

Conf 920606-74

ORGANIZATIONAL CULTURE DURING THE ACCIDENT RESPONSE PROCESS

BNL-NJREG--47342

D.A. Shurberg and S.B. Haber
Brookhaven National Laboratory
Engineering Technology Division
Upton, New York 11973

DE92 018164

INTRODUCTION

Within our society it has become clear that a number of organizations exist which have the potential to cause catastrophes if failure within them was to occur. Examples of such organizations include chemical plants, airlines, military organizations, and nuclear power plants (NPPs). Within this larger set of organizations exists a group which places the goal of safety above the goal of productivity. These organizations have been termed "high reliability organizations"[1]. A distinguishing characteristic of these organizations is that they often lack the ability to learn from their own mistakes because of the need to avoid failure at all costs. Thus, these organizations focus on high performance reliability as opposed to high outcome reliability.

Not all hazardous organizations are necessarily high reliability organizations. This has been portrayed during accidents such as Chernobyl, Bhopal, Space Shuttle Challenger, and Three Mile Island. The question becomes, what made these organizations different from the countless others which engage in similar operations but have not failed. As part of a larger project looking at the organizational factors which influence the accident response, the authors have focused on the issue of organizational culture as a differentiating variable.

THE ACCIDENT RESPONSE PROCESS

Based upon review and analysis of an extensive volume of Nuclear Regulatory Commission (NRC) documentation, an observable and definable process for responding to reactor accidents and emergencies was identified. This process is depicted in Figure 1 and is described in detail elsewhere [2]. Of main interest here is the fact that this process model is characterized by two primary strategies: an anticipatory strategy and an ad hoc strategy.

During the anticipatory strategy, personnel rely on an elaborate set of procedures which are based on comprehensive analyses and calculations to assist in the accident response. Under such a strategy the use of well written procedures provides a viable strategy for mitigation. However, abnormal situations do have varying degrees of uncertainty and thus the potential for surprises is present. Thus, the ad hoc strategy comes into play. The ad hoc organizational strategy is utilized when problems develop which have not been fully anticipated and it relies on the resilience of the organization and the technology it must manage. While procedures have been written for every foreseeable eventuality of NPP operations, the wisdom of any particular option remains hypothetical until it is actually undertaken. Complex and unanticipated interactions between the various components of a system can occur leading to a previously unforeseen eventuality.

While a NPP may be faced with the necessity to respond to a situation with either one or both of these strategies, the NPP must also be able to successfully transform itself from one strategy to the other. It is not clear that the behaviors and values that would lead to success within one strategy would lead to similar success in the other strategy. It is anticipated that different organizational cultures are needed for success within each strategy as well as successful transformation from one strategy to the next. As an NPP shifts from an anticipatory to an ad hoc strategy, individuals must reconcile those two sets of beliefs and expectations and rectify the discrepancies in emphasized

This work was performed under the auspices of the U.S. Nuclear Regulatory Commission.

MASTER

organizational behaviors which exist. In this paper, the literature and data are used to explore a critical dimension of the accident response process in an NPP: the transition from an anticipatory strategy to an ad hoc strategy. In particular, the effect of organizational culture on the implementation of each of these strategies is examined.

ORGANIZATIONAL CULTURE

Organizational culture has been defined as the beliefs, perceptions, and expectations that individuals have about the organization in which they work and about the consequences that will follow from one course of action or another. Consequently, culture is believed to highly influence behavior within the organization [3]. A large volume of literature exists which hypothesizes a direct relationship between organizational culture and organizational effectiveness [4]. In a 1988 paper by Lengnick-Hall [5] the cultures of efficiency and innovation were investigated. By drawing a parallel between efficiency and the anticipatory strategy and between innovation and the ad hoc strategy, some interesting hypotheses can be formulated as to the types of culture which would facilitate or impede the organization's success in undertaking each of the accident response strategies.

The organizational behaviors found [5] to lead to efficiency include shared values, common experiences, and an organizational, versus job, focus. Thus, homogeneity of perceived expectations delineating a hierarchical chain of command and conventional values is hypothesized to be a more critical cultural element for the anticipatory strategy than for the ad hoc strategy. On the other hand, organizational innovation appears to be best fostered by open lines of communication, organizational commitment, job satisfaction, and heterogeneity of organizational members' skills. Thus, the authors hypothesize that a more team-work oriented cultural style which de-emphasizes hierarchical levels and encourages open and collegial communications, is more effective for an ad hoc strategy.

