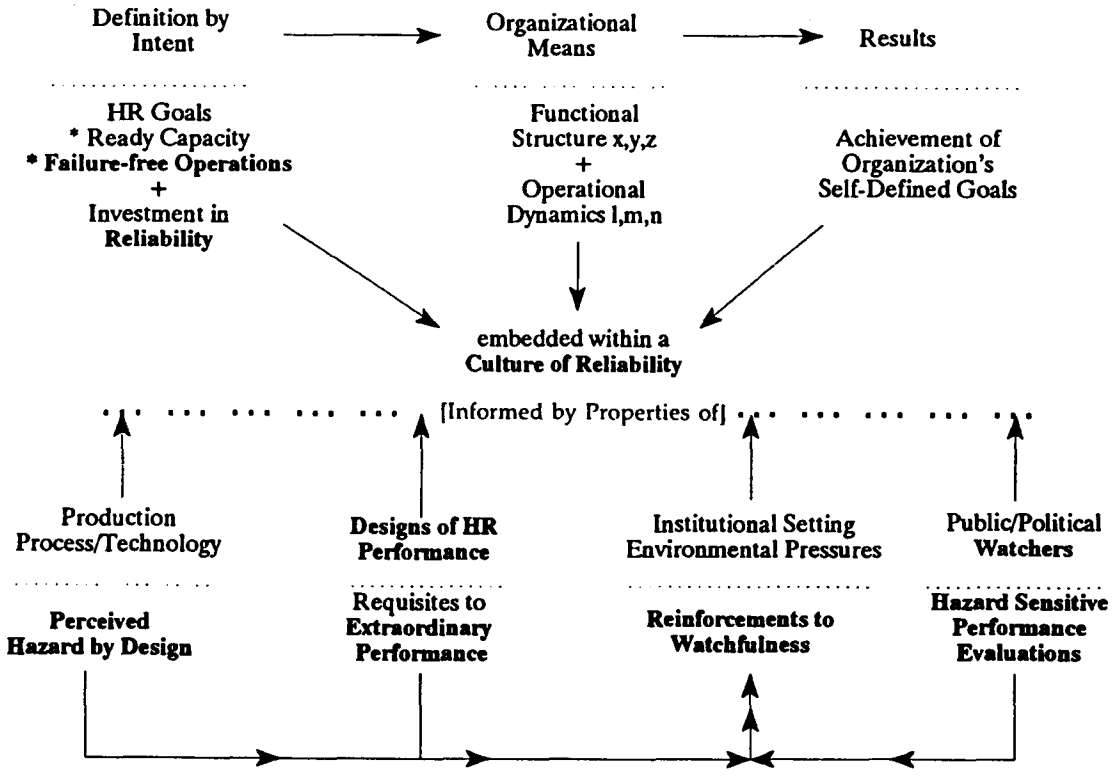

Figure 1: Conceptual logic undergirding HRO studies

schema from left to right, with a distinction between those that are related primarily to internal aspects and those that emphasize external relationships. Due to length constraints, this summary quite cryptically notes some findings that are emphasized for HROs.

Internal processes

Organizationally defined intention

HROs exhibit a strong sense of mission and operational goals stressing not only the objectives of providing ready capacity for production and service but an equal commitment to reliability in operations, and a readiness to assure investment in reliability enhancing technology, processes and personnel resources.

It is notable that for each of the HROs we studied, there is high tacit agreement within the organization and in the society at large regarding the inherent hazard of the technology being operated, the definition and seriousness of error, the value or benefit of whatever economic, social or military outcome is being produced and the cost of failing to provide it. This is an important, perhaps crucial, element of HRO regimes. Until recently, such 'domain consensus' (Thompson, 1967) has provided munificent support for corporate or agency leaders seeking to provide the organizational status and financial and personnel resources required for failure-prevention and quality enhancement.

Reliability enhancing operations

These are related (see Figure 1) to the aspects of structural and operational dynamics that stem from the requisites for extraordinary performance. These properties, to which I now turn, are re-enforced by an organizational culture of reliability, that is, the norms and workways of operations (Ott, 1989; Roberts, 1990a; 1993a).

