ON THE NATURE AND ROLE OF ORGANIZATIONAL DYNAMICS IN ADAPTIVE SAFETY

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1   INTRODUCTION

How can organizations maintain an effective posture of proactivity and adaptability with regard to safety in an increasingly complex, interconnected world in which change occurs at rates ranging from the gradual and quasi-predictable to the sudden and unexpected?   In this paper we will present a general systems theoretic perspective on adaptive sociotechnical system behavior that emphasizes the foundational importance of coordinated, nested communication and feedback loops within organizations, supported by participatory design processes. Adaptability, we argue, can be considered to be an emergent characteristic of systems whose component interrelationships are characterized by clear channels of communication (specifying constraints on adaptive responses to safety risks) and feedback (providing "sharp end" perspectives on risks and requirements for effective response. We will primarily focus on issues related to organizational resilience and safety – i.e., worker safety, process safety and related public safety.

2   SUMMARY OF THE PROPOSAL

Our paper will focus on examining organizational issues involved in proactively promoting adaptive approaches to routine and catastrophic safety risks in a way that does not trivialize the complex nature of either the process or the nature of the risks to be addressed. Much of what has been attempted in the past has, in our opinion, fallen short precisely for this reason. To begin to address this issue, we believe there are two subordinate questions to examine: (1) how do we create and maintain a genuine and durable culture of proactivity with regard to safety, and (2) how can we effectively engage and codify expertise from across the organization (i.e., from the board room all the way to the factory floor) to guide the identification of potential risks and appropriate responses to mitigate these risks.

Addressing Culture – As is well-illustrated in Leveson's STAMP approach (Leveson, 2012), every organizational level within a work-based sociotechnical system (e.g., board room, CEO, senior management, middle management, floor supervisors, front-line workers, etc.) already plays a vital role in either promoting or retarding safety, whether they realize it or not. Each level of the hierarchy already responds directly to the constraints imposed upon it by the level to which it reports. To promote a culture of proactive safety that goes beyond banners and posters, each level must take seriously its role in providing appropriate safety constraints and expectations to the levels below it. Considerations regarding the *nature* and the *level of specificity* of these constraints are vital. Constraints (i.e., guidance, requirements, etc.) must exist, but to promote truly adaptive response they must not "over specify" or overly constrain the repertoire of adaptive behaviors afforded to individuals at the sharp end of the response. For example, over-reliance on "checklist approaches" to countering safety risk may inhibit the natural and more effective, adaptive responses of expert operators/workers and prove to be of little or no worth (or worse) in unusual or unanticipated situations.

However, the provision of effective constraints is only half of the equation. Constraints need to be continually re-examined and updated (or not) on the basis of reliable and accurate information or feedback from lower levels of the hierarchy up through the higher levels. Without this vital flow of information, constraints will become increasingly arbitrary and divorced from reality (e.g., Flach et al, in press). Anything that stifles or discourages this information flow reduces the capacity to adaptively response to safety risk.

Engage and Codify Expertise – A key element of information flow involves consistent, frequent, open and honest discussion about safety issues across all levels of the organizational hierarchy. These discussions should give priority to the authority of expertise (e.g., direct experience), rather than the authority of power (e.g., formal rank). Since the work environment and, therefore, safety are dynamic and complex, these discussions must occur frequently and must result in the formulation of updated safety constraints and

feedback/communication approaches when appropriate.

The above represents a broad overview of two aspects of organizational dynamics that, in our opinion, directly impact the ability to adaptively respond to routine and non-routine safety risks. In our paper and presentation will we elaborate on principles of general systems theory and sociotechnical systems theory that support these assertions, as well as providing examples from the literature on and our experiences with accidents and mishaps – and successful adaptations to similar situations – as additional support.

3   RELEVANCE FOR SYMPOSIUM

Our paper and presentation will focus on the application of two broad theoretical perspectives of direct relevance to resilience engineering – general systems theory and sociotechnical systems theory – to issues of organizational dynamics that underlie the emergence of proactive adaptability to safety risk as a core organizational trait. Furthermore, our review of select case histories will help to render our theoretical treatment of the topic in more concrete terms that, we hope, will resonate with the experiences of other Symposium participants and lead to productive discussion.

4   SIGNIFICANCE/TAKEAWAY:

The proposal advances the ability to create and sustain resilience by focusing on core principles of organizational dynamics that can either promote or retard adaptive approaches to safety risk in routine, but especially non-routine situations. Our experiences as researchers and field practitioners have provided us with a perspective on key aspects of organizational structure and function that we believe will provide useful insights to Symposium participants.

5   REFERENCES

Flach, J.M., Carroll, J.S., Dainoff, M.J. and Hamilton, W.I. In press. Striving for safety:

Communicating and deciding in sociotechnical systems, *Ergonomics.*

Leveson, N., 2012. Engineering a safer world. Cambridge, MA: MIT Press.