DATA COLLECTION

To date, the authors have collected data at two NPPs during normal operations and six NPPs engaged in annual Emergency Preparedness Exercise Inspections. Additionally, historical documentation (e.g. Emergency Preparedness Exercise Inspection Reports, NRC Integrated Inspection Team Reports) has been reviewed for relevant insights.

Data collection during normal operations has utilized functional analysis, behavioral observations, and a paper and pencil survey. The behavioral observations involve the use of a predetermined scheme to capture the behaviors in which managers engage during their normal working time. The functional analysis is conducted to understand the roles and responsibilities that various departments and individuals serve within the overall organization as well as the functional relationships between the departments. Techniques such as structured interviews, an examination of documentation, walk-throughs, talk-throughs, and observation of organizational activities are utilized. Finally, a paper and pencil survey package, the Organizational Culture Survey (OCS), has been compiled, utilizing various survey instruments which tap issues believed to be important to high reliability. The OCS includes survey instruments which assess cultural dimensions and issues related to culture such as commitment to the organization, cohesion of working groups, coordination of working units, various aspects of communications, overall job satisfaction, the perceived hazardous nature of work, perception of the importance of safety to success in an organization, and perceptions concerning environment, safety, and health issues.

Data collected during Emergency Preparedness Exercise Inspections has relied upon behavioral observations, both unstructured and using a behavioral checklist developed for use in the observation of managers during normal operations and modified for the purposes of the exercise observations. Using the methodology detailed above for both normal operations and Emergency Preparedness Exercise

Inspections, one is able to compare organizations along similar dimensions. The details of the similarities and differences obtained between the two NPPs studied during normal operations are documented elsewhere [6]. Presented below are the relevant differences obtained on the dimensions of organizational culture hypothesized to be indicative of both the anticipatory and the ad hoc strategies between the various NPPs observed.

RESULTS

Work conducted by others [7] has suggested that the culture of high reliability organizations may best be described as placing emphasis on task-related behaviors. The emphasis on these behaviors is seen by the perceived organizational expectations of perfectionism, competitiveness, power, and opposition. Data collected by the authors seems to confirm that similar patterns also exist in NPPs. This finding confirms perceptions held that the NPPs visited are both "good" performing organizations and therefore can be classified as "high reliability". One important caveat to this observation is that the data was collected during "normal" operations which more closely resembles the anticipatory strategy due to the extensive reliance on procedures. The effect of such a culture on the operations of NPPs during an ad hoc, emergency type of situation is not yet known.

Based on the work cited earlier [5] on the cultures of efficiency and innovation, one would anticipate that the organizational characteristics important to success using an anticipatory strategy would parallel those necessary for efficiency and would include a clear hierarchical chain of command as well as the exhibition of more conventional types of behaviors. At one of the NPPs observed during normal operations, such a pattern was in fact observed. Decision making was pushed up the chain of command, often residing in the higher authority figures and often was undertaken in formal, non-collegial settings.

The second NPP, while exhibiting some of the behaviors hypothesized as important for success under an anticipatory strategy, demonstrated a pattern of results that more highly resembled those characteristics suggested as being important for success in an innovative, or ad hoc, strategy [5]. Open lines of communication, a more decentralized organizational structure with decisions being made across all levels within the organization, a greater emphasis on teamwork, and a higher level of organizational commitment and job satisfaction were more apparent in this plant than in the first.

Observations made during the Emergency Preparedness Exercise Inspections provide further insight on the culture which would best suit success in the ad hoc strategy. In particular, one of the NPPs at which an exercise was attended performed more poorly than the others. The communication lines were not as open at this NPP as that observed at other plants and this led to confusion among the exercise participants and the loss of important information. Additionally, a problem was cited concerning the low heterogeneity of skills within some of the emergency organization units, which resulted in a reduced pool of available resources be used for brainstorming and problem solving. As noted earlier, homogeneity of skills and communication patterns which reflect conventional and hierarchical organizational structures are characteristics of the anticipatory strategy.