Perhaps the most dominant quality of HROs' internal operating environments is their palpable technical and social interdependence. This is rooted in the requirement for group differentiation and coordinative hierarchies that characterizes all intensively technological organizations. In HROs, this seems to prompt pervasive patterns of complexly related, tightly-coupled technical and social relationships that shape their social, structural and decisional character (Perrow, 1984; Weick, 1987; Roberts and Gargano, 1989; La Porte and Consolini, 1991; Rochlin, 1993).[6]

HROs' *social character* is typified, not surprisingly, by high technical/professional competence and technical knowledge of the system and demonstrated high performance and awareness of the system's operating state.

1. Extraordinary *technical competence* ultimately shapes authority relations and decision processes among operating personnel who are often consummately skilled at what they do. Continuously attaining this quality entails attention to recruiting, training and staff incentives. It puts a premium on recruiting members with extraordinary skills and/or an organizational capacity to develop them *in situ* via continuous training and an emphasis on reliable knowledge of the fundamentals of the operating system.

   Sustaining very high levels of competence, effectiveness and operator and professional commitment is secured, in part, by a combination of high organizational status and visibility for the activities that enhance reliability, and roles with ready accessibility to senior management. Organizational status is supported by career incentives and the sense of efficacy associated with clear promotional opportunities to senior management positions.
2. HROs achieve rigorously *high operational performance* of the technical systems accompanied by stringent quality assurance (QA) measures in maintenance (Bourrier, 1994; 1996) and procedural acuity (Schulman, 1993a). Extensive performance data bases that track and calibrate technical operations strive to provide an unambiguous description of the systems' operating state. This becomes the information on reliability statistics, quality-control processes and accident-modelling, upon which awareness and interpretations of system readiness from a variety of perspectives are widely available and often nourish competition between groups formally responsible for safety (La Porte and Thomas, 1995).

   HROs' *structural features* are characterized especially by flexibility and redundancy in pursuit of safety and performance and overlapping or nested layers of authority relationships.
3. The HRO operating environment is not only hazardous, it is also often quite contingent. Effective performance calls for considerable flexibility and 'organizational slack' (reserve capacity) to insure safety and protect performance resilience. *Structural flexibility and redundancy* is evident in three ways: First, functional processes are designed so that there are often parallel or overlapping activities that can provide backup in the case of overload or unit breakdown and operational recombination in the face of surprise. Secondly, operators and first-line supervisors are trained for multiple jobs including systematic rotation to assure a wide range of skills and experience

redundancy. Thirdly, jobs and work groups are designed in ways that limit the interdependence of incompatible functions.

4. Predominately hierarchical patterns of authority, typical of large organizations, certainly exist in HROs (although they may be as much adjudicative as directive), most visibly during routine operations. But other, more *collegial*, patterns of authority based on skill and functional authority relationships emerge as the tempo of operations increases, exhibited by the same participants who, during routine times, act out the roles of rank relations and bureaucrats. And 'nested' within, or 'overlaid' upon, these are well practiced, almost scripted, patterns of relationships that are activated during times of acute emergency (Rochlin, La Porte and Roberts, 1987). As these clearly recognized patterns shift, communication patterns and role-relationships are altered to integrate the skills and experience called for by the situation.

   Within the context of HROs' structural properties, their *decision dynamics* are characterized by flexible, dispersed operational decision-making and sustained efforts to improve, including rewards for the discovery of, incipient error.
5. Decision making within shifting authority patterns, especially operating decisions, tend to be decentralized to the level where actions must be taken (Roberts, 1992). Tactical decisions often develop on the basis of intense bargaining and/or collegial interaction among those whose contributions are needed to operate effectively or solve problems (Schulman, 1993a).
6. Once determined, decisions are executed often very quickly with little chance for review, recovery or alteration. HROs therefore put an unusual premium on increasing the likelihood that decisions will be based on the best information available, on the one hand, and, on the other, that internal technical and procedural processes, once put in motion, will not be the source of failure. This lead to more or less formalized efforts, continually to *search for improvement* via systematic gleaning of feedback, and the conduct of program and operational review. These are frequently conducted by internal groups dedicated formally to search out the sources of potential failure as well as improvements or changes in procedures to minimize the likelihood of failure. Such groups are sometimes structured and rewarded in ways that put them in competition with each other to discover potential errors and, due to their attachment to different levels of reporting in the management hierarchy, encourage the quick forwarding of information about potential error to a higher authority (La Porte and Thomas, 1995).

