Informal leadership redundancy: Balancing structure and flexibility in subsea operations☆

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Summary   This article identifies how a reliability-seeking organization can respond flexibly to disruptive events. We study complex subsea operations that inspect, maintain and repair oil and gas installations on the Norwegian continental shelf. A superordinate leader is put in charge of a tightly coupled 'multiteam system' in the crucial execution phase of the operation, and his primary leadership function is task coordination. When unexpected disruptive events occur, which the formal leader cannot address, other individuals contain the event by performing leadership functions in his place, without explicit delegation. We call this mechanism *informal leadership redundancy*. We provide verification of it through an extended case study, making use of both field observations and interviews. We explore the conditions under which this form of redundancy can be effective.

Introduction

In complex organizations engaged in high-risk work, where operations are tightly coupled, there is little margin for error. The impact of external challenges and internal difficulties can set in motion consequences that are hard to predict and difficult to control. For those reasons, accidents and failure in complex organizations are in one sense 'normal' (Perrow, 1999a). There are, however exceptions, and studies of high reliability organizations (HROs[1]), such as aircraft carriers, nuclear power plants, power grids and air traffic control towers have sought to understand how some organizations avoid the failure rates that one might expect (Bigley & Roberts, 2001; Bourrier, 1996; Klein, Ziegert, Knight, & Xiao, 2006; Roberts, 1990; Weick & Roberts, 1993).

Two decades of research have found that such organizations, to be successful, must be both structured and flexible

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[1] A difficulty with the term HRO is that it is held up as an ideal and also serves as a descriptive term for organizations that operate successfully and safely with high-hazard technologies. Vogus and Welbourne (2003) have made a distinction between HROs that operate in dangerous environments and high-reliability seeking organizations where the risk concerns competition and innovation, and not physical danger. In this article, we use the term HRO more loosely, to describe organizations of both types.

(Faraj & Xiao, 2006; Weick, Sutcliffe, & Obstfeld, 1999). As Faraj and Xiao state, "(. . .) on the one hand, there is a need for tight structuring, formal coordination, and hierarchical decision making to ensure a clear division of responsibilities, prompt decision processes, and timely action; but, on the other hand, because of the need for rapid action and the uncertain environment, there is a competing need to rely on flexible structures, on-the-spot decision making, and informal coordination modes. Thus, such organizations paradoxically emphasize both formal and improvised coordination mechanisms" (Faraj & Xiao, 2006, p. 1157). While the concept of balancing structure and flexibility is broadly accepted as a key success factor in reliability-seeking organizations, research continues to examine how this balance operates in practice; for example, *who* makes decisions when unexpected and disruptive events occur, *how* authority migrates in a hierarchical system, and to what degree actions are taken *outside or within* existing procedures (Barton & Sutcliffe, 2009).

The present research is a case study of complex subsea operations that inspect, maintain and repair oil and gas installations on the Norwegian continental shelf. The work is complex, high-risk, strongly regulated and dictated by procedures. Previous research has shown that standardized rules and explicit procedures can enable people to coordinate their actions, detect and correct errors, and resolve conflicts (Hale & Borys, 2013; Pelegrin, 2013). Schulman (1993), in his study of a nuclear power plant, noted the 'zealotry' and competitive spirit with which employees at all levels engaged in drafting new procedures. However, while detailed rules and processes reduce uncertainty, they assume a level of predictability (Weick & Sutcliffe, 2007). Knowing the specific steps to take in a situation is only useful as long as the situation conforms to expectations based on past experience; but, in dynamic environments predictability can be elusive. An important question is how organizations that rely on procedural discipline can maintain flexibility when unexpected events occur. Previous research has described a variety of factors that enable HROs to anticipate and contain the unknown (Bigley & Roberts, 2001; Bourrier, 1996; Klein et al., 2006; Roberts, 1990; Weick & Roberts, 1993; Weick & Sutcliffe, 2007), one of which is to take advantage of redundancies or slack[2] (La Porte, 1996; Roberts, 1990; Weick & Roberts, 1993).

In this research we focus on one particular way of creating organizational slack through leadership redundancy. By leadership redundancy we mean individuals (other than the person normally in charge) who take the lead in coordination, decision making, problem solving, coaching, and other leadership functions, "the things that need to be done for the team to meet its needs and function effectively" (Morgeson, DeRue, & Karam, 2010, p. 9). Leadership redundancy can be a formal arrangement, such as when a co-pilot steps in for the pilot. In our research, however, we found situations where individuals, without explicit delegation, and on their own initiative, take care of leadership functions (Morgeson et al., 2010) *outside* their formal role. We show that slack informal leadership resources are utilized to contain disruptive events, which we refer to as *informal leadership redundancy*.

Subsea operations are conducted by multiteam systems (Johannessen, McArthur, Jonassen, & Leirbaek, 2013) — a complex organizational structure. Mathieu, Marks and Zaccaro (2001) define a multiteam system as a group of component teams, which work toward a common, overarching goal. Multiteam systems are increasingly being used in dynamic environments. However, multiteam systems face many challenges due to their complexity, particularly regarding leadership (Mathieu et al., 2001). Multiteam systems are, by design, collective leadership structures. How the team leaders in a multiteam system coordinate activities has been identified as a key leadership challenge (Mathieu et al., 2001). We need to understand how this coordination is structured and executed. Johannessen et al. (2012) found that, in subsea operations, a superordinate leader, the shift supervisor, is dedicated primarily to coordinating the execution of detailed Task Plans — a highly demanding role that requires focused attention. He is legally and practically confined to his control room for the execution phase of the operation. When disruptive events occur that the shift supervisor cannot attend to, other individuals step in to help. The ability of these individuals to act when needed constitutes a potential resource for the multiteam system — a kind of leadership redundancy. While this form of redundancy may enable the system to respond flexibly to changing demands, it may create unintended consequences by adding complexity and the potential for conflict.

Our study aims to shed light on two questions:

1. Can informal leadership redundancy be verified as one of several ways that the multiteam systems in our context handle unanticipated disturbances?
2. If verified, what can we learn about the conditions under which it may be effective?

Our research confirms the first question. To our knowledge, this has not been documented by previous research on multiteam systems. In addition, informal leadership redundancy adds to related types of distributed leadership in extant research on HROs (e.g. 'deference to expertise'). Finally, our research design also addresses a call for studying 'micro-level interactions' (Barton & Sutcliffe, 2009) in the context of high-risk operations (Hannah, Uhl-Bien, Avolio, & Cavarretta, 2009), to better understand how high-reliability organizations respond flexibly to disruptive events in daily practice. Since such events come at unpredictable intervals, they can be difficult to study. We use a two-tier model which includes field observations of a few such events that we then test with a larger number of informants. This methodology allows us to verify the existence of informal leadership redundancy, and assert that what we observed in the field actually constitutes a pattern. Finally, the interviews also allow us to explore the conditions that enable this kind of redundancy to be effective in a highly proceduralized environment. We begin our discussion by briefly reviewing the research on slack and redundancy in HROs.

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[2] The terms are often used interchangeably in the literature. Both are talked about as surplus resources, while redundancy sometimes is also used to describe *a particular arrangement* to make use of such resources.