CONCLUSIONS

The ability of an organization to effectively move from an anticipatory to an ad hoc strategy may well depend on the organization having the ability to balance these two apparently dichotomous cultural styles. The organization which is most capable of making the necessary transition in an optimal manner may well exhibit some aspects of both cultural styles during normal operations. Data collected at one NPP does exhibit this pattern of results, with the organization exhibiting a clear hierarchical chain of command and perceived conventional behavioral expectations as well as exhibiting a more decentralized and collegial approach to decisionmaking, a team work orientation, and informal communications. Thus,

it is expected that this organization possesses the capabilities to make a successful transition from an anticipatory to an ad hoc strategy. Data collected at a second NPP more strongly exhibits the traditional style suggested as being important during the anticipatory strategy, with more formal communications and bureaucratically controlled decision-making. This organization may experience difficulty if faced with the need to make a transition from an anticipatory to an ad hoc strategy. These conclusions are further validated based on observation of Emergency Preparedness Exercise Inspections, which suggest that the more anticipatory types of behaviors actually inhibit successful performance during an ad hoc response.

The final validation of these hypotheses needs to be demonstrated with cultural data collected during emergency simulations. The mechanism to obtain such data during these types of situations is an area for future research.

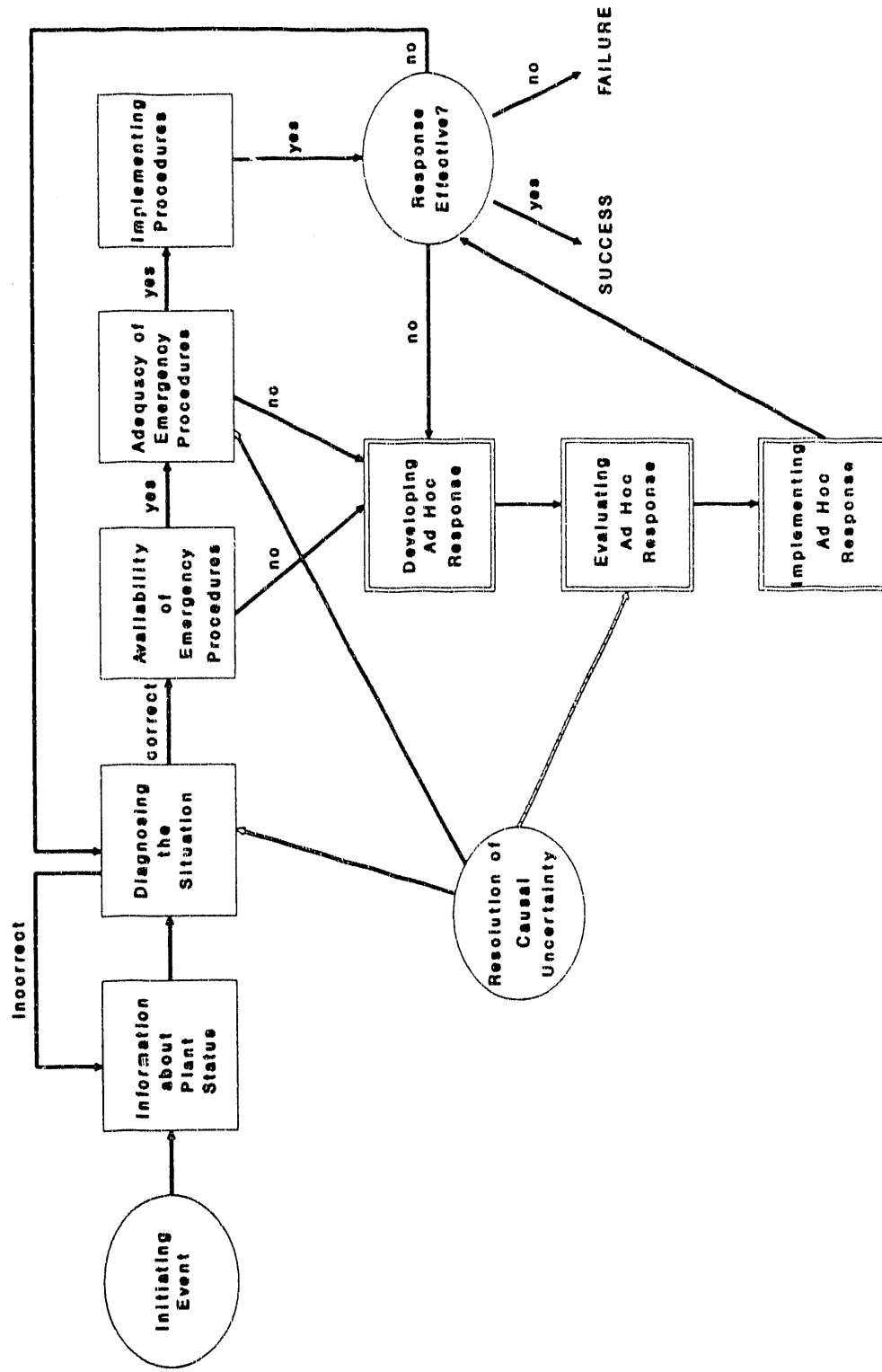
REFERENCES

1. LaPorte, T.R. and Consolini, P.M., "Working in Practice but not in Theory: Theoretical Challenges of 'High Reliability Organizations'," Journal of Public Administration Research and Theory, vol. 1, January, 1991, pp. 19 - 47.
2. Kramer, J.J. and Haber, S.B., "Responding to Emergencies: How Organization and Management Make a Difference", in Proceeding of the NEA/CSINI Special Meeting on Accident Management, September, 1991.
3. Haber, S.B., O'Brien, J.N., Metlay, D.S., and Crouch, D.A., Influence of Organizational Factors on Performance Reliability, (NUREG/CR-5538), December, 1991.
4. Wilkins, A.L. and Ouchi, W.G., "Efficient Cultures: Exploring the Relationship Between Culture and Organizational Performance," Administrative Science Quarterly, vol. 28, 1983, pp. 468-481.
5. Lengnick-Hall, C.A., "Fit and Misfit: How to Achieve Efficiency and Innovation," Organization Development Journal, vol. 6, Summer, 1988, pp. 67-74.