Finally, this kind of activity, due to its intrinsic blame — putting potential, is often sought but rarely conducted with much enthusiasm. In response, HROs exhibit a quite unusual willingness to *reward the discovery and reporting of error*, without at the same time pre-emptorially assigning blame from its commission. This obtains even for the reporting of *one's own error* in operations and procedural adherence. The premise is that it is better and commendable for one to report an error immediately than to ignore or to cover it up.

Organizational culture of reliability

The enactment of both structural support to reliability and the processes that increase it are additional demands in the already intense lives of those who operate and manage large-scale, advanced technical systems. Operating effectiveness calls for a level of personal engagement and attentive behaviour that is unlikely merely on the basis of formal rules and economic contracts. It requires a more fully engaged person responding to norms of individual and group relations that grow out of the particular demands and rewards of the hazardous systems involved. This certainly was evident to the HRO research teams as we came to know the operating groups in each organization (Weick, 1987; Roberts, 1993a). For lack of a better concept to capture these phenomena, we accepted the slippery concept of 'organizational culture' as a rough ordering notion.[7] In our terms, a culture of organizational reliability refers to the norms, shared perceptions, workways and informal traditions that arise within the operating and over-seeing groups closely involved with the systems of hazard (Roberts, 1990b; Rochlin and Von Meier, 1994).

Recall that, for HROs, high levels of production and safety are held as equally important and inexorably related (Rochlin, 1993; Schulman, 1993b). They face the challenge of being highly reliable, both as producers (many under all manner of demanding conditions) and as safety providers (under conditions of high production demands). This suggests an organizational culture integrating the familiar norms of mission accomplishment and production with those of the so-called 'safety culture' (Weick, 1987).

Examples of cultural norms particularly relevant to HRO operations are operator/member elan; operator autonomy; and incipient tensions between skilled operators and technical experts.

- Operating personnel *evince an intense elan* and strongly held expectations for themselves about the value of skilled performance; it seems to be a kind of prideful wariness. There are often intense, peer group pressures to excel as a highly competitive team and to cooperate with and assist each other in the face of high operating demands. This includes expectations of fulfilling responsibilities that often go well beyond formal role specifications. For example, there is a view that 'whoever spots a problem, owns it' until it is mitigated or solved in the interest of full, safe functioning. This *elan* is re-enforced by clearly recognized peer group incentives that signal high status and respect, pride in one's team, emphasis on peer 'retention' and social discipline and reward for contributing to quality enhancing, failure preventing activities (Rochlin and Von Meier, 1994).
- Hazardous operations are often time critical. A keen situational awareness is required for decisive action to be taken quickly with little opportunity for assistance or approval from others. Partly as a result, HRO operators come to develop and insist upon a *high degree of discretion*, autonomy and responsibility for activities 'on their watch' (Roberts, Rousseau, and La Porte, 1994). Often typified as being 'King of my turf', this is seen as highly appropriate by both other operators and supervisors.
- But operator autonomy has a price. The HROs in our initial studies all operated complex technical systems that put a premium on technical engineering knowledge as well as highly skilled operating knowledge and experience. These two types of skills are usually formally distinguished in the occupational roles designations within HROs. Each has a measure of status, each depends on the other for critical information in the face of potential system breakdown and recovery if problems cannot be contained. But operators also have an almost tactile sense of how the technical systems actually function that is likely to be more situationally refined and intuitively more credible that the more abstract, cognitively-based knowledge possessed by engineers. The result is *tension between operators and technical experts* when considerable stress is placed both on formal specifications and on experienced-based tacit knowledge of system operations (Rochlin and Von Meier, 1994; Von Meier, 1995).

These are dominant workways and attitudes about appropriate behaviour at the operating levels of HROs, that is, the work closest to the hazards, so to speak. They give a sense of the strength of the affective nature of HRO operations and provide the basis for the expressive authority and identitive compliance norms that enable the close cooperation necessary when facing the challenges of unexpected high-tempo/high-surge situations with minimum internal harm to people and capital equipment.

External relationships

HRO performance is centrally associated with extraordinarily dense patterns of cooperative behaviour within the organization. These are extensive, as well as quite intensive; they are unusual in terms both of continuous reliability and costs and would be difficult to sustain in the absence of external re-enforcement. Continuous attention to both achieving organizational missions and avoiding serious failures requires sustained interaction with elements in the external environment, not only to insure resources, but, as importantly, to support internal resolve to maintain internal relations outlined above and to sustain HROs' culture of reliability. The external support for achieving the internal conditions of trustworthiness is perhaps the most important of all the properties of HROs the Berkeley group studies; and without them the rest are difficult to achieve and sustain. In terms of the schema in Figure 1, this refers to the externally situated, independent public bodies and stake-holding interest groups.

Aggressive, knowledgeable 'watchers' increase the likelihood that reliability enhancing operations/investments will be seen as legitimate by corporate and regulatory actors, that is, costs should be incurred and social compression allowed in the interest of safety. This may mean investing, on one hand, in developing and training external review groups and some instruments of behavioural surveillance, for example, random drug tests, and, on the other hand, assuring that HRO leaders will be held quickly accountable for changes that could reduce reliability in service or safety.

These watching groups may be either formal or informal and are found both within the HRO's immediate institutional environment and outside it. It is crucial that there be clear institutional interest in highly reliable performance. This can be seen in strong *superordinate institutional elements of the parent organization* such as Corporate or Command level officers (for example, utility corporate headquarters, higher military command, Washington agency headquarters) and sometimes industrial association watchdogs (for example, the nuclear industry's Institute for Nuclear Power Operators (INPO) (Rees, 1994)).

At the same time, the strong presence of *external stake holding groups* assures attentiveness

(and occasional resentment). These range from quite formal public watchers, such as regulatory overseers, for example, the Nuclear Regulatory Commission (NRC) and user and client groups, for example, pilots or government officials, to a wide sweep of 'public intervenors' ranging from state and local governments to independent public or citizen interest groups. Finally, an important function is played by professional peer bodies and other knowledgeable observers such as HRO alumni, who are respected for their experience as well as their knowledge.

Such external watchers re-enforce and support the culture of reliability by creating 'mechanisms' for *boundary spanning processes* through which encouragement and constraint in the interest of product/safety reliability are exercised or expressed. Two types are evident. First, there are often a number of formally designated positions and/or groups (such as various forms of resident inspectors) who have oversight responsibilities. We found a host of these formalized channels. Sometimes this boundary spanning activity is expressed via the requirement for dual reporting, both to the organization and to an oversight or regulatory agency.

Boundary spanning, and with it increased transparency, also occurs intermittently in the form of formal, periodic visits from 'check' or review groups that often exercise powerful sanctions if the reviews do not measure up. These activities come in a number of forms, such as phased inspections and training checks in aircraft carrier combat preparations, or the NRC mandated, biannual, realistic simulation of activation of nuclear power-plant emergency scenarios in collaboration with all the relevant local and state decision-makers under the watchful eye of outside inspectors (La Porte and Thomas, 1995).

Finally, external watchers, however well provided with avenues of effect, must have credible, current information. This can be a very demanding requirement, often including not only full operating logs but also reports of annual evaluations, hazard indices, statistical summaries and other indicators of incipient harm and the early on-set of danger that become a basis for insightful reviews and public credibility (see below).

This compressed review of provisional findings is concluded with an important caveat. The organizations we chose are certainly excellent, indeed extraordinary, in many respects. But it is not warranted simply to apply these findings from three 'top performers' to other organizations that aspire to become HROs. Whilst these conditions may be necessary, they are not sufficient. Indeed, one of our work's most striking lessons is that these conditions are so demanding that they may not be attainable in other areas without great hazard, travail and social costs along the way.

Current conditions and challenges for HROs

While HROs may be interesting in their own right, both in operational and conceptual terms, they are also a special case of what have been termed large technical systems (LTS), which have steadily increased in number and range over the past 100 years (Hughes, 1983; 1987). The most significant properties of LTS, in addition to their undeniable importance as they grow to scale, are increasingly intensive knowledge requirements, tightening patterns of functional interdependence within major productive or service segments and expanding networks of cooperation and control (Joerges, 1988; La Porte, 1991a).

These properties are prompted by some of the characteristics we see in HROs and their supporting networks: the physical, engineering and architectural design requirements of production and distribution; the energy, communication and transport systems that support them; as well as the complex operational, financial and regulatory functions involved in large-scale delivery of benefits. LTS phenomena are not yet well understood, with only limited systematic knowledge about the patterns of evolution or internal dynamics of LTSs and their effects upon different political systems. But what has been developed (see Mayntz and Hughes, 1988; La Porte, 1991b; Summerton, 1994) provides a wider perspective with regard to the operation of HROs that raises other political or social issues, especially when HROs occupy important positions within extensive support and oversight networks.