6. Haber, S.B., Shurberg, D.A., Barriere, M.T., and Hall, R.E., "The Nuclear Organization and Management Analysis Concept Methodology: Four Years Later," in Proceedings from the 1992 IEEE 5th Conference on Human Factors and Power Plants, June 8-12, 1992.
7. Rousseau, D.M., "The Price Of Success? Security Oriented Cultures and High Reliability Organizations," Industrial Crisis Quarterly, vol. 3, 1989, pp. 285-302.

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

PROCESS MODEL OF ACCIDENT RESPONSE



it is expected that this organization possesses the capabilities to make a successful transition from an anticipatory to an ad hoc strategy. Data collected at a second NPP more strongly exhibits the traditional style suggested as being important during the anticipatory strategy, with more formal communications and bureaucratically controlled decision-making. This organization may experience difficulty if faced with the need to make a transition from an anticipatory to an ad hoc strategy. These conclusions are further validated based on observation of Emergency Preparedness Exercise Inspections, which suggest that the more anticipatory types of behaviors actually inhibit successful performance during an ad hoc response.

The final validation of these hypotheses needs to be demonstrated with cultural data collected during emergency simulations. The mechanism to obtain such data during these types of situations is an area for future research.

REFERENCES

1. LaPorte, T.R. and Consolini, P.M., "Working in Practice but not in Theory: Theoretical Challenges of 'High Reliability Organizations'," Journal of Public Administration Research and Theory, vol. 1, January, 1991, pp. 19 - 47.
2. Kramer, J.J. and Haber, S.B., "Responding to Emergencies: How Organization and Management Make a Difference", in Proceeding of the NEA/CSINI Special Meeting on Accident Management, September, 1991.
3. Haber, S.B., O'Brien, J.N., Metlay, D.S., and Crouch, D.A., Influence of Organizational Factors on Performance Reliability, (NUREG/CR-5538), December, 1991.
4. Wilkins, A.L. and Ouchi, W.G., "Efficient Cultures: Exploring the Relationship Between Culture and Organizational Performance," Administrative Science Quarterly, vol. 28, 1983, pp. 468-481.
5. Lengnick-Hall, C.A., "Fit and Misfit: How to Achieve Efficiency and Innovation," Organization Development Journal, vol. 6, Summer, 1988, pp. 67-74.
6. Haber, S.B., Shurberg, D.A., Barriere, M.T., and Hall, R.E., "The Nuclear Organization and Management Analysis Concept Methodology: Four Years Later," in Proceedings from the 1992 IEEE 5th Conference on Human Factors and Power Plants, June 8-12, 1992.
7. Rousseau, D.M., "The Price Of Success? Security Oriented Cultures and High Reliability Organizations," Industrial Crisis Quarterly, vol. 3, 1989, pp. 285-302.