When technical systems promise substantial benefits, they frequently are developed to large scale. Some produce enormous benefits, for example, air transport or electrical power systems, as they approach mid-stages of deployment and continue to do so as they reach full market maturity. A few develop in the midst of controversy and are still in question as they become mature, for example, the US nuclear industry. Other LTS, for example, the chemical industry, produce substantial benefits in the early and mid-stages of deployment, only to become seen as the source of considerable distress as they grow to very large, mature scale and produce substantial environmental and social disruptions.

What can be said about LTS thus far derives significantly from their properties as *networked* systems, whose benefits depend, in part, on the qualities of dispersed facilities and connectors that are relatively tightly coupled. Their properties intensify over time — as a function

of the scale and complexity of the system.

Networked large technical systems, and HRO as a crucial sub-set, are likely to be (La Porte, 1988):

- Tightly coupled technically, with complex organizational and management 'imperatives' prompted by operating requirements designed into the system, that is, unless operations are carried out in specific ways, there are no benefits and perhaps great harm can be imagined;
- prone to the operational tendencies or logic of network systems, that is, exhibit a drive to achieve maximum coverage of infrastructure and internal activity or traffic within the network (Thompson, 1967);
- non-substitutable services to the public, with few competing networks delivering the same service (the more effective the system, the more likely its monopoly);
- the objects of public anxiety about the possible wide-spread loss of capacity and interrupted service (the more effective it is, the more likely the anxiety); and
- especially for HROs, the source of alarm about the consequences of serious operating failures to users and outsiders, for example, mid-air collisions, nuclear power station disruptions, and subsequent public expressions of fear and demands for assurances of reliable operations.

In most cases then, LTS provide important, sometimes crucial, services or production for major regions or whole societies. Indeed, this characteristic draws aspiring organizational leaders to them, for this surely is the basis for exercising extraordinary institutional and social power. At the same time, many LTS — as they reach maturity — are discovered either to have substantially greater benefits or negative social, economic or environmental surprises than were expected. Societies often respond to unusual benefits with unrestrained enthusiasm and pell-mell, unregulated deployment to full-scale. Negative surprises raise different problems and elicit varied responses.

LTS, and especially their HRO elements, have been subjected to political efforts at standard-setting and regulation. There have been attempts to shape technology to particular political ends, military capabilities and social values; to control or protect domestic markets; and to mitigate consequences of mature systems. When hazards remain high and benefits crucial and citizens feel increasingly vulnerable, LTS, and HROs especially, come to be subject to political as well as economic and market constraints. This suggests that HRO leadership must be cognizant of the challenges of maintaining both economic and political legitimacy, and the need for heightened executive awareness regarding citizens and the political culture of the society.

HROs, networks and the problem of trustworthiness

When considered from the vantage of outsiders (those citizens and watchers noted above who play a vital role in assuring the persistence of high reliability), HROs are at once a source of benefit and worry. As the benefits become crucial and the potential damage from mis-steps becomes grave, the difficulties of maintaining public trust and confidence grow.[8] The degree of difficulty will, in large part, be a function of the following conditions, many associated with HROs (USDOE, 1993; La Porte and Metlay, 1996):

- Operations are beneficial but hazardous in their design, that is, the work is intrinsically dangerous;
- hazards are evident and likely to extend well after benefits have been gained;
- the benefits of the production system have already accrued to past and present generations with high costs still to be borne by future ones;
- overall success or failure of the operations is hard to determine for several work generations;
- there is reasonably rapid change in the technical aspects of the work, the core technologies, or information about the environment where it is deployed; and
- there is hostility to current or future operations based on learning from past corporate or agency practices.

These conditions, along with the ever present competition for resources generally, combine to re-enforce the sense of public dependence on the skills and integrity of managers and operational leaders. This, in effect, intensifies the public's perceived vulnerability and their hope — perhaps against hope — that organization leaders are worthy of the public's trust and confidence.[9] Along with the other demands of assuring HRO operations, this suggests an additional demanding management challenge. It is exacerbated by HROs/LTS network embeddedness, hazardousness and expected duration. If not taken into account in the operation of HROs, they put their sponsors and operators at risk with regard to their political legitimacy.

Responding to the requisites of institutional trustworthiness

When HROs' managers take seriously the obligations of being worthy of the public trust

— and they surely must — attending to both internal operations and external relations levies a demanding burden. It re-enforces the importance of the quality of technical knowledge, operations and management.

A key premise in the development of trust, enhancing internal operations, is that: 'tasks should be carried out in ways that, as the public become aware of internal processes, they discover activities that increases institutional trustworthiness rather than decreases it' (USDOE, 1993: 55).

The higher the potential hazard associated with HRO operations, the more critical is the organization's proper conduct. Put another way, trust is sustained (or in the more demanding case, recovered) when the more one knows about the agency or firm, the more confident one is that hazardous processes are, and will continue to be, done very well. When this is in fact the case, it reverses the effect most observers expect when they become fully familiar with large institutions, that is, 'the more you know, the worse it gets'.

There are six conditions of trustworthy internal operations which can be used to develop specific measures tailored to the context of particular HROs. These conditions are closely parallel to some of the properties already noted regarding HRO performance. The last four of these are relevant when the challenge is to *recover* public trust and confidence. These are (USDOE, 1993: 56):

- High professional and managerial competence and discipline in meeting technically realistic schedules;
- pursuing technical options whose consequences can be most clearly demonstrated to broad segments of the public;
- processes of self-assessment that re-enforce activities permitting the agency to 'get ahead of problems ... before they are discovered by outsiders';
- tough internal processes of reviewing and discovering actual operating activity that includes stakeholders; and
- clear, institutionalized assignment of responsibility for protecting the internal viability of efforts to sustain public trust and confidence throughout the organization.

This suggests that in effecting conditions that nurture public trust and confidence, HROs develop patterns of internal structure and dynamics with an unusual increment of public 'value added'. And, in a sense, they are involved in efforts to avoid the high *transaction costs of suspicion* (La Porte, 1994b). These emphases on public transparency and rigorously applied processes of discovery, evident in the HROs we studied, are different from the familiar skills of technical development, coordination and execution — all carried out far from public view. They are costly in time and other resources, and call for different managerial skills and attitudes of technical professionals *vis-a-vis* the public.

But attending to internal matters alone is not enough. To carry the effort fully through, either rescuing oneself from the edge of the 'slippery slope' of declining trust, or assuring the maintenance the organization's 'trust quotient', requires attending to *external relations* as well. Many of these are familiar, though they often seem an unnecessary and irksome burden to HRO operators. The central premise that informs the development of external trust evoking measures is:

> When agencies (or firms) manage programs that could be seen as levying more potential harm than benefits upon citizens and communities, agency (or industry) leaders must give all groups of citizens and their representatives opportunities for involvement and must demonstrate fairness in negotiating the terms of their immediate relationship' (USDOE, 1993: 50).

Insofar as this is not accomplished, nutrients for suspicion and grounds for distrust remain. To avoid this, HROs and other organizations should meet the following six conditions. Note that only the first one is needed if there has been a history of public trust and confidence in the organization. The other five are necessary for the *recovery* of trust and confidence. They are much more demanding with high transaction costs of reducing/overcoming suspicion. The six conditions are:

- Early and continuous involvement of stakeholders advisory groups, characterized by frequent contact, complete candor and rapid, full response to questions.
- Timely carrying out of agreements unless modified through an open process established in advance.
- Consistent and respectful reaching out to state and community leaders and the general public to inform, consult and collaborate with them about technical and operational aspects of agency (or firm) activities.
- Active, periodic presence of highly-placed leaders, visible and accessible to citizens at important agency field sites.
- Unmistakable agency (or firm) and program presence in the locality that contributes to community affairs and pays through appropriate mechanisms its fair share of the tax burden.
- Assuring the availability of negotiated benefits to the community along with the resources to the affected host communities

that might be needed to detect and respond to unexpected costs.

Concluding comments

One of the curious things about HRO operations in our society is that when either the consensus about their value declines or economic resources in general become more dear, reliability regimes are more difficult to sustain, especially after *conspicuous success* and/or as system *resources become relatively more scarce.* Supporting bodies, such as the corporate headquarters, budget offices and legislatures, usually do not understand the costs of reliability and safety. The better an HRO is in achieving safe, productive performance, the more difficult public resource overseers are to convince that resources applied to reliability enhancing activities should remain stable.

The HROs studied in the Berkeley Project have all operated in a climate of legitimacy, although the nuclear utility's 'margin of trust' was slim (Rees, 1994). Each HRO had also gone to considerable effort to develop the internal properties that nurture an expectation of trustworthiness. But now each faces increasingly stringent financial limitations. It remains to be seen if they will be able to continue the investment in the processes and personnel to avoid increasing their risk of losing political legitimacy. This will depend in part on the effectiveness of external watchers in their role, not only in scrutinizing HRO operations, but in taking up the role of interpreting HRO needs to society's corporate and political leaders.

Notes

1. There is less attention to failures that result merely in loss of profit, disappointment in attaining public objectives or the displacement of highly placed corporate leaders, unless of course bankruptcy follows.
2. The terms 'hazard' and 'risk', often used interchangeably, must be carefully distinguished. Hazard is the intrinsic capacity for harm, risk the probability of its occurrence. HROs (intrinsically high-hazard, managed low risk) must be distinguished from systems with low hazard as well as from those where risk is high.
3. See especially Rochlin (1993) for an extended discussion of the definitional challenges involved in the HRO project.
4. Three of the four research questions that informed our work are discussed here. The fourth, on the effects of new, often computer-based, technologies is discussed in more detail by Demchak (1996) and Rochlin (1996).
5. Caution should be taken in drawing generalized inferences from this discussion. These 'findings' are based mainly on three types of organizations, each with a limited number of cases, with bits from others (Roberts, 1993b). Though they operate in quite different institutional *milieux*, we cannot say they represent a systematic sample. No one now knows what the population of HROs might be.
6. While it is rarely done, it is useful to make a distinction between physical, functional, tight-coupling, that is, the degree to which the system is technically 'hard-wired' and the degree to which its working groups are tightly coupled in coordinative relationships. Both technical and social coupling can be structured in a vertical, hierarchical fashion and/or in horizontal tightly-coupled ways (See Figure 2).
7. The concept of organizational culture is attractive, for it captures the sense that there are norms,

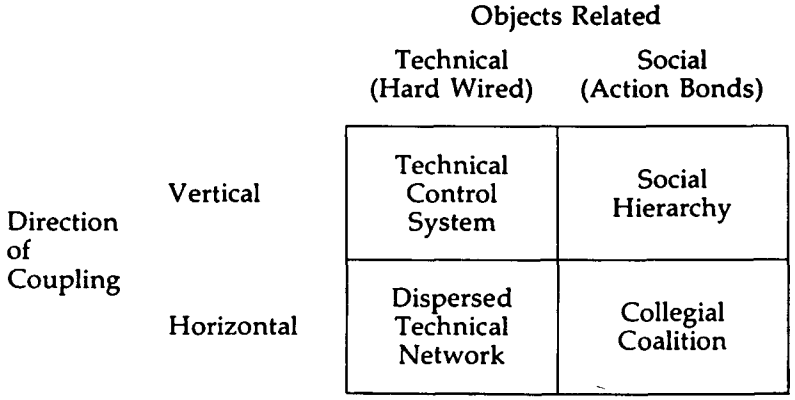

Figure 2: Dimensions of tightly-coupled units

values and 'taken for granted' modes of behaviour and perceptions that shape interpersonal and group relations. At the same time, the concept retains a reasonably high degree of operational ambiguity, its use subject to stiff criticism (Ott, 1989; Roberts, 1993b; Rochlin, 1996).

8. This challenge will differ depending on whether the stage of the organization's development and history presents it with the requirement of achieving the properties resulting in HRO performance for the first time; the happy condition of continuing to warrant substantial public trust in the face of changing conditions; or, in the bedeviling situation in which there is a steep deficit of trust, recovering trust (USDOE, 1993).
9. There have been few attempts systematically to explicate concepts of 'public trust and confidence' (Thomas, 1993). The following definitions are the conceptual touchstones for my treatment (see USDOE, 1993; La Porte, 1994a).
   1. Trust is the belief that those with whom one interacts will take your interests into account, even in situations where you are not in a position to recognize, evaluate and/or thwart a potentially negative course of action by those trusted.
   2. Confidence exits when the party trusted is seen to be able to empathize with (know of) your interests, is competent to act on that knowledge, and will go to considerable lengths to keep her/his word.
   3. Trustworthiness is a combination of trust and confidence. 'Trust and confidence' in this sense, is more akin to professional or 'institutional' trust and confidence.

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